



**GREEN HYDROGEN
SUMMIT**

Green Hydrogen SUMMIT 2024

Report

Hosted by

MASDAR 

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FOREWORD

As the 2030 deadline to limit CO2 emissions draws ever closer, the need to scale and integrate renewable energy solutions and infrastructure grows more pressing. Green hydrogen has emerged as a critical addition to the renewable energy mix, enabling some of the industries with the largest carbon footprints to decarbonize and accelerate the global energy transition.



Developing and adding green hydrogen to the global decarbonization toolbox could strengthen trade relationships between countries, help improve air quality, strengthen energy security and decarbonize hard-to-abate industries like iron and steel, fertilizers, aviation and marine transportation.

With demand for clean hydrogen projected to grow steadily and increasing commitment to green goals in both the private and public sectors, the conditions are right to fuel the growth of this vital technology.

At this critical moment, the second Green Hydrogen Summit convened in Abu Dhabi, bringing together policymakers, leading industry players, investors and civil society leaders from the region and around the globe. A series of impactful dialogues addressed hydrogen's critical role in decarbonizing the energy system, clarifying what is needed to unlock green

hydrogen at scale and support the energy transition on the journey to net-zero emissions by 2050.

Speakers discussed the immense potential of green hydrogen to decarbonize industries and meet the climate targets needed to divert the globe from climate disaster. High-level discussions emphasized the innovative and ambitious projects already underway worldwide; laid out the practicalities of financing ambitious projects and building infrastructure; and outlined the roadblocks – logistical and political – that stand in the way of a cleaner, more sustainable future powered by green hydrogen.

Underpinning the conversations – which spanned finance, infrastructure, politics, partnerships, technology and more – the spirit of collaboration and possibility remained a central thread. Host Eithne Treanor summarized the takeaway across panels by stating, "To achieve sustainability goals, we need more partnerships between the



public and private sector," continuing, "There's no point doing it alone and reinventing the wheel. We really need to be taking the best examples from around the world, and making sure that we learn from each other."

Nations can learn from nations, sectors can share knowledge and bridge gaps in resources, and together, usher the global green hydrogen economy into reality.

As keynote speaker, the Right Honorable Boris Johnson, stated, "Together we will not only promote peace, we will develop the technological solutions that will enable the world to tackle climate change, cut the cost of energy in the long term and produce millions of good, well-paid jobs."

And as the world continues to search for innovative new ways to build a more sustainable future where no one is left behind, the UAE and Masdar remain committed to bringing together key stakeholders and decision-makers to spark ideas and find common ground.

"Showing that the impossible can be achieved is, I believe, what we need."

Bertrand Piccard

Chairman, the Climate Impulse



THE VIEW FROM THE UAE

At the Green Hydrogen Summit, the UAE reaffirmed its commitment to establishing a green hydrogen economy fit for the future. As a vital element of the country's Energy Strategy 2050 – its roadmap to achieving climate neutrality by 2050 – green hydrogen is key to reducing emissions in hard-to-abate sectors. The summit was an opportunity for the UAE to continue the conversation with global partners and align strategies around establishing a resilient, innovative, and sustainable energy ecosystem.

Central to the discussions at the summit was Abu Dhabi's Low-Carbon Hydrogen Policy. Supported by major entities including Masdar, Mubadala, the Abu Dhabi Department of Energy, ADNOC, Department of Finance – Abu Dhabi, Abu Dhabi Investment Office, Abu Dhabi Department of Economic Development, Abu Dhabi Department of Municipalities and Transport and the Environment Agency – Abu Dhabi, the policy is an initiative that places the UAE at the forefront of green hydrogen development globally. The policy is part of a broader effort to integrate hydrogen technology into the national energy agenda, enhancing the UAE's role as a major player in sustainable energy. Carlos Gascó Travesedo, Energy Policy Executive Director at the Abu Dhabi Department of Energy, outlined the policy's objectives – one of which is to streamline collaboration between government entities and the private sector. "It allows the government and investors to engage on a permanent basis, and a hydrogen committee will be working closely

to analyze the projects that come, the added value to the economy of Abu Dhabi, and the future investments that are to follow," he said, during the panel entitled "Charting Abu Dhabi's Low Carbon Path." Contributing to the same discussion, Aaron Paul Howel, Energy Advisor at the Abu Dhabi Department of Finance, pointed out that Abu Dhabi's Low-Carbon Hydrogen Policy is "designed to offer confidence to investors. There's a very clear, established committee chaired by the Department of Finance, and we have very, very clear instructions and a responsibility to provide regulatory economic and financial support to this sector."

Mohammad Abdelqader El-Ramahi, Chief Green Hydrogen Officer at Masdar, reflected on Abu Dhabi's history as a global leader in the energy transition. He also called on international partners to join the nation in developing cost-effective, technology-driven and pioneering green hydrogen projects.

"We need international partners. We need to bring together all these international global players, financiers, technology providers and research institutions. We want to bring once again everyone to the same platform here in Abu Dhabi to create the green hydrogen economy."

Mohammad Abdelqader El-Ramahi

Chief Green Hydrogen Officer, Masdar

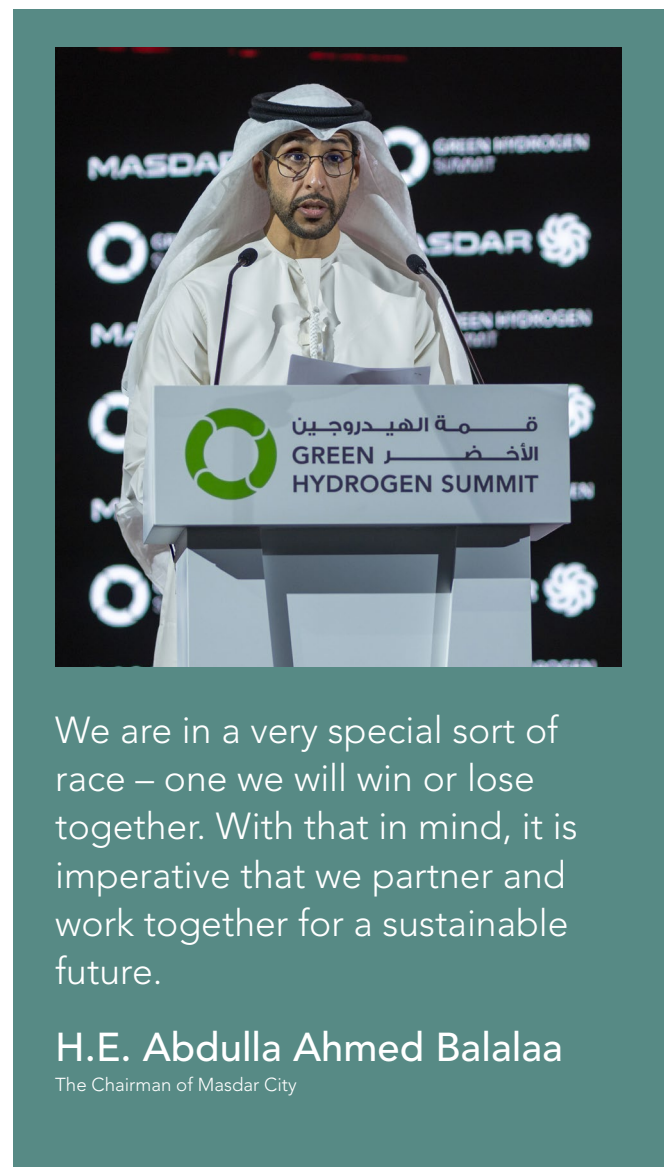


During the panel “Towards a Greener Horizon: Insights from the UAE’s Industry Leaders,” Khaled Al Huraimel, Group CEO & Vice Chairman at BEEAH; Tarek Hosny, Head of Investments and Projects at Fertiglabe; and Dr. Hesham Ismail, Senior Researcher at Dubai Electricity and Water Authority, discussed the UAE’s efforts to achieve its sustainability goals through energy diversification, reducing consumption, and waste management. The participants highlighted the country’s digitalization and waste management innovations, such as waste-to-hydrogen projects and the first waste-to-energy plant in the UAE, which has helped BEEAH to achieve 90% waste diversion. They emphasized the need for more partnerships between the public and private sectors to overcome the challenges of transitioning to green hydrogen.

Participants at the summit also touched on the path ahead, addressing infrastructure development, regulatory support, cost and technology. At the same time, there was a positive outlook on the UAE’s ambitious push toward green hydrogen. Speaking about Abu Dhabi’s Low-Carbon Hydrogen Policy, Aaron Paul Howel noted: “The UAE has positioned itself significantly ahead of many other areas and countries to deliver a low-carbon hydrogen economy.” The Chairman of Masdar City, H.E. Abdulla Ahmed Balalaa’s keynote address was also marked by optimism as he looked back at game-changing projects launched in the country over recent years: “The world’s largest single-site solar plant is powering 200,000 homes in the UAE right now, and one of our recent pilot projects was a high-speed hydrogen refueling station.”

The Green Hydrogen Summit served as a pivotal platform for the UAE to articulate its

vision and strategic initiatives around green hydrogen, reinforcing its position as a leader in global energy transformation. The ongoing efforts to overcome technological and economic challenges will be crucial for the UAE and the global community in achieving the ambitious goal of a carbon-neutral future. There was a recurring call for collaboration and joint action toward this goal throughout the summit.



OFF-TAKERS: THE PIONEERS OF THE HYDROGEN ECONOMY

The clean-hydrogen sector faces a familiar dilemma: the industry hesitates to invest in new projects without confirmed buyers, while off-takers watchfully wait for a stable supply before committing to contracts. Moreover, a shortage of government subsidies and a lagging regulatory environment prompt many promising developers to delay their plans.

Recognizing the exigency of the situation, a few organizations and nations are taking action by signing contracts for green hydrogen, even from projects still in the early stages or awaiting investment decisions. These are off-takers: pioneers laying the groundwork for the green hydrogen economy. In this realm, Europe and Asia are rising as the major backers of green hydrogen, through direct purchasing and the building of hospitable regulatory environments. Meanwhile, the United States' Inflation Reduction Act and Canada's Clean Hydrogen Investment Tax Credit offer valuable insights into how to effectively tailor policy to encourage the development of this promising industry.

Driving the Green Hydrogen Economy: Perspectives from World Leaders

The Green Hydrogen Summit featured speakers who are at the forefront of this change.

Representatives from Azerbaijan, Japan and the Netherlands highlighted major projects already underway. The leaders exemplified the range of actions and partnerships that can drive progress forward, from long-term strategy to breaking ground on infrastructure.

Azerbaijan's Minister of Energy, H.E. Parviz Shahbazov highlighted the creation of a green corridor between Azerbaijan, Uzbekistan and Kazakhstan, and the importance of public-private partnership in the creation of a green hydrogen economy. "It is a win-win situation when governments work together with companies," said Shahbazov. "There are certain things that governments should deliver [on energy projects] and certain things that companies [do best.]"

Japan's Parliamentary Vice-Minister of Economy Trade and Industry, H. E. Yoshida Nobuhiro,

showcased the nation's leadership in creating the world's first national strategy for hydrogen in 2017 and investment of over 20 trillion yen in developing renewable energy.

"It is important to establish a supply chain that is not dependent on any specific country ... Every country faces different energy situations, and there are various efforts to promote the utilization of green hydrogen," Nobuhiro said.

From the Netherlands, the Energy Special Envoy from the Ministry of Economic Affairs and Climate Policy, Frederik Wisselink, described how the country is already laying 1,000 km of pipeline, establishing itself as the future hydrogen backbone of Northern Europe.

In describing their various initiatives and experiences, three common threads emerged: the need to balance ambition with pragmatism, the facilitating role of policy and investment, and the vital importance of collaboration.



"I would like to find a common ground and accelerate the creation and development of the hydrogen market, which is in its infancy, through various pathways."

H.E. Yoshida Nobuhiro

Parliamentary Vice-Minister of Economy, Trade and Industry, Japan

Europe's Ambitious Vision: Green Hydrogen for Decarbonization

To help meet ambitious decarbonization targets, Europe is emerging as a major importer of green hydrogen. The European Commission has declared its intention to produce 10 million tonnes of renewable hydrogen and import the same amount by 2030, particularly for use in hard-to-abate sectors like industry and transport, and the EU has established the European Hydrogen Bank to support its development.

Joaquín Rodríguez Jadrque, Director of Hydrogen and Clean Energies at Cepsa, spoke about the supportive ecosystem in Europe and the importance of recognizing green hydrogen's critical role in wider climate goals: "In Europe, there is very clear regulation pointing to gradually decarbonizing heavy transportation."

Despite a supportive regional philosophy and business environment, Europe's green hydrogen market is still lagging behind its supportive regulatory environment. Speakers highlighted that despite mushrooming projects in Europe, less than five percent of these reach a Final Investment Decision. This is not for lack of viable technology, willingness or potential but due to a need for even more off-takers. Europe has led the way by showing how to encourage final investment decisions, but more needs to be done worldwide to create a sustainable hydrogen market.



Because, yes, this is all about hydrogen, but it is about decarbonizing ... to have an impact before 2030.

Joaquín Rodríguez Jadrque

Director of Hydrogen and Clean Energies, Cepsa

Allan Baker, Global Head of Energy Transition at Societe Generale, explained the vital importance of increasing the number of off-takers – in Europe and worldwide – to ensure that hydrogen projects secure long-term financing and gain the best possible chance for success.

"Globally, we've counted something like 800 projects around the world which are on the books and being developed but not going ahead. So it's not just a European problem. I think it's a much broader problem," said Baker.



"At the moment, [there is] a disconnect between what these projects can offer on the off-take side of the equation and what banks need to provide for long-term financing ... Revising a number of projects, we found it very difficult to find off-take which meets the bank's requirements for certainty, price and volume."

Allan Baker

Global Head of Energy Transition, Societe Generale

Lessons from the Inflation Reduction Act

Worldwide, governments are realizing their role in encouraging off-takers through supportive policy. The Inflation Reduction Act (IRA) in the United States is one of the most notable examples. Signed into law in late 2022, it aims to encourage the development of renewable energy through a \$350 billion investment in grants, technical assistance and tools, with other funds devoted to reducing healthcare costs and increasing tax revenue. The IRA has offered valuable lessons for nations evaluating how best to encourage clean-energy development as initial enthusiasm has turned to confusion about the complexities in accessing funding.

Daria Nochevnik, Director for Policy and Partnerships at the Hydrogen Council, explained the importance of knowledge sharing among policymakers: “We have seen how projects in Europe have been massively delayed when we’re talking about FID [final investment decision]. Globally, the project pipeline is around 1,400 mature projects. If you look at the projects that have crossed the FID line in Europe, that’s only 4%, as opposed to 5% in China ... So we have seen the material effect that complexity and uncertainty about the rules can have on the market and on the decisions that are made – or not made – by market participants and investors.”

However, lessons from Europe and the United States are not obstacles but opportunities, showing policymakers how they can shape policy to have maximum impact. Nochevnik continued:



“There’s a real opportunity to ensure that the proposed rule book is now reworked to guarantee that it’s truly fit for purpose for the industry and for investors, to allow them unlimited flexibility in order to maximize the value that hydrogen can bring.”

Daria Nochevnik

Director for Policy and Partnerships, the Hydrogen Council

The journey toward a future powered by clean hydrogen is promising. A key takeaway from the summit was that the next step in building the green hydrogen economy is creating and supporting the market, by highlighting the crucial role of off-takers and the need for streamlined policies.

Through collaboration, innovation and decisive action, we can propel the green hydrogen economy from aspiration to reality, bringing us one step closer to a more sustainable and inclusive future for all.

FINANCE: MAKING HYDROGEN BANKABLE

While off-takers are a crucial piece in the financing puzzle, many more are needed to complete the picture.

Green hydrogen may be one of the most promising renewable energy sources, but it is also costly. Today, green hydrogen is still more expensive than blue hydrogen because of the steep capital costs of electrolyzers and a lack of production at scale.

Green hydrogen also needs to scale considerably to effectively replace today's fuel systems. When addressing the summit, Director of Hydrogen and Clean Energies at Cepsa, Joaquín Rodríguez Jadraque, used the example of one of Spain's busiest ports, Algeciras, to illustrate the magnitude of the supply needed. Jadraque explained that to replace fossil fuel use on that port alone would require around 20 gigawatts of electrolyzer capacity – around 20 times more than today's global capacity to produce green hydrogen.

The technology and will to meet these challenges exists, but considerably more financing is needed to build, scale and iterate in time to make a difference for our environment. To achieve this, we will need an innovative blend of financial instruments, policy and partnerships.

The Role of Policy

In addition to off-taking agreements, governments and policymakers have considerable power in promoting the uptake of green hydrogen through subsidies, pricing policies and demand creation. As highlighted across sessions at the summit, a broad range of policies and initiatives have led the way. The Hydrogen Bank, an €800-million project, was launched to unlock investment and scale up the green hydrogen economy in Europe through targeted production subsidies and auctions. The US Inflation Reduction Act provides tax incentives for green hydrogen production. National initiatives like Germany's H2Global and the Netherlands' SDE ++ are powerful instruments promoting green hydrogen uptake.

Together, these are clear examples of how policy plays an integral role in creating market demand, supporting across financing and operations, stimulating investment and supporting research and development. The importance of these cannot be understated. While ultimately,

suppliers and off-takers will drive the green hydrogen economy, the seedling industry needs considerable support if it's to grow and bloom in the next decade.



“It’s a whole supply chain, it’s a whole economy we’re looking at if we want this to function. And that can’t happen without governments stepping up.”

James Grabert

Director of Mitigation at the UNFCCC

Banks and Banking Partnerships

Policymakers have a role to play, off-takers have a role to play, environmental engineers have a role to play, but there's one other critical cast member in the ensemble: banks.

Banks traditionally back industries that have more mature markets and more predictable patterns. But today's global climate challenge demands a rethink of how we can leverage the significant power of our economies' financial behemoths to propel us toward a green future.

Understanding green hydrogen's place in advancing growth in economies worldwide, development banks may be particularly suited to the task. The CEO of Dii Desert Energy, Cornelius Matthes, said "The role of development banks cannot be overstated. You need players like development banks coming in at [the] early stage and taking risks others simply wouldn't be prepared to take."

Rethinking Finance Solutions

Setting the scene at the start of the summit, Dr. Bertrand Piccard summed up the task that confronts the global community, as engineers, business leaders, governments and individuals navigate the early hydrogen economy: "We need to avoid the chicken and the egg dilemma. Producers waiting for consumers to appear and consumers waiting for producers to appear."

This requires innovative thinking, cooperation and solutions which span sectors. Piccard gave an example from Switzerland, in which a green hydrogen producer approached both supermarket chains interested in delivery trucks fueled by green hydrogen and fuel stations who would be interested in supplying the fleet simultaneously, in

The role of commercial banks, said Benoit Felix, Global Head of Structured Finance at Grupo Santander, is evolving when it comes to green hydrogen. Partnerships with multilaterals and export credit agencies can help enable the industry and reduce risk.



"The World Bank is trying to stimulate the development of the green hydrogen industry in developing economies, and through partnerships with other banks, we are really seeing green hydrogen scale up."

Claire Nicolas

Senior Energy Economist, World Bank

order to create a market loop for green hydrogen. As Dr. Piccard explained, "they solved the egg-and-chicken dilemma by building the entire farm at once."

Overhauling our energy systems over the next few years is an ambitious but necessary undertaking. To accomplish it, we will need to first overhaul how we think about financing. Just as with the energy technology itself, we need to take the best of what has worked in the past and leverage it for the future: using a blend of philanthropy, legislation, incentives and financial instruments, all backed by an ironclad mutual commitment to safeguard our future.

TOWARD A GLOBAL H2 ECONOMY

Green hydrogen could power giant ships for cleaner seas, lift planes into the air for clearer skies and decarbonize some of the world's most polluting industries like steel, cement and glass, slashing carbon emissions and powering a greener future. But it will take new infrastructure, scaling existing technologies exponentially, and profound commitment – both in investment and effort – from nations and industry alike.

At the Green Hydrogen Summit, the world's most prominent experts and advocates in the sphere analyzed the challenges, successes and opportunities as we plan, build and deploy hydrogen projects worldwide. They looked at the nations and organizations that are stepping up to the plate to bring ambitious projects out of planning stages and into reality through groundbreaking policy, globally significant partnerships, and investment in the technology, infrastructure and expertise needed.

From the promise and pain points of the Inflation Reduction Act and the UAE's strategic leadership through policy and investment, to the commitment of the European Union manifesting in projects and infrastructure, the summit made clear that the momentum needed to build a global green hydrogen economy is growing in strength.

Accelerating the pace of change

The other key theme at the summit: urgency.

Globally, we are working against the rapidly approaching deadline of 2050, a fact we're reminded of with increasingly blazing summers and bitter winters. As temperatures keep rising and records continue to be broken, climate

change has already begun to take a heavy toll on communities around the world. If green hydrogen is to fulfill its potential in a sustainable future, we need to raise awareness, increase financing, accelerate deployment and see a much greater commitment across the private and the public sector – within the next decade.



Summit participants were unified by this sense of urgency, understanding that the green hydrogen economy is part of a wider, vital mission to avert climate catastrophe. Speakers from across sectors and nations stressed that a sustainable, equitable future relied on heavy investment and commitment today. As Tom Philbeck, Managing Director at Swiss Foresight and Technology (SWIFT) Partners, said in closing the summit, “We’re here because we believe in sustainability. We have a keen interest in making an impact. We want to have a better future for the next generations.”

Foundations for a New Economy

Throughout the discussions at the event, there were four recurring themes: the vast potential of green hydrogen to decarbonize and reshape our future for the better; the need for a mix of financial instruments and supportive policies; the importance of creating and supporting the market; and the vital importance of succeeding in the mission to build a global green hydrogen economy, however impossible detractors claim it to be.

As Dr. Bertrand Piccard reminded participants, today’s bedrock technologies – the printing press, the airplane – were all once considered impossible. He urged participants: “We should not listen to the people who say that something is impossible. Because the impossible does not exist in reality. The impossible exists only in the

Philbeck unveiled the Net Zero Navigator, a groundbreaking foresight and AI-driven knowledge platform developed by Abu Dhabi Sustainability Week in partnership with SWIFT. The Navigator informs stakeholder decision-making by enabling unique cross-referencing of current financial mechanisms, best policy environments, incentives and partnership models. Through tools and knowledge across sectors and around the globe, the platform empowers stakeholders at every level of society in the development and scaling of technologies, innovations and strategies to achieve net zero faster.

mindset of the people who believe that the future will be an extrapolation of the past, which is never the case. The future is unpredictable, it’s uncertain and it requires us to be disruptive. That means to invent completely new ways to do and to think.”

The road to a global green hydrogen economy is a long one, marked by steep hills and deep valleys, but it is one that is traversable together. The Green Hydrogen Summit has helped map a global way forward, highlighting successes, sharing learning and showcasing emerging opportunities for other leaders to benefit from and implement. By thinking innovatively, designing realistic solutions and collaborating across sectors, we can build the green hydrogen economy, pipeline by pipeline, country by country.



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