WORLD HYDROGEN 2025

SUMMIT & EXHIBITION

2025 EXECUTIVE SUMMARY

THE LEADING GLOBAL PLATFORM WHERE HYDROGEN BUSINESS GETS DONE

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SUMMIT DAY ONE

SUMMIT WELCOME ADDRESSES

Carola Schouten
Mayor, City of Rotterdam

Boudewijn Siemons
CEO, Port of Rotterdam

The opening addresses for the World Hydrogen Summit 2025 were delivered by the Mayor of Rotterdam, Carola Schouten, and CEO for the Port of Rotterdam, Boudewijn Siemons.

Mayor Schouten emphasized the urgency and opportunity of the energy transition, stressing the importance of hydrogen as an economic engine and job creator. Schouten outlined that the hydrogen economy is at a central turning point, and that decisions made now will shape tomorrow's world. Rotterdam is investing in infrastructure, including electrolyzers, imports, terminals, and pipelines, to build a new sustainable economy, she said.

The mayor called for global cooperation and clear frameworks to scale up hydrogen projects and make them economically viable.

Boudewijn Siemons drew attention to the fact that hydrogen has been a key focus of the Port of Rotterdam for 10 years. He highlighted that over such a time period, the port has seen the bunkering of ammonia and methanol; that the carbon capture and storage project off of the port's coast, Porthos, is now visible from the shoreline on clear days; and, somewhat less visible, was the fact that hydrogen pipelines were now beneath the ground at the port, nearing the point where they will move hydrogen molecules from producer to buyer.

From 2026, following the development of the Porthos project, the port will see grey hydrogen turn blue, Siemons said, as current hydrogen producers can capture their carbon emissions and store them safely in the Dutch North Sea.

Siemons noted that despite the positive developments at the port, there remained uncertainty across global energy markets. However, he used this point of uncertainty to encourage greater focus on new markets and the development of hydrogen.
Hydrogen offers a means of providing clean, affordable energy that will make industry more sustainable, something Siemons highlighted was key amid current global energy market patterns of supply-chain dynamics.

Siemons noted that Europe is less advanced than the REPowerEU package, published in 2022, would have anticipated at this point in time, but it is still further ahead than first indications suggested in 2019.

SUMMIT WELCOME ADDRESSES

Nonetheless, Europe will need imports of clean energy such as hydrogen.
And the port can offer this, Siemons said, due to partnerships with countries such as Brazil, Spain, Oman, Morocco and Namibia, as well as local ports in Europe such as Duisburg and Antwerp.

Siemons then concluded with emphasis on the fact that the hydrogen market cannot wait for the risks of investment to disappear, implying that learnings can be achieved that support the hydrogen market's evolution if action is taken to invest and deploy capacity.

KEYNOTE ADDRESSES

H.E. Santosh Kumar Sarangi
Secretary, Ministry of New & Renewable Energy, Government of India

Ivo Bols
President for Europe & Africa, Air Products

Alexander Tancock
CEO & Chairman of the Board, InterContinental Energy

During his keynote address, Secretary Sarangi emphasized the urgency of climate action in light of 2024 being the hottest year on record. He highlighted green hydrogen as a critical solution for decarbonizing hard-to-abate sectors like transport, steel, cement, aviation, and shipping. India, leveraging its substantial renewable energy base – 230GW of installed capacity – is positioning itself as a global leader in green hydrogen. The National Green Hydrogen Mission, launched in 2023 with a $2.4 billion allocation, aims to produce 5 million metric tons of green hydrogen annually by 2030, reduce 50 million metric tons of CO2 emissions, attract $100 billion in investments, and create 600,000 jobs.

Secretary Sarangi went on to note that India has made significant strides by May 2025, allocating 860,000 tons per annum of green hydrogen production capacity to 19 companies and awarding 3GW of electrolyzer manufacturing capacity to 15 firms. The country has initiated projects across various sectors and introduced a green hydrogen certification system to align with global standards. The government has adopted a whole-of-government approach, offering regulatory exemptions and identifying key ports as hydrogen hubs. Fifteen Indian states have also introduced supportive policies, reinforcing India's commitment to becoming a global green hydrogen hub.

Despite this progress, Sarangi acknowledged challenges such as high production costs, lack of standardized frameworks, and infrastructure limitations. He called for global collaboration to overcome these barriers and invited summit participants to engage with over 40 Indian industry representatives at the India Pavilion. Looking ahead, India aims not only to meet domestic demand but also to become a major green hydrogen exporter by 2030. The country is actively seeking international partnerships, including with the European Investment Bank and organizations like H2Global, to build trade corridors and harmonize certification standards, reinforcing its belief in cooperation over competition for a sustainable energy future.

President for Europe & Africa at Air Products, Ivo Bols, made a very clear message for his keynote address, namely that hydrogen is a necessity. His address presented several routes to the evolution of the hydrogen economy as a whole, focusing on the fact that a hydrogen molecule's colour doesn't change its use cases, but higher demand and scale would make a large impact on lowering costs.

Bols, echoing the message of the opening addresses, focused his early address on the fact that if humanity does not correct its current path, then it could soon see radical impacts of climate change.

Bols also stressed the need to speed up green hydrogen and that in the long term, green is the goal, but for the near term, blue could be used to build momentum.

He highlighted the benefit of the Porthos project in Rotterdam, and outlined that there is a need to increase the scale of hydrogen growth, such as places with good renewable energy. Bols pointed to an example of such a place was the Neom project in Saudi Arabia, which is currently 80% complete, with expected production of 1.3 million tonnes of renewable ammonia prodution per year, or roughly 600 tonnes/day of renewable hydrogen from 2027.

Alongside such large international imports of renewable hydrogen, Bols said in parallel there could be blue hydrogen production at Rotterdam.

Bols concluded with several key actions to support the evolution of the hydrogen market. The first was the development of hydrogen demand, such as via government-driven incentive frameworks.

The second was regulatory certainty, which Bols discussed from the perspective of maintenance of current standards and rules for producing renewable hydrogen, which ultimately create a clear investment framework. However, Bols explained that if such rules were loosened it could welcome greenwashing and would be a step backwards.

Thirdly, Bols highlighted that green hydrogen can be cost competitive, but support for it is needed now.

Finally, Bols expressed positivity around the recent International Maritime Organization's (IMO's) as an example of international collaboration, a key fourth action for seeing hydrogen grow.

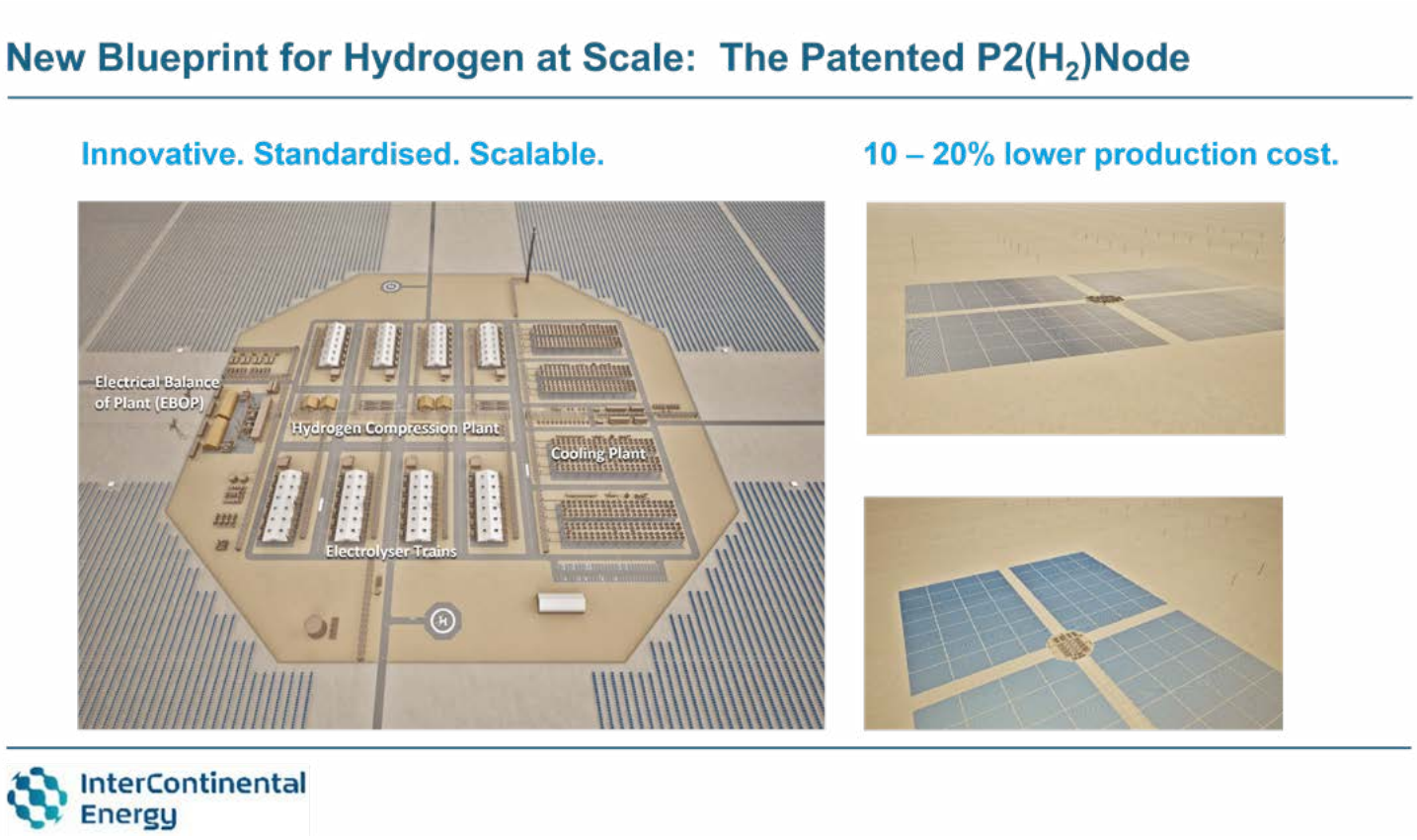
Alexander Tancock, CEO of InterContinental Energy, opened by reflection on the fact that hydrogen as an industrial gas is not new, but established and old. Instead, he clarified that his take on hydrogen was that as an energy transition mechanism, it was new and required different thinking.

Further to this, Tancock expanded on the evolution of wider energy markets, such as LNG, for which the first cargo sailed in 1996 and now, in 2025 occupies a 5% share in global energy. Comparatively, Nuclear, developed at a similar time, also has around a 5% share in global energy. Wind and solar, broadly established in the 1980s, now has a 3% penetration in global energy, Tancock noted.

He explained that all of the markets he discussed had a 0.07% growth per annum to reach where they are today in terms of global energy shares, highlight that this could support relative patience with hydrogen-market growth. Further, if the hydrogen market for the energy transition were to kick start today, it would be a strong success if it reached 2% of global energy supply by 2050 based on his LNG, nuclear and solar/wind growth reflections.

Tancock stressed that scale is key to seeing hydrogen reach such high shares by 2050, and he drew attention to InterContinental Energy's global portfolio as an example of this, which is developing 1.6mtpa in Oman, and over two separate projects 6.5mtpa in Australia. The projects seek to be large instead of local, Tancock said, and that they harnessed collaboration from across the value chain.

InterContinental Energy's project development aims to eliminate waste as much as possible and reducing capex by keeping power and electrolyzers close together. Tancock also highlighted that InterContinental Energy's new node technology, a key component of its project delivery, would result in 10-20% lower production costs for hydrogen.



FIRESIDE CHAT:
THE ROLE OF GREEN HYDROGEN IN REVITALIZING EUROPEANCOMPETITIVENESS AND ADVANCING DECARBONIZATION

Dr. Gokce Mete (Moderator)
Senior Partnership Manager, Vattenfall
Co-Founder & Board Member, Women in Green Hydrogen

Mohammad Abdelqader El Ramahi
Chief Green Hydrogen Officer, Masdar

Carlos Barrasa
EVP Commercial & Clean Energies, Moeve

The panel opened with Dr. Gokce Mete introducing the session's focus on the current state of hydrogen, the role of partnerships, and the broader economic and social implications of the hydrogen economy.

Carlos Barrasa provided a detailed update on Moeve's flagship Andalusian Green Hydrogen Valley project, emphasizing that the company is close to reaching a Final Investment Decision (FID). The project, located in southern Spain near the Bay of Algeciras, aims to develop 2GW of green hydrogen capacity by 2030, with the first phase involving a 400MW electrolyzer. Carlos highlighted that the project has already secured a significant milestone: a €304 million subsidy from the European Union – currently the largest hydrogen-related award in Europe, he said.

Despite this progress, Carlos noted that one critical hurdle remains before the FID can be finalized: securing a confirmed connection to the national electricity grid. The availability of sufficient grid capacity is essential to power the electrolyzer and ensure the project's viability. He expressed optimism that this issue would be resolved in the coming months, allowing the FID to be taken within the year. Once that happens, construction can begin, and the project will likely become one of the largest operational green hydrogen facilities in Europe.

Carlos also emphasized the strategic advantages of the project's location. Situated near major industrial demand centers and ports, the site is well-positioned for both domestic use and export – particularly via maritime corridors for green ammonia. He stressed that Spain's abundant and competitively priced renewable energy resources, including solar and wind, make it one of the most cost-effective locations for green hydrogen production in Europe. The project's timeline and structure reflect a broader shift in the industry from conceptual planning to real-world execution, with Moeve aiming to be at the forefront of this transition.

Mohammad Abdelqader El Ramahi, Chief Green Hydrogen Officer at Masdar, offered a comprehensive view of Abu Dhabi's strategic approach to green hydrogen, emphasizing its deep-rooted philosophy of long-term, win-win partnerships. He explained that Masdar's green hydrogen strategy is not a standalone initiative but part of a broader national vision to lead in the global energy transition. Masdar, backed by major shareholders including ADNOC and Mubadala, is already a global renewable energy powerhouse with a 51GW portfolio across more than 40 countries. In green hydrogen, the company aims to capture at least 5% of global demand.

Masdar's partnerships are built on decades of collaboration with global energy majors like Shell, BP, and OMV. These relationships are now being leveraged to transition from fossil fuels to low-carbon hydrogen. He stressed that green hydrogen is not just a molecule, it's an industry. Masdar is actively creating demand by embedding green hydrogen into Abu Dhabi's core export commodities, such as green steel and green aluminum. Masdar has already commissioned a small-scale green steel plant in partnership with Emirates Steel, which has been operational since October and is producing direct reduced iron (DRI) using green hydrogen.

In addition to industrial applications, Mohammad emphasized the UAE's strategic position as a global aviation and maritime hub, making it a natural leader in the development of sustainable aviation fuel (SAF). He pointed to the EU's SAF blending mandates – such as the 1.2% requirement by 2030 – as a key driver of demand, turning hydrogen from a decarbonization tool into a commercially viable business. He argued that hydrogen's role in hard-to-abate sectors like aviation is not just necessary but inevitable, and that Masdar is positioning itself to be a major player in this space.

Mohammad also articulated three core drivers behind Abu Dhabi's hydrogen strategy. First, the cultural and institutional commitment to long-term partnerships. Second, the UAE's historical leadership in energy innovation – from oil and LNG to renewables and nuclear – now entering what he called the "fifth wave" with clean hydrogen. And third, the pursuit of a knowledge-based economy. He stressed that green hydrogen is not just about climate – it's about macroeconomic transformation. Citing World Bank projections, he noted that even the most conservative scenarios forecast over $11 trillion in investment and up to 1 million jobs by 2030, with hundreds of billions in GDP contribution.

He concluded by drawing a parallel to the early days of renewable energy. Masdar's first solar plant in Abu Dhabi, developed with a Spanish partner, had a tariff of 44 cents per kilowatt-hour. Just 15 years later, the Al Dhafra solar project achieved a record-low tariff of 1.28 cents. This dramatic cost reduction, he argued, is exactly what can happen in green hydrogen with the right early-stage support. He praised the EU and Spanish government for their leadership in providing incentives and subsidies, noting that these are temporary measures to jump-start the sector. Once scalability, bankability, and commercial viability are achieved, the market will sustain itself.

FIRESIDE CHAT:
STATE OF INDUSTRY

Ivana Jemelkova (Moderator
CEO, Hydrogen Council

Pierre-Etienne Franc
CEO, Hy24

The fireside chat between Ivana Jemelkova, CEO of the Hydrogen Council, and Pierre-Etienne Franc, a seasoned hydrogen investor and entrepreneur, was framed as a bold and candid conversation about the state of the hydrogen industry. Ivana opened by acknowledging the mixed media narratives around hydrogen, ranging from hype to claims of failure, and invited Pierre-Etienne to offer a grounded perspective. He responded by identifying three common criticisms of hydrogen: timing, cost, and scale. While these concerns are valid, he argued they are often misunderstood or oversimplified. The facts, he said, show a sector that is progressing steadily, even if not at the pace some had hoped.

On the issue of timing, Pierre-Etienne emphasized that energy transitions take decades, not years. He compared hydrogen's trajectory to that of nuclear and solar energy, both of which took over 50 years to reach modest global energy shares. Hydrogen, by contrast, has moved from kilowatt-scale pilots to hundreds of megawatts in just a few years. There are now over 250 projects in Europe, more than 100 in China, and the average project size is rapidly increasing. Ivana added that most national hydrogen strategies were only introduced around 2020, and governments are still in the early stages of implementation. The disappointment, she argued, stems from unrealistic expectations rather than actual underperformance.

When discussing cost, Pierre-Etienne reframed the issue as a global race rather than a simple price challenge. He pointed to China's rapid progress in scaling hydrogen infrastructure, including 25,000 hydrogen vehicles, 540 refueling stations, and over 50% of global electrolyzer manufacturing capacity. China, he said, is leading the race through coordinated policy, industrial scale, and speed. Meanwhile, Europe is bogged down by regulatory delays and fragmented implementation, and the US has stumbled in executing its Inflation Reduction Act (IRA), with political uncertainty now threatening its hydrogen tax credit program. These inconsistencies, he warned, are undermining investor confidence and jeopardizing industrial competitiveness.

The conversation then turned to regulation. Ivana challenged the notion that the hydrogen sector "has it all" in terms of policy support. Pierre-Etienne countered that while policies exist on paper, they are often not implemented or are subject to constant revision. For example, the EU's delegated acts on renewable hydrogen took years to finalize and have not been implemented at scale across member states. Meanwhile, other countries are negotiating down targets and delaying subsidies. In the US, the hydrogen tax credit (45V) has been mired in political debate, despite representing just 0.3% of the federal reconciliation budget. In contrast, China offers a stable, coordinated policy environment that is enabling rapid industrial growth.

Pierre-Etienne issued a clear call to action: the technology is ready, the projects are scaling, and the industry is poised for takeoff, but only if policymakers stop shifting the goalposts. He urged governments to provide stable, long-term regulatory frameworks to unlock investment and secure industrial competitiveness. He cited examples of large-scale projects already underway, such as the H2 Green Steel (now known as "Stegra") initiative in Sweden and hydrogen mobility projects in Paris, as proof that scale is achievable.

In her closing remarks, Ivana reminded the audience of the progress already made: a sevenfold increase in committed capital and a fourfold growth in projects past final investment decision (FID). The key question now is whether the industry will continue on this trajectory with focus and determination or falter due to indecision and policy instability. Building the hydrogen economy, she concluded, will require rolling up sleeves and doing the hard work, together.

MINISTERIAL PANEL:
GLOBAL POLICIES DRIVING SUPPLY & DEMAND FOR MARKET ACTIVATION

Moderated by Alicia Eastman, the first ministerial panel of the event offered a compelling look at how countries with diverse geographies, economies, and energy profiles are converging around a shared ambition to accelerate the hydrogen transition through strategic policy, infrastructure, and international cooperation.

The conversation opened with Namibia's James Mnyupe, who emphasized the importance of strategic partnerships for smaller economies with vast renewable potential but limited domestic demand. Namibia's green industrialization strategy is built around exporting renewable molecules and integrating into global value chains. Mnyupe highlighted how Namibia is closely tracking international policy developments, such as Japan and South Korea's hydrogen auctions, the EU's Hydrogen Bank, and carbon leakage mechanisms like CBAM, to inform its own approach. He also pointed to green shipping fuels as a promising area, noting that Namibia could become a bunkering hub, attracting maritime traffic rather than exporting fuels alone.

South Africa's Deputy Minister of Electricity and Energy, Samantha Graham-Mare, echoed the importance of collaboration, noting that hydrogen is no longer a theoretical concept but a rapidly emerging industry. South Africa has developed a suite of policies including the Hydrogen Society Roadmap, the Green Hydrogen Commercialization Strategy, and the Critical Minerals Strategy, all aimed at leveraging the country's natural resources and industrial base. However, Graham-Mare also raised concerns about regulatory bottlenecks, particularly the challenge of transitioning legacy grey hydrogen infrastructure, to green hydrogen under rigid EU frameworks. She called for more flexible, transitional pathways that reflect the realities of developing economies. Despite logistical challenges in exporting hydrogen, South Africa is investing in domestic offtake opportunities, including green steel and sustainable aviation fuel, with the hydrogen hubs already in development.

Alice Eastman (Moderator)
Managing Director, APC Investors, Co-Founder & Board Director, Intercontinental Energy

H.E. Mohsin Al Hadhrami
Undersecretary of Energy & Minerals, Sultanate of Oman

Dr. Zeid Al Ghareeb
Debuty Minister of Localization at the Ministry of Energy, Kingdom of Saudi Arabia

Federico Rehermann
National Coordinator, Green Hydrogen Program, Government of Uruguay

James Mnyupe
Head of Programme, Namibia Green Hydrogen Programme (NGH2P)

H.E. Samantha Graham-Mare
Debuty Minister of Electricity and Energy, Government of South Africa

Saudi Arabia's Dr. Zeid Al Ghareeb offered a different perspective, emphasizing the Kingdom's focus on "speed and clarity" rather than financial incentives. By appointing national champions, such as Saudi Aramco for blue hydrogen and ACWA Power for green, the government has streamlined development and ensured alignment with national goals. A key initiative is the National Geographic Survey Program, which provides bankable data on solar and wind potential to guide private sector investment. Al Ghareeb stressed that regulatory stability is essential to give investors the confidence to commit capital to long-term hydrogen projects.

Uruguay's Federico Rehermann provided a historical lens, describing how a cross-party energy policy launched in 2008 enabled the country to achieve over 99% renewable electricity generation. Building on this foundation, Uruguay is now advancing green hydrogen and its derivatives, supported by international partnerships and a strong institutional framework. Rehermann highlighted Uruguay's competitive advantages, including complementary solar and wind resources, biogenic CO_2 for methanol production, and a strategic port location. He also emphasized the country's political stability and skilled workforce as key enablers of investment.

Oman's Undersecretary Mohsin Al Hadhrami underscored the importance of ecosystem thinking and global collaboration. Oman's hydrogen strategy is deeply integrated with international partners, from launching its first hydrogen fueling station to signing agreements with Japan, Germany, and the EU. Al Hadhrami described Oman's policy development as co-creative, involving close consultation with industry to ensure sector-specific energy transition policies are practical and aligned. Oman is also investing heavily in readiness, streamlining permitting, enhancing logistics, and building workforce capacity through its Net Zero Center. He stressed that no country can succeed in isolation, and that alignment across borders, especially in standards and certification, is critical to building a functioning global hydrogen market.

The session concluded with a shared recognition that while each country faces unique challenges, the path forward lies in cooperation, knowledge exchange, and policy alignment. As Eastman noted, the global hydrogen economy will only succeed if nations work together – not just to share best practices, but to build the infrastructure, standards, and trust needed to scale the industry sustainably and inclusively.

SPOTLIGHT:
HYDROGEN'S PATH TO REALITY: SCALING WITH DISCIPLINE, POLICY, & PARTNERSHIP

Andrew Beard
President of Hydrogen, Shell

Andrew Beard emphasized Shell's leadership in low-carbon hydrogen, highlighting that the company is not just theorizing but actively building real-world projects. He pointed to Shell's operational and under-construction assets as proof that the hydrogen industry is progressing beyond concepts. Projects like Holland Hydrogen 1, a 200MW electrolyzer near Rotterdam, and Refhyne 2 in Germany demonstrate how Shell is integrating offshore wind with downstream energy operations to create viable, scalable hydrogen ecosystems.

Beard stressed that hydrogen's role in the energy transition is vital but complex, requiring a bridge between ambition and affordability. He warned against the risk of hydrogen getting stuck in the "missing middle" and called for continued collaboration across industry, government, and academia. Shell's work with over 150 partners on Holland Hydrogen 1 exemplifies the scale and cooperation needed to bring such projects to life. He also highlighted Shell's efforts to move beyond captive markets and toward an internationally traded hydrogen economy, citing a recent US-based project on liquid hydrogen storage as a step toward reducing storage costs and enabling global trade.

In addition to infrastructure and technology, Beard underscored the importance of setting clear and stable policy frameworks. He praised recent European Commission efforts to create lead markets and provide demand certainty, which are essential for closing the affordability gap and accelerating project development. He also welcomed pragmatic regulatory approaches, such as those seen in the Netherlands' Spring Climate Memorandum, which recognizes the value of low-carbon hydrogen in refinery processes and supports increased demand through soft targets.

Beard concluded by saying that it is important to get the right conditions for hydrogen to thrive through focused collaboration, patient investment, and adaptable regulation. With the right support, he expressed confidence that a future with abundant, affordable low-carbon hydrogen is within reach.

SESSION 1:
PIONEERING HYDROGEN PROJECTS: TACKLING INDUSTRY CHALLENGES THROUGH PARTNERSHIPS

Moderated by Tim Hard of Argus, the session featured representatives from Iberdrola, Linde, Uniper, Moeve (formerly Cepsa), and Vattenfall. The discussion opened with a consensus that regulatory uncertainty and fragmented policy frameworks across regions, particularly in the EU, are major barriers to investment. Jorge Palomar Herrero and David Burns emphasized the need for harmonized, long-term regulations and clearer definitions of clean hydrogen to support cross-border projects and ensure investor confidence.

The panel also highlighted the persistent gap between supply and demand. Jan Taschenberger noted that while early projects have driven down costs through learning and innovation, many developers are now stuck due to a lack of committed offtakers. Without long-term contracts, final investment decisions (FIDs) are stalling. This "valley of disillusionment" threatens to derail momentum unless targeted support mechanisms are introduced. The speakers stressed that demand-side incentives and revenue stabilization tools are essential to bridge this gap and unlock further investment.

Infrastructure misalignment emerged as another critical challenge. Dr. Gokce Mete pointed out that in regions like Denmark, where renewable energy is abundant and cheap, the absence of hydrogen pipelines and grid transparency leaves projects stranded. Joaquin Rodriguez echoed this, describing the complexity of coordinating entire value chains, from renewable generation to SAF delivery at airports. He advocated for fewer, larger, and better-planned projects with strong public-private coordination, rather than a fragmented approach of small, speculative initiatives.

Tim Hard (Moderator)
SVP Energy Transition,
Argus

Dr. Gokce Mete
Senior Partnership Manager,
Vattenfall
Co-Founder & Board Member,
Women in Green Hydrogen

Dr. David Burns
Vice President Clean Energy,
Linde

Jorge Palomar Herrero
Global Hydrogen
Development Director,
Iberdrola

Jan Taschenberger
COO New Green Power
& Gas,
Uniper

Joaquin Rodriguez
Director of Hydrogen
& Clean Energies,
Moeve

Partnerships were unanimously recognized as the cornerstone of successful hydrogen project development. Panelists shared how collaboration helps distribute risk, fill capability gaps, and foster innovation. Iberdrola's four FIDs were all underpinned by partnerships with offtakers and renewable suppliers. Moeve is building a local hydrogen ecosystem in Andalusia, Spain, integrating electrolysis with biogenic CO_2 from bio-LPG reforming. Vattenfall emphasized the value of learning from competitors and adapting through cross-sector collaboration. Linde highlighted the importance of bringing in partners with complementary strengths, such as renewable energy producers or sequestration experts.

Finally, the panel addressed the need for robust market mechanisms to support early-stage projects. Long-term offtake agreements were deemed essential for bankability, and mechanisms like H2Global were cited as promising models to stabilize prices and reduce risk. While the US was noted for its simpler policy landscape, uncertainty around incentives like 45V remains. The session concluded with a call for smarter policy design, synchronized infrastructure planning, and continued collaboration to move hydrogen from promise to practice.

SPOTLIGHT:
THYSSENKRUPP NUCERA

Dr. Werner Ponikwar
CEO, thyssenkrupp nucera

Dr. Werner Ponikwar opened his address with a candid reflection on the state of the green hydrogen industry, acknowledging that the initial hype has faded. He emphasized that while early projections of over 5TW of electrolyzer demand were unrealistic, the need for green hydrogen remains critical, especially in industrial sectors where fossil fuels are still deeply embedded. Rather than chasing hype, he called for pragmatic, results-driven decisions focused on scaling technologies that deliver real-world impact. Replacing the 100 million tons of fossil-based hydrogen currently produced each year would already require at least 1TW of electrolyzer capacity, underscoring the scale of the challenge and opportunity.

He stressed that the conversation has shifted from "if" green hydrogen will happen to "how" it will happen. In this context, Ponikwar questioned the notion of technological neutrality, arguing that not all hydrogen production methods contribute equally to climate and economic goals. While no technology should be banned outright, public funding should prioritize scalable, sustainable solutions, particularly electrolysis, which can be adapted over time to use greener energy sources. He emphasized that even older electrolyzers can play a vital role in enhancing energy security and reducing reliance on fossil fuel imports.

Ponikwar highlighted the strategic importance of building an independent green hydrogen supply chain in Europe, decoupled from fossil natural gas. Electrolysis, he argued, forms the backbone of a resilient and future-proof energy infrastructure. Thyssenkrupp Nucera is already implementing projects in key areas such as CO_2-free steel production and the synthesis of low-carbon fuels, where clean hydrogen is essential. He reiterated that the focus should not be on the color of hydrogen, but on scaling the technologies that align with long-term sustainability and energy independence goals.

In closing, Ponikwar left the audience with three key messages: first, while the hype may be over, the need for green hydrogen remains immense; second, governments must direct public funding toward projects that support long-term, sustainable hydrogen production; and third, scaling electrolyzer projects is essential to achieving energy independence in Europe and globally.

SPOTLIGHT:
JAPAN'S HYDROGEN POLICIES

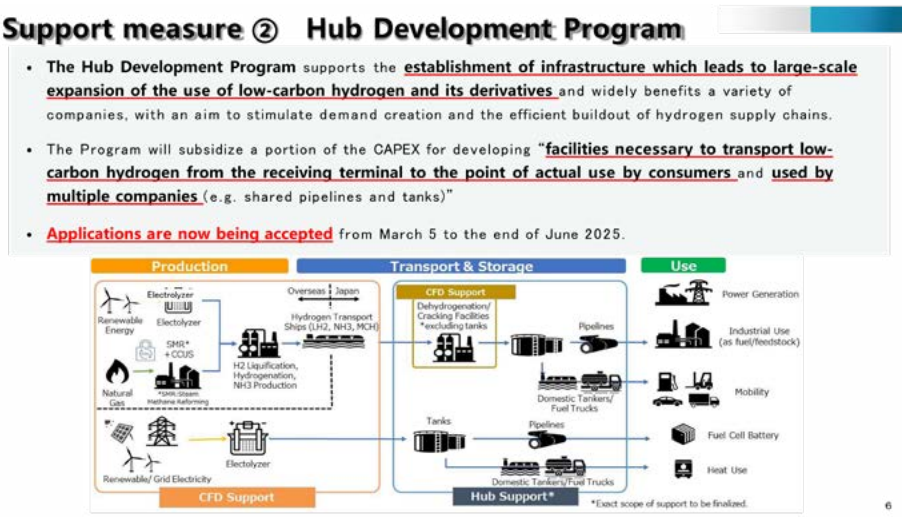
Shinichi Kihara
DG for International Policy on Carbon Neutrality, Ministry of Economy, Trade and Industry, Japan

H.E. Shinichi Kihara outlined Japan's "Green Transformation" strategy, a comprehensive national effort to achieve carbon neutrality by 2050. The strategy is built on three core principles: achieving energy security, economic growth, and emissions reduction simultaneously; recognizing that each country will follow its own path to net zero, and contributing globally through Japan's technology, finance, and expertise. While the global hydrogen momentum may appear to be slowing, Japan sees hydrogen as essential for decarbonizing sectors like heavy industry, transport, and thermal power – areas where renewables and electric vehicles alone are insufficient.

Hydrogen plays a central role in Japan's Green Transformation strategy. Japan was the first country to adopt a national hydrogen strategy in 2017 and has since expanded its efforts through the Green Innovation Fund, which allocates €13 billion for R&D and commercialization. The revised 2023 strategy sets ambitious hydrogen supply targets: 3 million tons by 2030, 12 million by 2040, and 20 million by 2050. Two major support mechanisms have been introduced: a Contract-for-Difference (CfD) scheme to bridge the cost gap between low-carbon hydrogen and fossil fuels, and a hydrogen hub development program to fund shared infrastructure like pipelines and storage tanks in high-demand regions.

Japan is also promoting hydrogen use in the mobility sector, particularly for commercial vehicles such as buses and trucks. Hydrogen fuel cell vehicles offer longer ranges and faster refueling than battery EVs, making them ideal for long-distance transport. The government has designated five priority regions for focused deployment of fuel cell vehicles and infrastructure. Support includes subsidies for hydrogen station operation and fuel costs, aiming to create regional mobility hubs that can expand hydrogen demand across the country.

International collaboration is a key pillar of Japan's hydrogen strategy. Japanese companies are partnering with European firms to develop and demonstrate hydrogen technologies across the supply chain. Examples include Toray and Siemens working on large-scale electrolysis systems, Kawasaki Heavy Industries shipping liquefied hydrogen from Australia, and upcoming hydrogen turbine demonstrations in Germany. In the mobility sector, Toyota, Mitsubishi Fuso, and Daimler Truck are collaborating to strengthen commercial hydrogen vehicle deployment. These partnerships reflect Japan's commitment to building a robust global hydrogen supply chain and contributing to international decarbonization efforts.



SESSION 2:
HYDROGEN DEMAND DRIVERS: FIRST MOVERS & MARKET CATALYSTS

At the heart of the second session of the World Hydrogen Summit was a critical question: how can the hydrogen economy move beyond supply-side enthusiasm to unlock real, scalable demand? Moderated by Olivia Carpenter-Lomax, Head of Sustainable Energy Systems at Ricardo, the panel brought together leaders from Shell, Air Products, Yara Clean Ammonia, SEFE, and Power2X to explore the practical, regulatory, and economic challenges of building a sustainable hydrogen demand ecosystem.

Carpenter-Lomax opened the session by framing hydrogen not as an isolated solution, but as a key enabler in the broader decarbonization of energy, transport, industry, and the built environment. She emphasized the need to think holistically about demand, not just supply, and invited panelists to reflect on why now is a pivotal moment for hydrogen.

Suhail Kak of Shell highlighted the company's focus on captive demand using hydrogen to decarbonize its own assets as a foundation for scaling up. Caroline Stancell of Air Products echoed this, noting that while hydrogen production has advanced significantly since 2020, many projects remain stalled at the final investment decision (FID) stage due to a lack of demand certainty and regulatory clarity.

Dr. Hans Dieter Hermes of SEFE emphasized the need for integrated, customer-driven approaches. Hermes stressed that infrastructure, upstream development, and regulation must evolve in tandem. He warned against over-engineering regulation before the market has matured, advocating instead for pragmatic, adaptive frameworks that reward early movers.

Olivia Carpenter-Lomax (Moderator)
Head of Sustainable Energy Systems, Ricardo

Caroline Stancell
Executive Director of Hydrogen, Europe & Africa, Air Products

Suhail Kak
Europe Hydrogen Ventures Director, Shell

Occo Roelofsen
CEO, Power2X

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

Vibeke Rasmussen
SVP Product Management and Certification, Yara Clean Ammonia

Vibeke Rasmussen of Yara Clean Ammonia brought a producer's perspective, underscoring the importance of demand signals for low-carbon products. Yara is already producing green ammonia for fertilizer, but Rasmussen noted that voluntary demand remains limited. She called for policy support to create lead markets and incentivize early adoption, particularly in sectors like shipping and agriculture.

Occo Roelofsen, CEO of Power2X, offered a candid assessment of the sector's current state. He likened the focus on demand to a sign of immaturity by stating that no one questions demand at oil or gas conferences. Roelofsen stressed the need for clear mandates and regulatory certainty to unlock investment, and warned that excessive regulatory burdens could stifle progress. He also highlighted the importance of reducing the cost of capital by de-risking projects through policy and market alignment.

Throughout the discussion, panelists returned to the theme of cost – not just the cost of hydrogen itself, but the broader economic context. Green hydrogen remains more expensive than fossil fuels, and without carbon pricing that reflects the true cost of emissions, the business case remains weak. Several panelists advocated for a mix of mandates, subsidies, and consumer-side incentives to bridge the cost gap and stimulate demand.

The conversation also touched on infrastructure and resilience. Kak shared Shell's experience of overcoming unexpected grid connection delays by building its own substation, an example of the innovation and agility required in this emerging sector. Rasmussen and Stancell emphasized the long lead times for hydrogen projects and the urgency of making investment decisions now to meet 2030 climate targets.

SPOTLIGHT:
ALGERIA HYDROGEN ECONOMY

H.E. Professor Noureddine Yassaa
Secretary of State for Renewable Energy,
Government of Algeria

H.E. Professor Yassaa presented Algeria's green hydrogen roadmap as a cornerstone of its just energy transition strategy. With a legacy as a reliable energy supplier to Europe, Algeria aims to extend this role into the renewable sector, leveraging its abundant solar and wind resources, strategic location, and existing infrastructure. The country's National Renewable Energy Program targets 15GW of renewable capacity by 2035, supported by over 200 identified production sites and major grid enhancements. Initial projects include 20 new solar plants, solar-powered irrigation, rural electrification, and the integration of wind energy, all contributing to the foundation for large-scale green hydrogen production.

Algeria's hydrogen strategy is built on six pillars: regulatory frameworks, human capital development, industrial integration, investment incentives, international collaboration, and pilot projects. The government has established a national hydrogen committee and introduced specialized university programs and research initiatives. Collaborations with the EU, Germany, and the Netherlands have led to regulatory development, feasibility studies, and capacity-building programs. Notable initiatives include the MedLink project – a 5GW renewable energy export plan to Italy – and the SouthH2 Corridor, connecting North Africa to Europe via hydrogen infrastructure, supported by multiple European partners.

Looking ahead, Algeria envisions full industrial development of its hydrogen sector by 2045, aiming to diversify its economy and contribute to global climate goals. Strategic pilot projects are underway, including hydrogen value chain testing, hydrogen-fueled turbines, and the production of synthetic fuels like methanol and e-kerosene. Algeria emphasizes the need for harmonized certification, carbon accounting, and de-risking financial tools to unlock investment. Through active international engagement and cooperation, Algeria positions itself as a cost-competitive, secure, and scalable supplier of green hydrogen to Europe, reaffirming its commitment to a sustainable and inclusive energy future.

SESSION 3:
ACHIEVING HYDROGEN TARGETS: INFRASTRUCTURE INNOVATIONS IN STORAGE, TRANSPORT & DISTRIBUTION

Enagas' Maria Sicilia highlighted the urgency of deploying hydrogen infrastructure by 2030, warning that the end of the decade is in "just 250 weeks' time, which for infrastructure deployment, is a very short time." She emphasised the importance of derisking, recommending an intertemporal cost allocation mechanism, such as Germany's amortisation account, to ensure that the first users of the hydrogen infrastructure do not overpay.

Christian Belting-Clar of Siemens Energy spoke about the challenge of designing future-proof pipeline infrastructure that can handle different flow requirements as it scales up over time. He suggested that expensive infrastructure must be capable of being "revamped and extended" in order to attract investment.

Luxfer's Keith Croysdale pointed to the United Kingdom's hydrogen production business model as an example of a government funding scheme which has effectively incentivised the creation of production capacity. He later referenced deals in Europe for six euros per kilogram of hydrogen sold at scale to heavy industry in Germany, as an example of a challenging price for producers to make profit.

Taco Hoencamp from Royal HaskoningDHV said that "seeing is believing" for companies that will be encouraged to invest by successful infrastructure developments, such as the 32 km pipeline under construction just around the corner in the host city of Rotterdam.

Sjoerd Boer (Moderator)
Vice President New Energies, Advario

Christian Belting-Clar
Head of Applied H2 Compression, Siemens Energy

Maria Sicilia
Co-Chairwoman of European Hydrogen Backbone, Enagas

Taco Hoencamp
Director Business Development, New Energy, Royal HaskoningDHV

Xander Japin
Senior Business Developer Hydrogen & CO2, VTTI BV

Keith Croysdale
Business Development Manager, Luxfer

VTTI BV 's Xander Japin spoke about integrating ammonia import terminals and cracking facilities into the broader energy network, saying that "timely connection is critical". He also emphasised the importance of policy alignment across the EU to incentivise ammonia-based imports.

SUMMIT DAY TWO

SUMMIT WELCOME ADDRESSES

Opening day two of the World Hydrogen Summit 2025, Amber-Jade Sanderson, Western Australia's Minister for Energy, Decarbonisation, Manufacturing, Skills, and the Pilbara Region, delivered a powerful address outlining the state's strategic vision for becoming a global leader in clean hydrogen. Speaking on behalf of the Western Australian Government, Sanderson emphasized the region's deep historical and contemporary ties with the Netherlands, particularly through its partnership with the Port of Rotterdam to explore renewable hydrogen export supply chains.

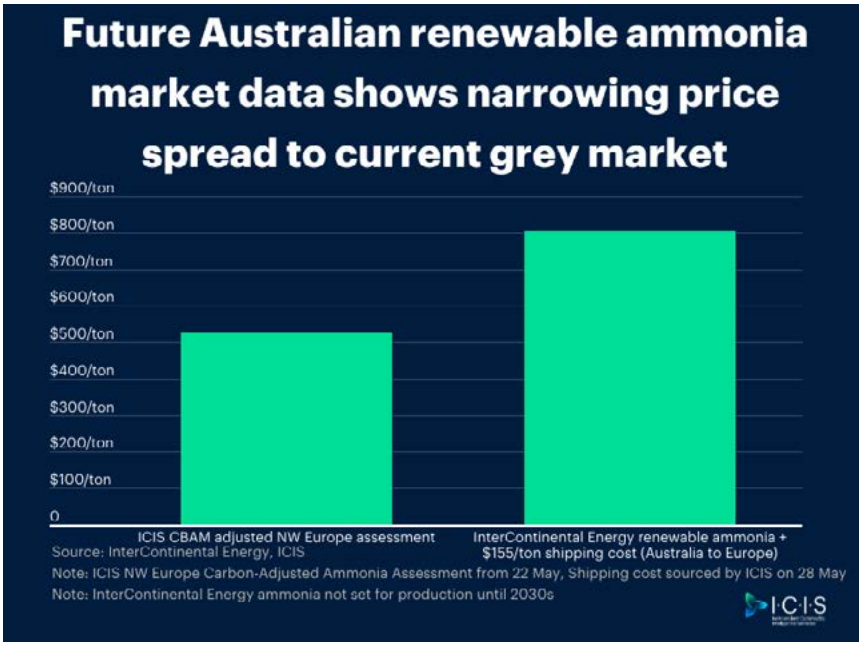
Hon. Amber-Jade Sanderson
Minister for Energy and Decarbonisation, Skills and TAFE, and the Pilibara; Government of Western Australia

Sanderson acknowledged the evolution of hydrogen policy over the past five years. What began as widespread optimism about hydrogen as a "wonder molecule" has matured into a more focused and pragmatic approach. While hydrogen remains essential for decarbonizing hard-to-abate sectors like shipping, steel, and long-duration energy storage, Western Australia now recognizes that other sectors may be more efficiently served by wind, solar, and battery technologies. This recalibration, she argued, is not a setback but a necessary next phase in the global energy transition.

Western Australia's ambition to develop a world-class hydrogen industry is stronger than ever. The state is concentrating its financial, human, and political capital on high-impact, strategic projects with a greater likelihood of success. With over 30 hydrogen projects in development and two state-backed hydrogen hubs in the Pilbara and Midwest regions, the government is actively supporting the industry's growth. A recent trilateral feasibility study with the Port of Rotterdam and the German government confirmed Western Australia's potential to export millions of tons of green hydrogen and ammonia annually, thanks to its abundant renewable resources and political stability.

Sanderson emphasized that the state's clean energy transition is backed by unprecedented political support. The Cook Government has been re-elected with a strong mandate, and the Albanese Federal Government has committed significant funding through programs like Hydrogen Headstart.

Drawing on the state's successful experience in building a world-class LNG industry, Sanderson highlighted the importance of government involvement in de-risking major energy projects. Just as the LNG sector was supported through infrastructure investment, off-take agreements, and streamlined approvals, the hydrogen industry will benefit from similar government backing. The state is leveraging its ownership of energy utilities, legislative reforms, and a €580 million strategic industries fund to accelerate project development and reduce "project-on-project" risk.



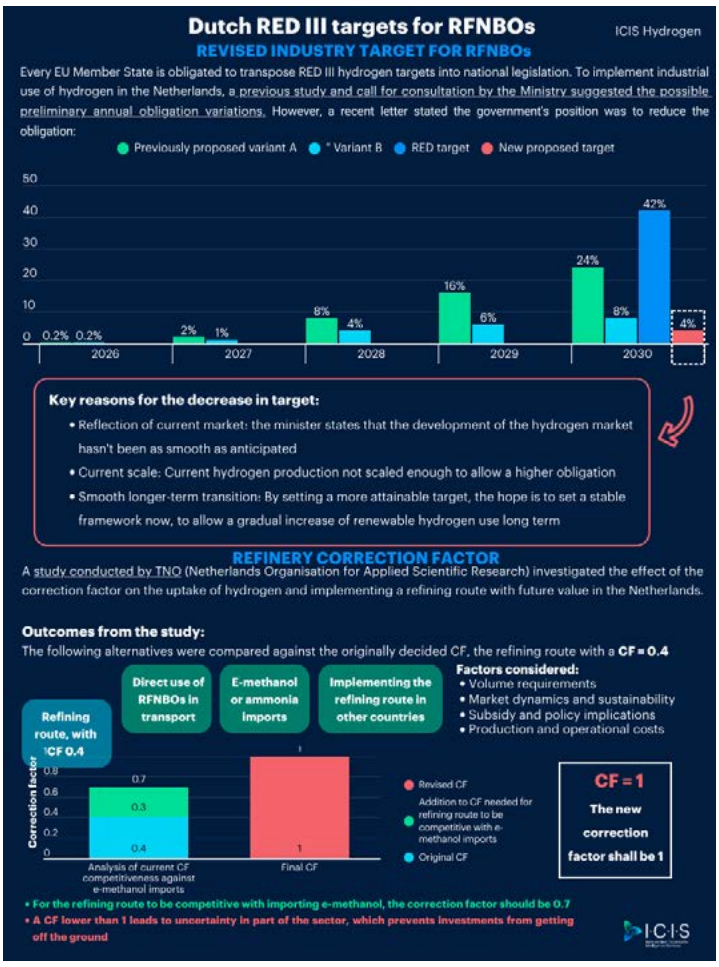
MINISTERIAL KEYNOTE ADDRESSES

For Wednesday's ministerial keynote address, Sophie Hermans, Minister for Climate Policy and Green Growth of the Netherlands, delivered a clear and confident message: the time for hydrogen ambition has passed, now is the time for action. Hermans emphasized the Netherlands' commitment to building a robust, integrated hydrogen economy that supports both domestic decarbonization and global energy cooperation.

H.E. Sophie Hermans
Minister of Climate Policy & Green Growth,
Government of The Netherlands

She framed hydrogen – both renewable and low-carbon – as a critical pillar of the energy transition, essential not only for meeting climate targets but also for transforming industry, securing energy supply, and driving innovation. The Netherlands, she noted, has been working toward this goal since launching its national hydrogen strategy five years ago. While global conditions have shifted and some early projects have faced delays, the country's commitment remains firm.

She said that the Dutch government has taken concrete steps to stimulate both supply and demand. These include the development of a national hydrogen backbone for transport and storage, funding for electrolysis projects, and regulatory incentives to drive demand. Notably, the Netherlands is expanding the scope of RFNBO (Renewable Fuels of Non-Biological Origin) quotas for transport and refining, and is considering blending obligations for gas-fired power plants. These measures send a clear signal: the Netherlands is not just participating in the hydrogen race – it intends to lead.



Implementation is already underway. Hermans pointed to visible progress in the Port of Rotterdam, where Shell's Holland Hydrogen 1 is under construction, and Dutch companies are investing in electrolyzers, storage, and import terminals. Infrastructure is becoming operational, and demand is being stimulated across sectors, laying the foundation for a Dutch hydrogen hub that will benefit the wider region.

The Netherlands is actively building international partnerships, including a joint auction with Germany on the H2Global platform, and bilateral agreements with countries such as Oman, Namibia, Chile, Canada, Spain, and Australia. She emphasized the need for fair, transparent, and inclusive hydrogen trade, underpinned by common standards and respect for each country's development needs.

In closing, Hermans declared that hydrogen is no longer a distant promise, but a present priority.

SPOTLIGHT:
HINTCO AUCTIONS, 2ND H2GLOBAL TENDER

In a detailed and forward-looking presentation, Timo Bollerhey, Managing Director of Hintco (Hydrogen Intermediary Network Company), introduced the second H2Global tender – an ambitious joint initiative between the German and Dutch governments aimed at accelerating the global hydrogen economy through real, bankable business cases.

Timo Bollerhey
CEO, Hintco Gmbh

Bollerhey began by explaining the core mechanism of the H2Global instrument. At its heart is Hintco, a unique intermediary trader that buys hydrogen and its derivatives through long-term off-take agreements and sells them into the market via short-term contracts. This model is designed to bridge the gap between project developers and market demand, enabling projects to reach Final Investment Decision (FID) by offering fixed prices and long-term certainty.

The second H2Global tender marks a significant evolution of the program. It includes five lots: four regional (Africa & Middle East, Asia, Latin America, and Oceania) and one global lot, the latter being the first to be jointly funded by two governments. The global lot alone is backed by nearly €600 million, with the potential for further increases pending decisions from the newly formed German government. For the first time, the tender includes hydrogen as a direct product (not just derivatives like ammonia or methanol), and it allows participation from European producers, expanding the scope and inclusivity of the initiative.

The tender is designed to create real, executable contracts that can be used by developers to secure financing from banks and investors. The delivery period spans from 2028 to 2036, with flexibility built in to accommodate early-stage uncertainties. The hydrogen must be delivered to designated hubs in Germany and the Netherlands, integrating with the emerging hydrogen transport networks.

The process is structured in several phases: public consultation; application phase; negotiation phase, where bidders negotiate the final terms of the hydrogen purchase agreements; bidding phase; and contracting phase, where contracts are awarded and first agreements potentially finalized by early 2026.

The H2Global mechanism is designed to be efficient for taxpayers. Hintco is expected to buy at higher prices and sell at lower ones, meaning funding is used to cover the cost gap, similar to a CfD, but with built in price discovery. Over time, as market liquidity and price transparency improve, the need for such an intermediary may diminish.

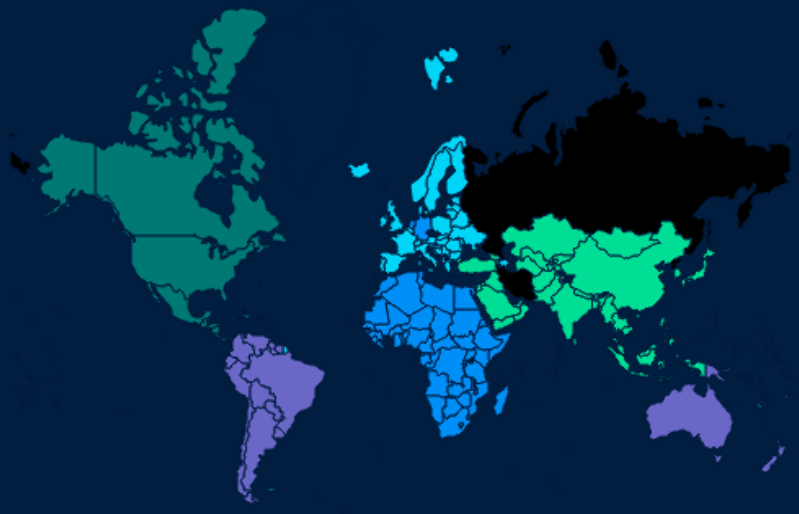
ICIS HYDROGEN

Hydrogen Support: Hintco launches second H2Global auction

Summary: *On 19 February 2025, Hintco, a hydrogen market development and trade company, announced it had initiated its second H2Global mechanism auction with a budget of €2.5 billion. Following the successful conclusion of its first auction in July 2024, Hintco's second auction has expanded from three to five lots, with the use of four regional lots and one global lot.*

OVERVIEW OF THE SCHEME

The scheme is a supply-side initiative, encouraging hydrogen imports into Europe, specifically Germany and the Netherlands, through tenders. In the tenders, Hintco acts as a trader, buying hydrogen or hydrogen derivatives from international sellers with the aim of re-selling those volumes to European buyers at the highest possible price. There are a total of five available lots, the four regional lots are classified as the Asia lot, Africa lot, North America lot and South America & Oceania lot. The global lot allows for any global producer (including European producers) to bid. EU trade-sanctioned countries are barred from bidding.



REGIONAL LOTS

- **Bidding per region** (Asia, Africa, North America or South America & Oceania)
- **€484 million (up to €587 million), Germany funded:** Potential to increase funding based on government, as German elections are ongoing
- **Product-open:** RFNBO (green) ammonia, methanol or hydrogen can be delivered as the final product

GLOBAL LOT

- **Open to all regions, including Europe but excludes Germany and the Netherlands.** German and Dutch companies can apply given that production is not domestic
- **Minimum €567 million:** Funded by the German or Dutch governments based on the delivery point
- **Vector-open:** Only RFNBO hydrogen can be delivered as the final product, transported in any way

PRODUCT DELIVERY DETAILS

Hintco utilises a "double-auction sequence," auctioning for both producers and consumers of RFNBOs. The supply-side auction consists of the lots mentioned above, in which producers deliver the product to Hintco at ports in Germany, or in the global lot case, the Netherlands. After delivery, Hincto initiates the demand-side auction, selling to consumers in the industrial, transport and energy sectors. The price difference is compensated by Hintco through the German or Dutch governments.

Bids evaluated on weighted score of product price (90%) and volume (10%). Prices of different RFNBO products compared on energy content basis to avoid bias

ELIGIBILITY CRITERIA

On the supply-side, there are some requirements that producers must meet before they can bid. The main aspect of this is compliance with EU regulations.

CERTIFICATION & PROOF OF SUSTAINABILITY

Under the EU's Delegated Acts, renewable hydrogen and derivatives must provide proof of sustainability based on valid certifications through voluntary schemes, recognised by the European Commission

73% GHG EMISSIONS SAVINGS

RFNBOs must have at least 70% greenhouse gas (GHG) emissions reductions compared to a fossil fuel comparator, an extra 3% to account for emissions from transportation from delivery point in Europe to point of use

ADDITIONAL SUSTAINABILITY CRITERIA

Other criteria around sustainability must also be met, including protection of arid regions and water supply, sustainable water desalination, local value creation and gender equality, adherence to international labour standards and sustainable land use

FUNDING MECHANISM

Based on grant notices, the budget is allocated in fixed annual amounts. Unused funds cannot be carried over to future years.

- Funding is provided from 2028 to 2035*. After this, funding is still pending parliamentary approval, so is currently unclear
- During ramp-up phase, Hintco provides option quantities on a non-firm basis for offtake of volumes lower than expected production. These can only be offered for a maximum of one year
- Regardless of option quantities, full firm delivery must commence no later than 5 years after the HPA has been awarded

An example has been provided below:

For any questions regarding the information provided above, please contact ICIS hydrogen policy & regulation analyst Aayesha Pathan: aayesha.pathan@icis.com

SPOTLIGHT:
TAKING FID – WHAT MAKES A BANKABLE PROJECT

Ramon van den Dungen
Managing Director Energy Sector Coverage, Hydrogen Lead the Netherlands, ING

Marcel Galjee
Chief Strategy Officer, HyCC

In a focused and insightful dialogue, Ramon van den Dungen of ING and Marcel Galjee of HyCC explored the complex path to bankability and Final Investment Decision (FID) for green hydrogen projects. The session, framed as a 15-minute crash course in "the art of making a deal," offered a candid look at the financial, regulatory, and operational realities of scaling hydrogen infrastructure in Europe.

Galjee began by outlining HyCC's unique position in the hydrogen ecosystem. Unlike many new entrants, HyCC was born from a chemical company (now Nobian) with decades of experience operating chlor-alkali electrolyzers. This operational heritage gives HyCC a distinct advantage in safely and reliably running electrolysis assets, an often overlooked but critical component of long-term project success. HyCC is currently developing several major hydrogen projects in the Netherlands and Germany. Among them is H2eron, a 100MW green hydrogen facility in Delfzijl, part of the "Hydrogen Valley" initiative in the northern Netherlands. The plant will supply hydrogen to local industries, including sustainable aviation fuel (SAF) production.

Another flagship project is H2Next, a large-scale electrolyzer in Rotterdam designed to produce approximately 25,000 tons of green hydrogen annually. Located near major offshore wind farms and integrated with the national hydrogen network, H2Next aims to support decarbonization across Northwest Europe, with FID targeted for 2028 and production expected around 2030.

The conversation then turned to the broader European landscape. Europe, Galjee argued, has a strong starting position with its industrial clusters, integrated infrastructure, and access to the North Sea. However, disparities in power prices – 40% higher in the Netherlands than in Germany, and 60% higher than in France – pose a serious challenge to project viability and FID.

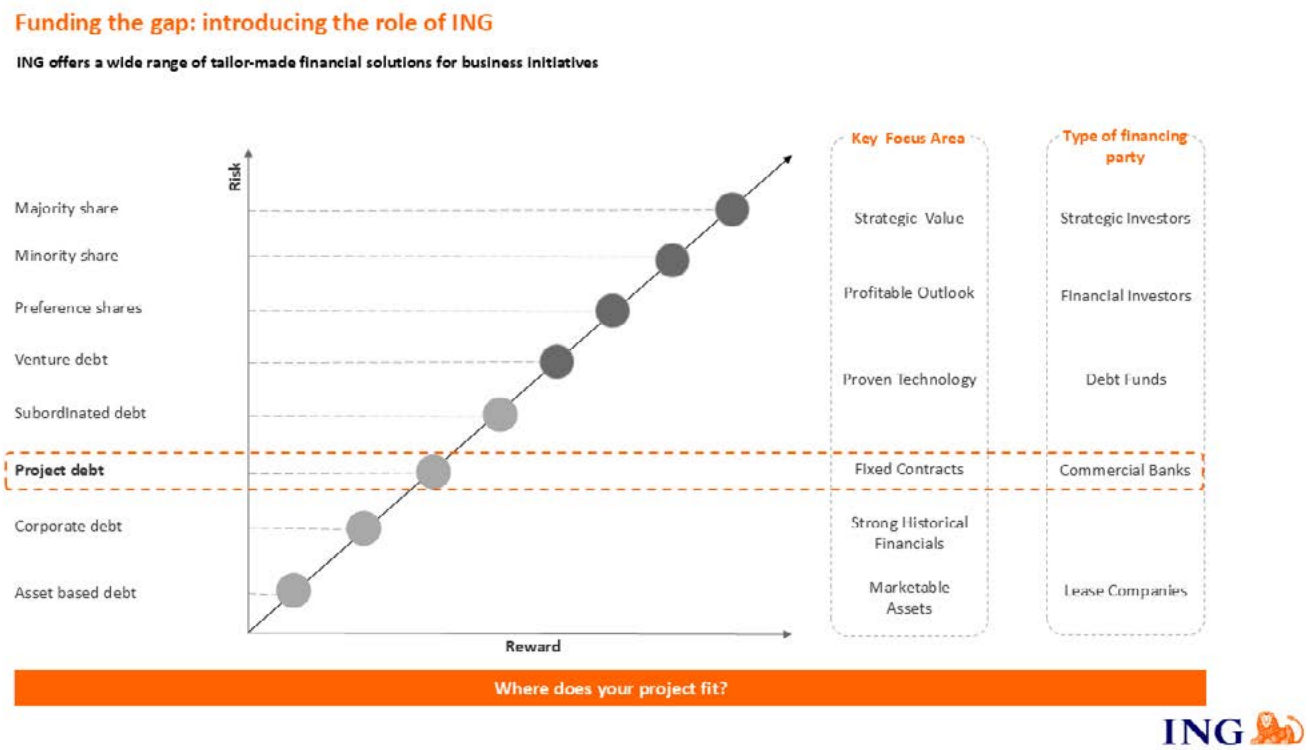
On the topic of bankability, Galjee acknowledged the financial sector's need for stable or predictable cash flows. He pointed out that the current lack of regulatory clarity and market certainty is a major barrier. While there is willingness among industrial customers to pay for green hydrogen, their ability to do so is constrained by the absence of mandates, subsidies, and other enabling policies. He stressed that regulatory mechanisms must evolve to create real demand and unlock investment.

HyCC's off-take strategy focuses on hard-to-abate sectors such as shipping, aviation, and chemicals. Galjee emphasized that the question is not whether these markets will emerge, but when and where. He urged European policymakers to act decisively to ensure that the continent remains competitive in the global hydrogen economy. Discussing broader hurdles to FID, Galjee highlighted several key issues: the need for accelerated renewable energy development, delays in hydrogen infrastructure, and long permitting timelines – particularly for high-voltage grid access, which can take up to 10 years. These bottlenecks, he warned, directly impact project timelines and investor confidence.

Despite these challenges, Galjee remained optimistic. He pointed to growing government commitments, emerging subsidy frameworks, and the Clean Industrial Deal as signs of progress. These developments, he said, are beginning to create the stability needed for customers to commit and for projects to reach FID.

In closing, Galjee encouraged the financial sector to engage earlier in project development, support scale-up phases, and be vocal about the regulatory conditions needed to build a viable hydrogen economy. Van den Dungen
echoed this sentiment, affirming ING's commitment to early engagement and advocacy.

The session concluded on a hopeful note, with both speakers agreeing that while the path to FID is complex, the foundation is being laid and the time for action is now.



SESSION 4:
FINANCING & INVESTMENTS ACROSS THE HYDROGEN VALUE CHAIN

In a dynamic and wide-ranging panel moderated by Susana Moreira, Executive Director and Co-Chair of the H2Global Foundation, experts from across the hydrogen ecosystem – spanning government, finance, consulting, project development, and investment – came together to explore the evolving landscape of financing hydrogen projects. The session focused on the challenges of bankability, the role of government incentives, and the critical need for collaboration across the value chain to accelerate Final Investment Decisions (FIDs).

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

Nikunj Panchal
Global Vice President of Energy, Infastructure Transition, Ricardo

Henry Rushton
Director, Energy Sector Coverage, Hydrogen EMEA Lead, ING Bank

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

Damien Eyriès
Chief Executive Officer, Rely
Senior Representative, Moeve

Alex McIntosh of the Australian Renewable Energy Agency (ARENA) opened the discussion by acknowledging the sobering reality of hydrogen production costs. While prices in Europe are hovering around €8-10/kg, Australia is seeing slightly lower figures, though still far from commercially viable without support.

Nikunj Panchal of Ricardo provided a global perspective on the risks facing hydrogen projects. These include technology integration, supply chain constraints (especially for electrolyzers), lack of common user infrastructure, and the difficulty of securing long-term power purchase agreements (PPAs) and offtake contracts. He emphasized the need for policy alignment and streamlined access to incentives across regions.

Henry Rushton of ING Bank highlighted the importance of offtake agreements in achieving bankability. Drawing on ING's experience financing projects like H2 Green Steel (now "Stegra"), he noted that securing around 70% of offtake under long-term contracts, on fixed term but also potentially with variable pricing, can unlock project financing.

Damien Eyries, CEO of Rely, emphasized the importance of integrating technology, offering performance guarantees, and ensuring the financial strength of the supply chain. He noted that electrolyzers will need replacement every 7-8 years, making long-term supplier reliability critical. Rely's approach, backed by Technip Energies, focuses on quality, safety, and lifecycle support.

Christian Pho, CTO of Smartenergy, discussed the investment case for sustainable aviation fuel (SAF), particularly in the Iberian Peninsula and MENA region. He highlighted the role of blending mandates, voluntary airline commitments, and the potential for cost reductions through solar and wind integration. Smartenergy is targeting SAF production costs of €2,700/ton in MENA – down from €5,000 in Europe – by leveraging low-cost renewables and optimized project structures.

The panel also explored the role of government incentives. McIntosh detailed Australia's robust support ecosystem, including a $2/kg hydrogen production tax credit, the $4 billion Hydrogen Headstart program (with €814 million already awarded to the Murchison project), and upcoming bilateral initiatives with Germany under H2Global. These programs aim to bridge the cost gap and attract private capital.

Rushton and Panchal agreed that while incentives like Contracts for Difference (CfDs) and H2Global-style double auctions are effective, access and alignment remain challenges. Panchal stressed the need for better coordination between funding streams and project timelines, as well as deeper integration of electrolyzer suppliers into project consortia to avoid "profit stacking" across the value chain.

The discussion also addressed the impact of US policy changes, particularly around the Inflation Reduction Act (IRA) and 45V tax credits. While these incentives have not yet triggered a wave of investment, panelists noted that localization requirements and high labor costs in the US may offset some of the benefits.

On the topic of technology, panelists agreed that while PEM and alkaline electrolyzers differ in maturity and efficiency, technology choice is not a major barrier to financing. Instead, the focus should be on integration, performance guarantees, and long-term cost reduction through innovation and scale. Eyries broke down hydrogen production costs in Europe: €2.4/kg for power and chemistry, €2.9/kg for capex, and €1.7/kg for OPEX and system efficiency – highlighting the need to address the 88% of costs beyond the electrolyzer stack.

In closing, panelists were asked to fast-forward to 2030 and identify the single biggest game-changer for hydrogen finance. Their answers included: scaling lighthouse projects to build supply chains and investor confidence; mandates and regulatory stability, particularly in Europe; learning by doing, with projects like Neom and Murchison serving as global references; integrated project structures that align stakeholders and reduce risk.

SPOTLIGHT:
HOW GEOPOLITICS AFFECT HYDROGEN: INVESTOR'S VIEW

Pierre-Etienne Franc
CEO, Hy24

Pierre-Etienne Franc delivered a wide-ranging strategic overview of the global green energy transition, emphasizing the enduring importance of hydrogen. He began by highlighting Europe's energy dependency, noting that "Europe still imports 60% of its energy needs," costing around €400 billion annually. He argued that green hydrogen offers a path to energy sovereignty, particularly in sectors like fertilizer and steel, where clean hydrogen can reduce emissions with minimal cost impact on end products.

Franc stressed the role of regulation in driving change, advocating for consistent and enforceable carbon border adjustments to protect domestic industries and encourage global decarbonization. He praised Europe's institutional stability as a magnet for investment, contrasting it with higher-risk regions. He also pointed to China's dominance in clean energy manufacturing, warning that "they seem, on all fronts, fully unstoppable," while acknowledging their need for export partnerships to avoid saturating their own markets.

Turning to the US, Franc critiqued its inward-focused energy strategy, suggesting it risks falling behind in the global green race. He emphasized that hydrogen must complement, not compete with, electrification: "The people that believe that a pure electrification of everything is the future are dreamers." He concluded by calling for regulatory consistency and political will, warning that constant rule changes are "a disaster for the industry." Franc remains optimistic, noting that large-scale hydrogen projects are now gaining traction, and with steady policy support, hydrogen can become the industrial backbone of the clean energy future.

SPOTLIGHT:
ENVIRONMENTAL DEFENSE FUND

Dr. Steven Hamburg of the Environmental Defense Fund (EDF) announced a groundbreaking collaborative research initiative aimed at understanding and minimizing hydrogen emissions across the value chain. Partnering with major industry players – Air Liquide, Air Products, Shell, and TotalEnergies – the initiative seeks to fill a critical data gap by empirically measuring hydrogen losses during production, transport, and use. While hydrogen is not a direct greenhouse gas, its release into the atmosphere indirectly contributes to global warming by extending methane's lifetime and increasing tropospheric ozone and stratospheric water vapor, Hamburg said. The study will deploy advanced measurement tools, including high-precision analyzers and mobile platforms, across facilities in North America and Europe.

Each corporate partner emphasized the importance of this initiative from both a climate and operational perspective. Erwin Penfornis of Air Liquide highlighted that hydrogen leak detection has long been a safety and efficiency priority, but the emerging climate implications make it even more urgent. He stressed the value of collective action and the need for industry-wide standards to avoid future regulatory or reputational setbacks. Caroline Stancell of Air Products echoed this, noting that as hydrogen infrastructure scales up, even small losses could have significant climate impacts. She emphasized the importance of transparency, robust data, and shared methodologies to ensure credible and actionable insights.

Dr. Steven Hamburg
Chief Scientist & SVP,
Environmental Defense Fund

Erwin Penfornis
Vice President Hydrogen Energy World Busine Line,
Air Liquide

Caroline Stancell
Vice President Hydrogen for Mobility, Air Products

Saskia Boeve
Head of Hydrogen Mobility,
Shell

Raffaele Luce
Head of Business Development Hydrogen Europe,
TotalEnergies

Saskia Boeve of Shell underscored the company's commitment to proactively addressing unintended emissions before hydrogen infrastructure scales further. She emphasized Shell's role in shaping future codes and standards and the importance of taking responsibility early. Raffaele Luce of TotalEnergies added that understanding hydrogen's indirect warming effects is essential for managing the company's own emissions and ensuring sustainable global hydrogen trade. He noted that as hydrogen production and consumption become more geographically dispersed, the risk of emissions during transport increases, making detection and mitigation even more critical.

The panel also discussed early lessons from the field. Participants noted that simply beginning to measure emissions has already led to new insights and a reevaluation of operational practices. The initiative is fostering collaboration not only in data sharing but also in aligning measurement methodologies and advancing detection technologies. Dr. Hamburg emphasized that this effort mirrors earlier work in the natural gas sector, where improved measurement tools led to significant emissions reductions. He expressed optimism that similar progress can be made in hydrogen, especially with the commitment of leading companies.

Looking ahead, the initiative will continue fieldwork over the next year, with findings to be published in peer-reviewed journals and made publicly available. The goal is to create a transparent, data-driven foundation for hydrogen's role in the energy transition, ensuring that its climate benefits are fully realized.

SESSION 5:
GLOBAL HYDROGEN STANDARDS & CERTIFICATION SOLUTIONS: ENSURING INTEROPERABILITY & COMPLIANCE ENABLEMENT

Moderated by Jorgo Chatzimarkakis, the session brought together experts from government, industry, and science, including representatives from the German Ministry for Economic Affairs and Climate Action, Hydrogenious, Honeywell, the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), and the Environmental Defense Fund (EDF), all with the aim of exploring the evolving landscape of hydrogen standards, certification, and digital traceability. The discussion centered on the urgent need for globally recognized standards and certification systems to ensure hydrogen's credibility as a clean energy carrier and to enable international trade.

Jorgo Chatzimarkakis (Moderator)
CEO, Hydrogen Europe

Dr. Laurent Antoni
Executive Director, IPHE

Dr. Steven Hamburg
Chief Scientist, Environmental Defense Fund

Baishakhi Bhattacharyya
Growth Leader - Sustainable Fuels and Chemicals (EMEA Region), Honeywell

Dr. Andreas Lehmann
CEO Hydrogenious LOHC Technologies Senior Representative, BMWK

Dr. Christine Falken-Grosser of the German Ministry outlined a five-step framework for structuring hydrogen certification: setting carbon intensity thresholds, defining methodologies for emissions accounting, accrediting certifiers, establishing certification procedures, and enabling digital traceability. She emphasized the importance of international cooperation, mutual recognition of certification schemes, and the need for pragmatic policymaking that balances ambition with feasibility. The German government, she noted, is pushing for more flexible and business-friendly approaches, particularly in light of evolving technical, geopolitical, and market conditions.

Dr. Laurent Antoni of IPHE and ISO provided an update on the development of the ISO 19870 standard, which defines how to calculate greenhouse gas emissions from hydrogen production. The standard, developed over five years with input from over 100 experts across 16 countries, is now in its final draft stage and expected to be formally adopted by COP30. It includes provisions for fugitive emissions, co-product allocation, and prioritization of site-specific data. While the ISO standard does not override national regulations, it serves as a critical reference point for aligning global certification schemes and ensuring comparability across borders.

The panel also explored the role of digital infrastructure in enabling traceability and transparency. Baishakhi Bhattacharyya of Honeywell introduced the concept of a "hydrogen passport", a digital document that records the carbon intensity and origin of hydrogen molecules. She stressed the need for reliable, auditable data and a robust digital system to support certification bodies and regulators. Such infrastructure, she argued, would not only streamline compliance but also future-proof the system as standards evolve. The digital passport could become a universal tool for verifying hydrogen's environmental credentials across global supply chains.

Dr. Steven Hamburg of EDF offered a scientific perspective, urging the sector to remain adaptable and evidence based. He highlighted the importance of incorporating emerging science, such as the indirect warming effects of hydrogen, into certification frameworks. Hamburg warned against repeating past mistakes made with methane, where underestimating emissions delayed climate action. He called for certification systems that are rigorous, transparent, and capable of evolving with new scientific insights. The panel concluded with a shared commitment to pragmatism, collaboration, and continuous improvement, recognizing that hydrogen is a front-runner in clean energy innovation and must set a high standard for accountability and trust.

SESSION 6:
HYDROGEN CARRIERS: AMMONIA, METHANOL, LIQUID H2 & BEYOND

Trevor Brown (Moderator)
Executive Director, Ammonia Energy Association

Duna Uribe
Programme Manager Clean Ammonia, Port of Rotterdam

Kristjana M. Kristjánsdóttir
CCO, Carbon Recycling International

Christopher Jackson
Founder and CEO, Protium

Session 6 brought together industry leaders to explore the evolving role of hydrogen derivatives such as ammonia, methanol, and synthetic fuels in the context of the global energy transition. Moderated by Trevor Brown of the Ammonia Energy Association, the session featured insights from Kristjana M. Kristjánsdóttir (CRI), Christopher Jackson (Protium), and Duna Uribe (Port of Rotterdam). The panel aligned early on in the session on a shared vision of a multi-molecule future where various hydrogen derivatives serve both as energy carriers and as end-use fuels or feedstocks.

Kristjánsdóttir emphasized CRI's leadership in CO_2-to-methanol technology, highlighting commercial-scale e-methanol plants already in operation and a global pipeline of projects. Methanol, she noted, is not only a hydrogen and carbon carrier but also a critical chemical building block, making it a versatile solution for both energy and industrial decarbonization. Jackson described Protium's integrated approach to green hydrogen production and its role in enabling early-stage SAF, methanol, and ammonia projects. He stressed the importance of supporting smaller-scale innovators and building flexible, modular systems that can scale over time. Uribe detailed the Port of Rotterdam's infrastructure developments, including terminal expansions, ammonia bunkering readiness, and a newly announced ammonia cracker, all aimed at positioning the port as a key hub for hydrogen and its derivatives.

A central theme of the discussion was the dual identity of hydrogen derivatives as both carriers and end-use fuels. Ammonia, for example, is used directly in fertilizers and shipping, but also serves as a hydrogen carrier when put through a cracker to split the molecular compound. Methanol similarly bridges energy and chemical markets. The panelists agreed that this duality creates synergies that can improve project economics, enable infrastructure reuse, and accelerate deployment. They also advocated for a "green refinery" model, where multiple hydrogen-based products are produced and optimized based on market demand, mirroring the flexibility of today's fossil fuel refineries.

Looking ahead, the panelists emphasized the need for clear regulatory frameworks, especially around EU mandates and certification schemes, to provide investment certainty. Jackson urged governments to be transparent about the trade-offs involved in decarbonization and called on industry to take calculated risks and commit to final investment decisions (FIDs). Kristjánsdóttir highlighted the importance of building out supply chains and scaling up manufacturing to meet growing demand. Uribe stressed the need for harmonized port regulations and infrastructure readiness to support global hydrogen trade.

In closing, the panelists reflected on the maturity of the hydrogen sector. While the initial wave of optimism has given way to realism and challenges, they agreed that this is a sign of progress. The technologies are ready, the infrastructure is advancing, and the demand is real. What's needed now is delivery, turning projects into reality and proving that hydrogen carriers can play a central role in the decarbonized energy system of the future.

INTERNATIONAL HYDROGEN TRADE FORUM (IHTF) UPDATE

During day two of the World Hydrogen Summit 2025, the International Hydrogen Trade Forum convened top government officials and industry leaders to assess the current state of the global hydrogen economy and chart a path forward. Co-chaired by Dutch Minister of Energy Sophie Hermans, the forum brought together representatives from over 15 governments and 20 companies to reflect on the progress made since the forum's inception in 2022 and to address the challenges facing the next wave of hydrogen deployment. The tone was pragmatic yet optimistic, with a shared recognition that the sector has moved from early enthusiasm to the hard work of implementation.

Ivana Jemelkova (Moderator)
CEO, Hydrogen Council

H.E. Sophie Hermans
Minister of Climate Policy & Green Growth, Government of The Netherlands

H.E. Diego Pardow
Minister of Energy, Government of Chile

Boudewijn Siemon
Chief Executive Officer, Port of Rotterdam

Jay Chang
President & CEO, Hyundai Motor Company

Minister Hermans emphasized three key priorities: stimulating demand, embracing a color-agnostic approach to hydrogen (green, blue, or otherwise), and ensuring clear, predictable regulations. She acknowledged that the sector is entering a more complex phase, but stressed the importance of maintaining momentum and collaboration. Chilean Minister Diego Pardow echoed this sentiment, noting that although Chile's hydrogen strategy is slightly behind schedule, the country has seen a dramatic surge in project activity, with environmental assessments jumping from $250 million to $25 billion in value. He highlighted the need for international coordination, especially in sectors like shipping and refining, where global standards could accelerate adoption.

Jay Chang of Hyundai offered an industry perspective, detailing the company's integrated hydrogen strategy, from production using electrolysis and waste streams to deploying hydrogen-powered logistics fleets in the US and Europe. Hyundai's approach, he said, is to be both the "chicken and the egg," creating demand while building supply. He stressed the importance of strong public-private partnerships and predictable policy frameworks to scale hydrogen solutions globally. Boudewijn Siemons of the Port of Rotterdam reinforced the need for infrastructure investment. He urged stakeholders to avoid waiting for perfect conditions and instead take collective action to de-risk and advance projects.

The forum also reflected on the achievements of the first wave of hydrogen investment, acknowledging that while progress has not met the most ambitious expectations, it has been substantial. The sector has moved from "PowerPoint to practice," with real infrastructure, terminals, and electrolyzers now being built. Looking ahead, participants emphasized the need for ecosystem thinking, ensuring that infrastructure, regulation, and market development are aligned and mutually reinforcing. Minister Pardow highlighted the opportunity to repurpose legacy infrastructure and the importance of capacity building to ensure a just and inclusive transition.

In closing, panelists shared personal messages to the hydrogen community. Their collective wish: stay the course, remain optimistic, and be proud of the progress made. The transition will take decades, not years, but with continued collaboration, pragmatism, and a shared sense of purpose, the hydrogen economy can become a cornerstone of a cleaner, more resilient global energy system.

SPOTLIGHT:
PORTS AS ENERGY HUBS: THE ROLE OF PORTS IN ENABLING THE HYDROGEN ECONOMY

Emilie Kaern (Moderator)
Lead Transitioning Industrial Clusters, World Economic Forum

Berte Simons
COO, Port of Rotterdam

Emile Hoogsteden
CEO, Sohar Port & Free Zone

Ahmed Saad
CEO, SCZONE

During this spotlight session, leaders from major global ports discussed the critical role ports play in enabling the hydrogen economy. Moderated by Emilie Kaern of the World Economic Forum, the session featured Berte Simons (Port of Rotterdam), Ahmed Saad (Suez Canal Economic Zone, Egypt), and Emile Hoogsteden (Sohar Port and Free Zone). The discussion focused on how ports are driving hydrogen ecosystem development, deploying clean energy infrastructure, and fostering global partnerships to accelerate the energy transition.

Berte Simons emphasized the Port of Rotterdam's central role in Europe's energy transition. As a major logistics and industrial hub, the port handles 13% of Europe's energy and is home to over 3,000 companies. With more than 100 energy transition projects underway, Rotterdam is actively decarbonizing its operations and supporting the shift to green energy through infrastructure development, circular economy initiatives, and hydrogen production. Simons highlighted the port's role as a community builder, aligning stakeholders and fostering collaboration across the value chain.

Ahmed Saad outlined Egypt's strategic vision for the Suez Canal Economic Zone (SCZONE), which manages six ports and four industrial clusters. Positioned at the intersection of three continents, SCZone is rapidly becoming a green hydrogen hub, leveraging Egypt's renewable energy resources, skilled workforce, and strong trade agreements. Saad noted the exponential growth in industrial activity and emphasized the importance of government commitment, regulatory clarity, and international partnerships to attract investment and scale hydrogen production.

Emile Hoogsteden shared Sohar Port's ambition to become a green manufacturing and bunkering hub. Located at a key maritime crossroads, Sohar integrates logistics and industrial operations under one management, enabling efficient development. The port is pursuing a comprehensive energy transition strategy, including green hydrogen, CCUS, and renewable energy projects. Hoogsteden highlighted Sohar's role as a matchmaker, connecting hydrogen producers with offtakers, and its leadership in forming alliances like the Sohar Net Zero Alliance to coordinate decarbonization efforts.

The panelists agreed that ports are uniquely positioned to accelerate the hydrogen economy by serving as connectors between supply and demand, orchestrating infrastructure development, and enabling global trade. They stressed the importance of international collaboration, with Rotterdam, Sohar, and SCZONE all actively engaging in cross-border partnerships to align infrastructure, aggregate demand, and de-risk early investments. Simons noted that while ports won't buy hydrogen themselves, they play a vital role in facilitating the first commercial agreements and ensuring the ecosystem is ready for scale.

In closing, the panel underscored that while the hydrogen transition is complex and still evolving, ports are already taking concrete steps to lead the way. Their strategic locations, industrial capabilities, and convening power make them essential players in building a global hydrogen economy.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SESSION 7:
HYDROGEN'S ROLE IN HARD-TO-ELECTRIFY SECTORS

Moderated by Clare Jackson, CEO of Hydrogen UK, the session on hydrogen's role in hard-to-electrify sectors featured representatives from steel, shipping, energy, and technology sectors, including EMSTEEL, MarineFifty, Gentari (Petronas), Plug Power, Star Scientific, and others. The discussion focused on real-world applications, demand stimulation, regulatory drivers, and the practical challenges of scaling hydrogen solutions.

Clare Jackson (Moderator)
Chief Executive, Hydrogen UK

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

Michèle Azalbert
Chief Hydrogen Officer, Hydrogen, Gentari

Dr. Dimitrios Dimitriou
Group Vice President ESG & Sustainability, EMSTEEL Group

Ralph de Haan
Partner, MarineFifty

Alasdair Leapman
Director, European Sales Applications, Plug Power

The panel opened with a strong affirmation of hydrogen's critical role in decarbonizing sectors where electrification is not feasible. Dimitrios Dimitriou of EMSTEEL shared an example of a pilot project in the UAE where green hydrogen is being used in steel production, including a symbolic offtake agreement to build the region's first net-zero mosque. Other panelists highlighted successful offtake models in logistics (Plug Power's material handling solutions), shipping (Air Products' ammonia offtake from NEOM), and industrial heat (Star Scientific's catalyst-based heat-as-a-service model). These examples underscored that while challenges remain, demand is emerging across a wide range of sectors.

A recurring theme was the importance of regulation and policy in driving demand. Ralph de Haan of MarineFifty emphasized the transformative potential of upcoming International Maritime Organization (IMO) regulations, which will introduce emissions pricing and fuel standards for global shipping. Michèle Azalbert of Gentari pointed to compliance markets, such as refineries and shipping, as key early adopters, where the cost of switching to green hydrogen can be absorbed with minimal impact on end-product prices. Panelists agreed that both "carrots" (incentives, subsidies) and "sticks" (penalties, carbon pricing) are needed to accelerate adoption.

The conversation also addressed the need for a more balanced approach between supply and demand. Several panelists noted that hydrogen policy has historically focused too heavily on production, with insufficient attention to securing offtake. Alasdair Leapman of Plug Power and Matthew Hingerty of Star Scientific stressed the importance of building local, scalable demand – particularly in sectors like food, beverage, and textiles – where hydrogen can replace fossil fuels in process heat. Hingerty praised the Czech Republic's pragmatic, phased approach to hydrogen deployment, starting small and building from local demand.

In closing, panelists shared their visions for the next 12 months. They called for greater consumer awareness and demand for carbon-neutral products, more integrated value chains, and continued regulatory clarity. The consensus was clear: while the hydrogen industry faces headwinds, it is entering a phase of practical deployment, learning, and growth. With the right mix of policy support, industry collaboration, and consumer engagement, hydrogen can deliver on its promise to decarbonize the hardest sectors of the global economy.

SESSION 8:
HYDROGEN MOBILITY: TRANSFORMING LAND, SEA & AIR TRANSPORT

The hydrogen mobility panel brought together leaders from across the mobility spectrum, including aviation, maritime, automotive, and infrastructure. Panelists explored hydrogen's evolving role in decarbonizing transport. Moderated by Clare Harris of Power2X, the panel featured representatives from BMW, KLM, Air Products, Air Liquide, and the Port of Rotterdam. The discussion focused on the technical, commercial, and regulatory progress made over the past few years, and the challenges and opportunities that lie ahead.

Clare Harris (Moderator)
Executive Director, Power2X

Erwin Penfornis
Vice President Hydrogen Energy World Business Line, Air Liquide

Naomi van den Berg
Program Manager Sustainable Supply Chains, Port of Rotterdam

Jolanda Stevens
Program Manager for Zero Emissions Aviation, KLM Royal Dutch Airlines

Stefan Fenchel
Project Manager Sustainability BMW Group Plant Leipzig, BMW Group

Anouck Massant
Director Hydrogen for Mobility Northern Continent & European Strategy, Air Products

Panelists reflected on how hydrogen mobility has shifted from early-stage pilots to commercial-scale deployment. Naomi van den Berg of the Port of Rotterdam noted the port's growing role as a hydrogen and bunker hub, with recent milestones including the first ammonia bunkering pilot. Stefan Fenchel of BMW highlighted the company's commitment to launching a hydrogen fuel cell vehicle by 2028 and emphasized hydrogen's complementary role alongside battery electric vehicles, particularly in regions with limited charging infrastructure. KLM's Jolanda Stevens shared the airline's progress in exploring hydrogen-powered aviation, including a planned liquid hydrogen demonstrator flight in 2026, and stressed the need for cross-sector collaboration to accelerate innovation.

Air Products and Air Liquide, two of the world's largest hydrogen producers, outlined their efforts to scale up hydrogen infrastructure and supply chains. Anouck Massant of Air Products pointed to major projects like the NEOM green hydrogen initiative and recent bunkering operations for maritime and aviation applications. Erwin Penfornis of Air Liquide emphasized the urgency of supporting hydrogen adoption in road transport, particularly for heavy-duty vehicles, and warned that Europe risks falling behind regions like China and Korea without more agile and supportive regulation.

A key theme was the importance of regulatory clarity and global coordination. The panel discussed the upcoming International Maritime Organization (IMO) decisions on lifecycle emissions standards, which could significantly influence fuel choices in shipping. Naomi van den Berg urged stakeholders to advocate for adoption of these standards to ensure a level playing field. In aviation, Stevens acknowledged the sector's long decarbonization timeline but emphasized the need to act now, especially given public scrutiny and the long lifespan of aircraft.

The panel also debated the prioritization of hydrogen across sectors. While some argued for focusing hydrogen on sectors with no viable alternatives, others stressed the importance of a broad-based approach to build scale and public acceptance. Fenchel likened hydrogen to the "champagne" of the energy transition and called for engineers to be given the freedom to innovate across applications.

Panelists agreed that hydrogen's role in mobility is no longer theoretical: it is real, growing, and essential. The path forward requires coordinated action across the entire ecosystem: governments, industry, infrastructure providers, and consumers. As Harris concluded, "It's everybody, all things, all at once", a call to collective ambition and urgency in the race to decarbonize transport.

SPOTLIGHT:
LEADING CITIES SPEARHEADING HYDROGEN DEVELOPMENT

Alex Krekt (Moderator)
Managing Director, NLHydrogen

Carola Schouten
Mayor, City of Rotterdam

Cllr. Phillippus A. Balhao
Mayor of Lüderitz, Namibia

Kai Lipsius
Head of Climate Protection Unit, City of Duisberg

In the closing session of day two of the World Hydrogen Summit 2025, the spotlight session on leading cities spearheading hydrogen development featured city leaders and representatives from Rotterdam (Netherlands), Lüderitz (Namibia), and Duisburg (Germany) to reflect on the global progress of hydrogen development and the importance of international cooperation. Moderated by Alex Krekt, the panel emphasized how cities across continents are navigating the hydrogen transition – each with unique challenges, but united by shared ambition and the need for collaboration.

Mayor Carola Schouten of Rotterdam opened the discussion by highlighting the city's role as a major energy hub for Europe and its commitment to transitioning from fossil fuels to green hydrogen. She emphasized that hydrogen is not a luxury but a necessity for a sustainable future, and that the summit itself demonstrated the power of bringing together governments, industry, investors, and knowledge institutions. Schouten stressed the importance of trust and long-term vision, noting that Rotterdam is ready to lead but needs national and European support to scale infrastructure and close the cost gap between fossil and green hydrogen.

Mayor Phillippus A. Balhao of Lüderitz, Namibia, shared the transformative impact of a major green hydrogen project in his small coastal town. With a population of just 17,000, Lüderitz is preparing to host a gigawatt-scale hydrogen and ammonia production facility that could employ up to 15,000 workers during construction. Balhao described the town's efforts to expand land, engage with over 50 stakeholder groups, including indigenous communities, and ensure inclusive development. He emphasized the importance of early engagement, transparent communication, and strategic partnerships to ensure that local communities benefit from the hydrogen revolution.

Kai Lipsius, representing the city of Duisburg, Germany, described the city's transition from a traditional coal and steel hub to a center for green industry and logistics. Duisburg is home to Europe's largest inland port and is investing heavily in hydrogen infrastructure, including green steel production and climate-neutral logistics. Lipsius highlighted the city's citizen council and stakeholder engagement initiatives, which ensure public buy-in and help shape sustainable urban development. He also stressed the need for Europe to stay the course on climate neutrality and seize the opportunity to lead in hydrogen innovation.

Throughout the discussion, the panelists emphasized the interconnectedness of the global hydrogen economy. Rotterdam, as a key port and energy hub, plays a central role in transporting hydrogen from producers like Namibia to industrial users in regions like Duisburg. The panelists agreed that international cooperation, trust, and shared learning are essential to overcoming regulatory, infrastructural, and financial hurdles. They called for stronger policy frameworks, clearer regulations, and continued investment in cross-border partnerships.

In closing, the panelists shared a message of optimism and urgency. They acknowledged the complexity of the transition but affirmed that the momentum is real and growing. As Mayor Schouten put it, "This is not just about energy – it's about relationships, trust, and building a sustainable future together." The session ended with a call to action: to jump together, stay connected, and turn ambition into action.

SUMMIT DAY THREE

SUMMIT WELCOME ADDRESSES

In the final welcome address of the World Hydrogen Summit 2025, Arne Weverling, Regional Minister of Zuid-Holland, emphasized the province's strong commitment to leading the hydrogen transition. Weverling acknowl edged the progress made over the past two days and called for continued action, collaboration, and realism in building the hydrogen economy.

Arne Weverling
Regional Minister, Province of Zuid-Holland

He outlined the critical role of provinces like Zuid-Holland in bridging national and municipal efforts, particularly in areas such as spatial planning, infrastructure, mobility, and economic development. Zuid-Holland, and especially the Port of Rotterdam, is uniquely positioned to become a European hydrogen hub. The region boasts a powerful combination of industrial demand, logistical infrastructure, offshore wind potential, and world-class research institutions like Delft University of Technology.

Weverling acknowledged the challenges ahead, such as geopolitical tensions, economic uncertainties, and slower-than-expected cost reductions for hydrogen. However, he stressed that these are natural parts of any major transition. He highlighted the importance of safety in hydrogen transport and storage, particularly as imports via carriers like ammonia and methanol increase.

The minister praised the shift from visionary thinking to concrete action, noting that the summit has evolved from a gathering of dreamers to a meeting of doers. He cited real-world examples of progress, including Shell's operational hydrogen plant in Rotterdam and the launch of the world's largest inland hydrogen-powered vessel. He also pointed to cross-border collaboration with Germany through the Rhine Corridor initiative, aimed at decarbonizing Europe's busiest transport route.

Weverling concluded with a call for honest, pragmatic dialogue about what is possible today and what can be achieved together in the future. He urged all stakeholders, including governments, businesses, researchers, and civil society, to continue building partnerships and scaling up efforts. "The system is being shaped as we speak," he said. "Let's build it together."

MINISTERIAL KEYNOTE ADDRESS

For the final ministerial address, Jaehong Kim, President and CEO of H2KOREA, outlined South Korea's comprehensive strategy to become a global leader in the hydrogen economy. Emphasizing the urgency of climate action and the growing global demand for hydrogen, Kim positioned hydrogen as a practical and essential energy source for achieving carbon neutrality.

Jaehong Kim
President & CEO, Korean Hydrogen Alliance (H2KOREA)

He highlighted how Korea, alongside Japan, is leading demand creation in the power sector through government-led initiatives, such as Korea's Clean Hydrogen Power Bidding System (CHPs) and Japan's $19 billion Contracts for Difference (CFD) program.

Korea's hydrogen strategy is built on three pillars: scale up, build up, and level up. The country aims to deploy 300,000 hydrogen vehicles and 21,000 hydrogen buses by 2030, increase the share of clean hydrogen and ammonia in power generation to 6.2% by 2038, and establish over 70 liquid hydrogen refueling stations. Korea is also investing in liquefied hydrogen carriers and hydrogen-powered cities, with full-scale hydrogen power generation set to begin by 2028.

Kim highlighted the leadership of Korean companies in hydrogen innovation. SK Innovation has built the world's largest liquefied hydrogen plant in Incheon, Hyundai Motor has scaled up hydrogen bus production, and POSCO is piloting hydrogen-based steelmaking. Korea has already deployed over 37,000 hydrogen vehicles and 400 refueling stations, with fuel cell power generation surpassing 1GW.

Despite this progress, Kim acknowledged significant challenges, particularly in scaling clean hydrogen power. In 2024, only one project secured a contract under Korea's clean hydrogen power market due to high costs and risk premiums. He stressed the need for public support to reduce financial risks and attract private investment. Infrastructure bottlenecks, permitting delays, and operational losses in refueling stations also remain barriers to wider adoption.

Looking ahead, Korea is preparing for hydrogen shipping, with a pilot liquefied hydrogen carrier expected by 2027 and full-scale operations by 2030. Kim emphasized the importance of accelerating demonstration projects and aligning them with Korea's hydrogen import strategy.

He concluded by noting that while Korea's hydrogen policies may evolve with the upcoming presidential election, the country remains committed to strengthening its regulatory framework and global partnerships. Kim called for continued international cooperation, knowledge sharing, and joint action to accelerate the global hydrogen transition.

SPOTLIGHT:
TWO EUROPEAN MECHANISMS, ONE GOAL: ACCELERATING HYDROGEN MARKET DEPLOYMENT

In this spotlight session, European leaders and experts came together to discuss two major mechanisms designed to accelerate the hydrogen market: Germany's H2Global initiative and the European Commission's new EU Hydrogen Mechanism. Moderated by Dr. Caroline Kollau of the Dutch Ministry of Climate Policy & Green Growth, the panel included Pauline Raabe (H2Global Foundation), Dr. Christian Storost (German Federal Ministry for Economic Affairs & Energy), and Maciej Ciszewski (European Commission, DG Energy).

Dr. Caroline Kollau (Moderator)
Deputy DG Climate & Energy, Ministry of Climate Policy & Green Growth, The Netherlands

Maciej Ciszewski
Head of Unit, Diversification & Joint Purchasing, DG Energy, European Commission

Dr. Christian Storost
Head Division Intl. H2 Ramp-up, German Federal Ministry for Economic Affairs & Energy

Pauline Raabe
Project Manager, H2Global Foundation

Pauline Raabe opened by explaining H2Global's flexible, market-based approach to supporting hydrogen and its derivatives. Funded by concessionary capital from governments, primarily Germany, H2Global enables early-stage market creation by offering price signals and supporting offtake through competitive auctions. She highlighted the success of the first pilot auction in 2023, which awarded a renewable ammonia project in Egypt and set a benchmark price of €811 per ton. A second round, including regional and global lots, is now underway.

Dr. Christian Storost emphasized Germany's continued commitment to hydrogen, noting that H2Global is explicitly supported in the country's coalition agreement. He stressed the importance of price-based instruments over traditional capital expenditure (CAPEX) subsidies, arguing that price signals are essential to building a self-sustaining market. He called for deeper partnerships across Europe and with international suppliers to scale up demand and ensure market viability.

Maciej Ciszewski introduced the European Commission's EU Hydrogen Mechanism, a new platform launching in mid-2025. The mechanism will connect European and global hydrogen suppliers with offtakers, support infrastructure development, and link stakeholders with financial institutions. It will focus on renewable and low-carbon hydrogen and is open to international partners. Ciszewski emphasized the importance of regulatory certainty, infrastructure investment, and dynamic, scalable tools to support the evolving hydrogen market.

All panelists agreed that early-stage government support is essential to overcome the "chicken-and-egg" dilemma of supply and demand. They stressed the need for complementary instruments, policy clarity, and international cooperation. Raabe underscored the importance of price transparency and real-time market data, while Storost called for focus and pragmatism in deploying the most efficient tools. Ciszewski concluded with a call for consistency, innovation, and collaboration across borders.

Together, these mechanisms aim to create a robust, interconnected hydrogen market in Europe and beyond – one that is driven by clear price signals, supported by public and private investment, and built on strong international partnerships.

European Commission | Hydrogen Mechanism

European Hydrogen Bank

- **Market-based online platform,** creating connections through matchmaking and aggregation
- **Empower companies** to enter the market
  - *organising calls for demand/supply interest*
  - *market testing of infrastructure*
  - *connecting with financial support*
- **Scope**: H2 & derivatives (ammonia, methanol, eSAF)
  Renewable and low-carbon
- **European offtakers** & **European/global suppliers**
- Registration in **June** / 1st Round in **September**

Presentation today at 15:45 (Dock 1)
Registration (optional) here

H2Global H2Global Instrument

- **Market-based double-auction mechanism** for purchase and sell via an intermediary
- **Empower member states** to ramp up hydrogen market at minimum costs
  - *Global purchase at lowest costs, local sale at highest possible costs*
  - *Cost-of-difference covered by governments*
  - *Fixed contracts sending price signals into the market*
- **Scope**: H2 & derivatives, agnostic and flexible
- **European/global offtakers** & **European/global suppliers**
- **European Hydrogen Ramp up:**
  - *Successful pilot auction on green ammonia (€0,3bn)*
  - *Upcoming second tender round (€2,6bn)*

EUROPEAN HYDROGEN POLICIES

In this high-level panel on European hydrogen policies, moderated by Noé van Hulst (Vice Chair, IPHE), representatives from the European Commission, Germany, the Netherlands, and Lithuania shared national strategies, challenges, and collaborative efforts to accelerate the hydrogen economy across Europe.

Vice Minister Airidas Daukšas of Lithuania opened by highlighting his country's ambitious renewable energy goals, aiming for full energy self-sufficiency by 2028. Lithuania plans to develop 1.3GW of electrolyzer capacity by 2030 and is actively participating in the North-Baltic Hydrogen Corridor, a cross-border infrastructure project connecting Finland to Germany. Daukšas emphasized the importance of infrastructure, regulatory clarity, and offtake agreements to attract large-scale hydrogen investments.

Dr. Christine Falken-Grosser of Germany's Federal Ministry for Economic Affairs and Climate Action outlined the new German government's continued commitment to hydrogen, now under the leadership of Minister Katharina Reiche, a former head of the National Hydrogen Council. She emphasized three key themes: European cooperation, support for small and medium-sized enterprises (SMEs), and a pragmatic, cost-effective approach to policy. Germany is focusing on leveraging public funds to attract private investment, supporting a broader range of hydrogen technologies, and reassessing regulatory frameworks to reduce costs and accelerate deployment.

Noe van Hulst (Moderator)
Vice Chair, IPHE; Hydrogen Advisor, IEA & Gasunie

H.E. Airidas Daukšas
Vice Minister of Energy, Government of Lithuania

Gijs Postma
Deputy Director, Ministry of Climate and Green Growth, Dutch Government

Dr. Christine Falken-Grosser
Head of Division, Hydrogen – Coordination, Federal Ministry for Economic Affairs and Climate Action, City of Duisberg

Maciej Ciszewski
Head of Unit, Diversification & Joint Purchasing, DG Energy, European Commission

Gijs Postma from the Dutch Ministry of Climate and Green Growth detailed recent policy developments in the Netherlands, including new mandates for hydrogen use in industry and transport, a €1 billion production subsidy scheme, and a €662 million demand-side subsidy. He stressed the importance of balancing mandatory targets with industrial competitiveness, particularly to avoid driving industry out of Europe. Postma also highlighted the Netherlands' upcoming H2Global tender and its broader strategy for low-carbon hydrogen.

Maciej Ciszewski of the European Commission emphasized the EU's commitment to hydrogen as a pillar of its clean industrial strategy. He discussed the upcoming third auction under the European Hydrogen Bank, which will allocate another €1 billion to renewable hydrogen projects, and the launch of the EU Hydrogen Mechanism, which is a dynamic platform to connect suppliers, offtakers, and financiers across Europe and beyond. Ciszewski underscored the need for regulatory clarity, infrastructure investment, and pragmatic tools to support market development, especially for SMEs.

The panelists agreed that while hydrogen targets such as the EU's 20 million tons by 2030 remain aspirational, the focus must now shift to implementation. Key challenges include high hydrogen costs, uncertain offtake, and the need for coordinated infrastructure. Instruments like H2Global and the EU Hydrogen Mechanism were praised for providing price signals and bridging the gap between supply and demand.
In closing, the panel emphasized the importance of consistency, collaboration, and flexibility. Governments must support early-stage projects while preparing for long-term market sustainability. As van Hulst noted, "We're all building the bridge while walking on it" – and Europe must walk together to make the hydrogen economy a reality.

SESSION 9:
THE ROLE OF LOW CARBON HYDROGEN & CCS IN THE GLOBAL HYDROGEN MARKET

In this pivotal session, moderated by Mathilde Blanchard of the Global CCS Institute, panelists explored the evolving role of low-carbon hydrogen and carbon capture and storage (CCS) in the global hydrogen economy. The discussion brought together perspectives from the UK government, Algeria's national energy company Sonatrach, technology providers, and environmental advocates.

Mathilda Blanchard (Moderator)
Senior Policy Lead, Global CCS Institute

Ole Skatka Jensen
Vice President, Europe, Middle East & Africa, Nikkiso Clean Energy & Industrial Gases Group

Dr. Eugene McKenna
SVP Hydrogen & Sustainable Technologies, Johnson Matthey

Stefanie Murphy
Director of Hydrogen and Industrial Carbon Capture, UK Government

Youcef Khanfar
Central Director Green & Renewable Energies, Sonatrach

Beth Trask
Vice President, Global Energy Transition, Environmental Defense Fund

Stefanie Murphy of the UK Government outlined the country's progress since launching its hydrogen strategy in 2021. The UK has committed over £2.3 billion in revenue support and £90 million in capital grants for green hydrogen projects, with 11 projects already selected and 27 more shortlisted. The UK is also advancing its carbon capture clusters and preparing to launch hydrogen transport and storage business models. Murphy emphasized a shift in focus from production to demand, targeting hard-to-abate sectors such as heavy industry, transport, and power.

Youcef Khanfar of Sonatrach highlighted Algeria's ambition to become a leading supplier of green hydrogen to Europe. With abundant solar and wind resources, existing gas infrastructure, and strong government backing, Algeria is positioning itself as a key player in the southern corridor of Europe's hydrogen supply. Khanfar stressed the need for international partnerships, regulatory clarity, and phased development, starting with smaller projects and scaling up to gigawatt-scale exports via pipelines and shipping.

Ole Skatka Jensen of Nikkiso Clean Energy emphasized the importance of leveraging global best practices and deploying proven technologies. He noted that while Europe is still finalizing its policy frameworks, regions like Japan, South Korea, and the US are already moving forward with commercial-scale hydrogen projects. Jensen called for government incentives to be directed toward scalable, commercially viable projects rather than pilots.

Dr. Eugene McKenna of Johnson Matthey discussed the importance of integrated policy frameworks to make low-carbon hydrogen investable. He stressed that successful projects require alignment across gas supply, hydrogen production, CCS, and end-use sectors. McKenna also emphasized the need for high carbon capture rates (above 90%) to ensure environmental integrity and public trust in blue hydrogen.

Beth Trask of the Environmental Defense Fund (EDF) brought a critical environmental lens to the discussion. She identified three key factors for ensuring climate benefits from low-carbon hydrogen: minimizing upstream methane emissions, maximizing CCS effectiveness, and managing hydrogen leakage. Trask highlighted EDF's new global hydrogen emissions measurement study, launched in partnership with major industry players, to gather empirical data and inform mitigation strategies.

The panel also addressed the need for robust certification systems, harmonized standards, and transparent monitoring and verification to build trust and enable global hydrogen trade. Several speakers noted that delays in EU regulatory clarity – particularly around delegated acts and emissions accounting – could hinder project development.

In closing, panelists shared their top priorities for the next 12 months:

- **Youcef Khanfar:** Strengthen partnerships and begin medium-scale projects while preparing for large-scale exports.
- **Stefanie Murphy:** Launch hydrogen transport and storage allocation rounds to support infrastructure.
- **Eugene McKenna:** Apply agile, customer-focused thinking to policy design – start simple and scale.
- **Beth Trask:** Build a robust data ecosystem for methane, CCS, and hydrogen emissions.
- **Ole Skatka Jensen:** Focus on deploying real, sustainable projects that deliver both environmental and commercial value.

The session concluded with a clear call to action: the time for planning is over, now is the time to deliver scalable, verifiable, and collaborative solutions to accelerate the global hydrogen transition.

SPOTLIGHT:
NAMIBIA GREEN HYDROGEN PROGRAM

Namibia showcased its bold and rapidly advancing green hydrogen strategy, positioning itself as a future global hub for clean energy and industrialization. The session featured remarks from Hon. Gaudentia Kröhne, Namibia's Deputy Minister of Industry, Mines and Energy, and James Mnyupe, Head of the Namibia Green Hydrogen Programme (NGH2P).

James Mnyupe (Moderator)
Head of Programme, Namibia Green Hydrogen Programme (NGH2P)

Hon. Gaudentia Kröhne
Deputy Minister of Industry, Mines and Energy, Government of Namibia

Deputy Minister Kröhne opened by highlighting the country's strategic vision, rooted in green industrialization, mineral beneficiation, and infrastructure development. She emphasized Namibia's strong political commitment, abundant renewable resources, and access to deep-sea ports as key enablers. Since signing a joint declaration of intent with Germany in 2021, Namibia has launched a national green hydrogen strategy, hosted its first hydrogen conference, and established a blended finance fund to support project development.

A major milestone was the April 2025 inauguration of the HyIron Oshiwelo project in the Erongo region, the world's first direct reduced iron (DRI) facility powered by renewable hydrogen. This flagship project symbolizes Namibia's ambition to not only decarbonize but also industrialize, creating green value chains and jobs. Kröhne acknowledged ongoing challenges, including infrastructure readiness, concessional financing, and global market uptake, but reaffirmed Namibia's commitment to international collaboration and investment.

James Mnyupe expanded on the country's progress, noting the continuity of political leadership and the historic inauguration of Namibia's first female president and vice president. He described the HyIron project as a "United Nations plant," with components sourced globally – from Chinese solar panels to German kilns – and built almost entirely by Namibian labor. The project is already producing near-zero carbon iron and has secured offtake agreements, with plans to scale up significantly.

Mnyupe also highlighted Namibia's regional integration strategy, including plans to supply green electricity to the Southern African Power Pool and collaborate with South Africa on green steel production. Additional projects include a green ammonia bunkering hub in partnership with CMB.Tech and a high-tech agricultural facility using green hydrogen-derived fertilizers.

To support these initiatives, Namibia is pursuing concessional capital through the Climate Investment Fund's Industry Decarbonization Program and aims to establish a large blended finance fund to de-risk investments and attract global developers.

SESSION 10:
SCALING UP RENEWABLE HYDROGEN PRODUCTION & REDUCING COSTS

In this dynamic session, moderated by Eng. Nawal Alhanaee of the UAE Ministry of Energy and Infrastructure, panelists from Siemens Energy, Bechtel, Electric Hydrogen, InterContinental Energy, and Envision Energy explored the key challenges and opportunities in scaling up renewable hydrogen production and driving down costs.

The discussion opened with a consensus that while the technical capability to build large-scale hydrogen projects exists, the primary bottleneck remains demand – driven by regulatory clarity and long-term offtake agreements. John Gunn (Bechtel) emphasized that policy certainty is essential to unlock investment, while Richard Colwill (InterContinental Energy) highlighted the importance of modular, scalable project design to manage risk and reduce costs over time.

Frank Yu (Envision Energy) pointed to three major challenges: weak demand signals, strict project financing requirements, and outdated engineering approaches. He called for a radical rethink of project design, moving away from traditional oil and gas models to more agile, cost-effective methods. Jason Mortimer (Electric Hydrogen) echoed this, stressing the need for factory-built, modular electrolyzer systems that reduce on-site labor and accelerate deployment.

Alexey Ustinov (Siemens Energy) emphasized the importance of trust, built through proven project performance, safety, and long-term service agreements. He welcomed the end of the "hydrogen hype," noting that the industry is now entering a more professional, data-driven phase focused on real-world delivery.

Engr. Nawal Alhanaee (Moderator)
Director of Future Energy Department, Ministry of Energy and Infrastructure, UAE

Alexey Ustinov
SVP Sustainable Energy Systems, Siemens Energy

John Gunn
Global Manager of Operations, Energy Transition, Bechtel

Jason Mortimer
SVP, Global Commercial, Electric Hydrogen

Richard Colwill
Head of Engineering & Innovation, InterContinental Energy

Frank Yu
Senior Vice President, Head of Hydrogen Product Line, Envision Energy

On cost reduction, panelists agreed that the biggest lever is access to low-cost renewable electricity. Mortimer noted that intermittent power is now the norm, and electrolyzers must be designed to operate flexibly. Ustinov added that while stack costs represent only a fraction of total project costs, modularization and smarter EPC (engineering, procurement, and construction) strategies offer significant savings.

The panel also addressed the role of policy. Colwill praised supportive governments in Oman and Australia, while Yu argued that carbon pricing, rather than subsidies, is the most effective tool to drive market adoption. Mortimer called for consistency in regulation, particularly in Europe, where uncertainty around RED III implementation is delaying investment.

In the Q&A, panelists tackled questions on overcapacity, modular design, and technology choices. They agreed that modular, phased development is key to managing risk and scaling efficiently. On electrolyzer technologies, both PEM and alkaline were seen as having roles to play, depending on project needs and power profiles.

In closing, the panelists called for collaboration across the value chain – developers, OEMs, EPCs, and policymakers – to accelerate the transition. As Mortimer put it, "We're all here on the same team," working toward a shared goal of making renewable hydrogen scalable, affordable, and impactful.

SESSION 11:
ELECTROLYSER & FUEL CELL BREAKTHROUGHS: INNOVATIONS & SCALING UP

In session 11, moderated by Dr. Emma Guthrie of the UK Hydrogen Energy Association, panelists from SFC Energy, Hitachi Energy, ITM Power, Hysata, and H2Pro explored the latest innovations in electrolyzer and fuel cell technologies, and the challenges and opportunities in scaling them up for commercial deployment.

The session opened with each panelist introducing their organization's unique approach to hydrogen technology. Björn Ledergerber (SFC Energy) emphasized the need to make hydrogen as accessible and user-friendly as diesel, particularly for off-grid and critical infrastructure applications. Jerome Henry (Hitachi Energy) highlighted the dual role of hydrogen in both powering and stabilizing renewable energy grids, while also replacing diesel generators in sectors like construction and data centers.

Dr. Peter Pötschacher (ITM Power) stressed the importance of looking beyond the electrolyzer stack to the full system – including engineering, infrastructure, and manufacturing processes – to reduce costs and improve reliability. Daniel Tas Sandermann (Hysata) introduced their ultra-efficient capillary-fed electrolyzer, which achieves over 98% cell efficiency and aims to reduce system complexity. Rotem Arad (H2Pro) presented their membrane-less, decoupled electrolysis technology, designed for flexible, behind-the-meter applications that can directly integrate with intermittent renewables.

Dr. Emma Guthrie (Moderator)
CEO, The Hydrogen Energy Association

Björn Ledergerber
Senior Vice President, SFC

Jerome Henry
Hydrogen Global Center of Competence Manager, Hitachi Energy

Dr. Peter Pötschacher
Vice President Region EU & Middle East, ITM Power

Daniel Tas Sandermann
Chief Commercial Officer, Hysata

Rotem Arad
Chief Business Officer, H2Pro

A key theme throughout the discussion was the need to make hydrogen technologies more customer centric. Panelists agreed that hydrogen must become easier to access, store, and use – especially for end users unfamiliar with industrial gas handling. This includes simplifying logistics, improving safety, and creating standardized, modular systems that can be deployed quickly and cost-effectively.

On the topic of cost reduction, the panel emphasized that while stack efficiency is critical, the total installed cost, which includes balance of plant, civil works, and project execution, must also come down. Modularization, factory-built systems, and early EPC (engineering, procurement, and construction) engagement were cited as key strategies. Panelists also discussed the importance of site selection, automation, and standardization to reduce project risk and improve bankability.

In closing, panelists reflected on the broader meaning of innovation. While technical breakthroughs in stack design remain important, true innovation lies in adapting to a rapidly evolving market, integrating across the value chain, and delivering reliable, cost-effective solutions at scale. As Rotem Arad put it, "It's not the strongest who survive, but those who adapt fastest."

SPOTLIGHT:
HYDROGEN SAFETY BOOTCAMP & CHALLENGE: BEST PRACTICES AND STANDARDS

In this interactive session, Nick Barilo, Executive Director of the Center for Hydrogen Safety (CHS), led a dynamic "Hydrogen Safety Bootcamp" designed to challenge assumptions, test knowledge, and promote a culture of safety across the hydrogen value chain.

Nick Barilo
Executive Director, Centre for Hydrogen Safety (CHS)

Barilo opened by emphasizing that safety is not just a technical requirement, it's a business imperative. He posed a series of provocative questions to the audience: Can your organization afford a safety incident? Can it withstand reputational damage, regulatory delays, or business interruption? Most importantly, do your actions affect public trust in the hydrogen industry?

The session featured real-world case studies and a live quiz using Slido, where participants were tested on their responses to hydrogen-related incidents. Scenarios included a hydrogen delivery truck leak, a fire department response to a compressed gas accident, and the installation of electrical equipment near hydrogen systems. These examples illustrated how human error, lack of training, and poor planning can escalate into serious safety events.

Barilo highlighted the importance of proactive safety planning, noting that many hydrogen incidents stem from common factors such as inadequate training, poor hazard analysis, and incorrect assumptions. He stressed that hydrogen is not inherently unsafe, but its use as a fuel, especially outside traditional industrial settings, requires new thinking, standards, and awareness.

The Center for Hydrogen Safety, founded on the expertise of the Hydrogen Safety Panel (with over 800 years of collective experience), provides a suite of resources to support safe hydrogen deployment. These include:

- The Hydrogen Tools Portal, with 35,000+ monthly sessions and a vast library of best practices, incident reports, and safety guides.
- Training programs for professionals and first responders, including e-learning, webinars, and in-person courses.
- The Hydrogen Safety Challenge and the newly launched Hydrogen Safety Awards, recognizing excellence in safety leadership across projects, organizations, and individuals.

Barilo called for a global movement to prioritize hydrogen safety, noting that CHS now includes over 100 member organizations. He encouraged attendees to join the effort, not just to comply with regulations, but to lead with integrity and build public trust in hydrogen as a safe, scalable energy solution.

The session concluded with a reminder: "Don't gamble with safety." Attendees received a deck of limited-edition hydrogen safety cards, each featuring a key safety message – reinforcing the idea that safety should be embedded in daily operations, not treated as an afterthought.

SESSION 12:
NAVIGATING TODAY'S CHALLENGES: DELIVERING SUCCESSFUL HYDROGEN PROJECTS

In the penultimate session of the summit, moderated by Ivana Jemelkova, leaders from across the hydrogen value chain came together to share how they are navigating today's challenges and delivering real-world hydrogen projects. The tone was pragmatic and optimistic, with a strong emphasis on action, partnerships, and cost reduction.

Ivana Jamelkova (Moderator)
CEO, Hydrogen Council

Erwin Penfornis
Vice President Hydrogen Energy World Business Line, Air Liquide

Raffi Garabedian
CEO and Co-founder, Electric Hydrogen

Dr. Thomas Pauer
Executive Vice President, Robert Bosch GmbH

Linda Dempsey
Vice President, Public Affairs, CF Industries

Erwin Penfornis of Air Liquide opened the discussion by highlighting the company's large-scale electrolyzer project in Normandy, which is set to become one of the largest in Europe. What makes this project particularly notable is its dual purpose: supplying hydrogen to both industrial users and mobility applications, including taxis and trucks in the Paris region. With two more similar projects already underway in the Netherlands, Penfornis emphasized that this is no longer a one-off, it's a replicable business model.

Dr. Thomas Pauer of Bosch spoke about the company's transition from traditional powertrain technologies to hydrogen solutions, including PEM fuel cells and electrolyzers. Bosch has already launched fuel cell systems in China, where the market is growing rapidly. Pauer expressed pride in Bosch's ability to lead in this space and called for Europe and North America to accelerate their own deployments.

Raffi Garabedian, CEO of Electric Hydrogen, brought a bold perspective to the panel. He argued that cost, not technology, is the primary barrier to scaling green hydrogen. His company is focused on delivering high-efficiency, high-power-density electrolyzers that dramatically reduce the levelized cost of hydrogen. Garabedian announced the company's first 100MW project in Texas, which will produce sustainable aviation fuel for export to Europe and the UK. Drawing on his experience in the solar industry, he emphasized the need for hydrogen to follow a similar trajectory: start with subsidies, scale rapidly, and drive down costs through innovation and volume.

Linda Dempsey of CF Industries shared how the company, the world's largest ammonia producer, is investing in low-carbon ammonia production using auto-thermal reforming and carbon capture and storage technology. With three major projects underway, including a 1.4 million ton per year facility, CF Industries is targeting both traditional fertilizer markets and emerging uses like co-firing in power generation and hydrogen carriers. Dempsey stressed the importance of partnerships – with technology providers, offtakers, and sequestration partners – as the key to success.

Isaac Hinton of InterContinental Energy brought the perspective of mega-scale green hydrogen development. With projects in Australia and Oman totaling 120GW of upstream energy, Hinton emphasized the importance of local demand and smart engineering. He introduced the company's patented "P2H2 node" design, which co-locates hydrogen production with renewable generation to improve efficiency and reduce capital costs. He also praised Australia's Future Made in Australia Act, which provides stable, legislated production incentives that give investors confidence.

As the conversation turned to challenges, panelists were candid about the hurdles they face. Dempsey pointed to the lack of consistent demand signals and the difficulty of securing long-term offtake agreements in commodity markets like fertilizer. Penfornis and Pauer highlighted the need for better policy support in Europe, especially for hydrogen mobility, where the continent is falling behind China, Korea, and the US Hinton called for greater global coordination of policy timelines and incentives, noting that developers often face misaligned application windows across jurisdictions. Garabedian added that while global policy is fragmented, the best opportunities today lie in local projects with strong fundamentals and stable frameworks.

In the Q&A, panelists discussed the importance of offtake agreements, the need for clear and consistent policy implementation (especially around RED III in Europe), and the role of infrastructure in enabling demand. Garabedian projected that green hydrogen could reach $2.50/kg by 2030-2031, provided the industry stays focused on cost and efficiency.

The session closed on a personal note, with each panelist offering a message to their peers. Penfornis called for "conviction and resilience," Pauer urged the industry to "just do it," Garabedian reminded everyone that "renewable hydrogen doesn't have to be expensive," Dempsey declared, "we are doing this, we can do this, we will do this," and Hinton affirmed that his company is "ready to launch."

Jemelkova wrapped up with a rallying call: "Let's keep building. Let's keep going. And let's just do it."

SESSION 13:
WHAT'S ON THE HYDROGEN HORIZON? OUTLOOK FOR THE FUTURE OF HYDROGEN

In the final panel of the summit, moderator Monica Swanson of the Port of Rotterdam brought together a diverse group of global hydrogen leaders to reflect on the past year and look ahead to the future of hydrogen. The conversation was grounded in realism, but also filled with optimism and a shared sense of urgency to move from announcements to execution.

Monica Swanson (Moderator)
Program Manager International Hydrogen, Port of Rotterdam

Dr. Ralf Schaaf
Chief Technology Officer, First Ammonia

Dr. Jehan Kanga
Founder & CEO, RUX Energy

Arnava Sinha
EVP, Head of BD, Green Hydrogen & Ammonia, ACME Cleantech

Karen Hamberg
Partner & National Clean Technology Lead, Deloitte Canada

Johan Douma
Hydrogen Import Manager, Gasunie

Karen Hamberg, representing the Government of Canada, opened by highlighting the country's evolving hydrogen strategy. With a new prime minister committed to energy diversification, Canada is positioning itself as a global hydrogen leader. Hamberg emphasized the country's east-west trade ambitions, with green hydrogen projects in the Atlantic provinces targeting exports to Europe, and Western Canada looking toward the Asia-Pacific. She also noted growing domestic momentum, particularly in heavy-duty transportation, where pilot projects in British Columbia and Alberta are helping to build local demand and industry expertise.

Arnava Sinha of Acme Green Tech shared India's remarkable progress in green energy. He traced the country's journey from high-cost solar to one of the world's most competitive renewable markets, and explained how India is now applying that same model to green hydrogen. With a national target of 5 million tons of green hydrogen by 2030, India is building both export capacity and domestic demand, particularly in fertilizer and refining. Sinha emphasized the importance of flexibility in offtake agreements and the need for RFNBO certification to access European markets.

Dr. Ralf Schaaf of First Ammonia offered a European perspective on regulatory uncertainty. His company's project in Texas is European in design and offtake, but has been delayed by shifting US tax credit rules and complex EU regulations. Schaaf argued that hydrogen is a "political business," shaped more by policy than market forces, and called for simpler, more pragmatic rules to accelerate deployment.

Dr. Jehan Kanga of Rux Energy brought insights from Australia, where a recent landslide election has created political stability and renewed momentum for hydrogen. He described how small-scale, regionally produced hydrogen is already achieving price parity with diesel in remote areas, and how this is enabling larger maritime and bunkering projects. Kanga emphasized the importance of modularity, open-access infrastructure, and rapid deployment to build confidence and scale.

Johan Douma of Gasunie spoke about the Netherlands' role as a hydrogen hub for northwestern Europe. He described the country's progress in building hydrogen and CO_2 pipelines, including a corridor under construction in Rotterdam. Douma stressed the importance of international cooperation, policy alignment, and infrastructure investment to unlock offtake and reach a tipping point for industrial decarbonization.

Throughout the discussion, panelists returned to the theme of cost. While electrolyzer prices are falling, Schaaf noted that they account for less than 10% of total project costs. Civil works, logistics, and regulatory compliance remain major cost drivers. He urged the industry to focus on these "non-electrolyzer" elements and to challenge outdated engineering assumptions.

The panel also explored the tension between waiting for perfect regulations and moving ahead with imperfect but workable solutions. Kanga and Sinha both argued that countries like India and Australia, with more flexible frameworks, may be better positioned to lead in the near term. Meanwhile, Hamberg emphasized the importance of building domestic demand and industry capacity alongside export ambitions.

In closing, each panelist offered a final reflection. Hamberg reminded the audience that project execution is far harder than announcements, and that Canada's strength lies in its stability. Sinha described hydrogen's evolution from hype to hope to reality. Schaaf called for continued regulatory reform and cost reduction. Kanga emphasized coordination, collaboration, and open infrastructure. Douma urged the industry not to wait for the market, but to lead it.

Swanson wrapped up the session with a call for strategic execution and steady progress. "Big dreams are important," she said, "but it's the step-by-step work that will get us there."

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