



AUS European Union Green Hydrogen Dialogue #1: Summary Report Scaling and Accelerating Green Hydrogen: Global State of Play

The first AUS EU Green Hydrogen Dialogue saw opening presentations on the European Union and Australia context and the state of play of the green hydrogen economy each jurisdiction, to provide industry and policy perspectives on the facilitation of investment and assistance to reduce technology costs, foster coordination and common goals across the hydrogen value chain.

Themes for discussions during the Dialogue were on the following topics:

1. Facilitating investment and assistance in reducing technology costs and improving performance through support for research, development, and demonstration (RD&D), tax incentives as well as setting manufacturing or deployment targets, and other de-risking mechanisms.
2. Fostering coordination and common goals along the hydrogen value chain, across borders, across relevant sectors and between stakeholders, including establishing regulations, common standards, and certification schemes.
3. Essential role of ports and associated infrastructure in enabling a hydrogen economy in both exporting as well as importing countries.

Presentations on the EU and AUS context were provided by:

- Australian Hydrogen Council
- European Clean Hydrogen Partnership
- Department of Climate Change, Energy, Environment and Water (DCEEW)
- DG GROW (Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs) European Commission
- Environmental and Climate Affairs, Ministry of Economic Affairs, Ports and Transformation, Bremen, Germany
- DG ENERGY European Commission

Dialogue participants from a wide range of organisations shared their own experiences and insights on the barriers and challenges to scaling up the green hydrogen economy.

Summary of Discussion

Support in Research and Development

The importance of coordination in research and development and demonstration was highlighted by the EU Clean Hydrogen Partnership, which is the partnership of the European Commission with private associations comprising more than 550 industries/companies and 150 research organisations or academia. The Partnership has supported over 370 projects, with €1.6 billion in funding over the past 15 years, of which a considerable portion goes beyond university and research institutions to support start-ups and industry. Funding is also distributed across the value chain, with 33% being provided towards the end use of hydrogen in transportation and 18% for use of hydrogen in clean heat and power generation projects. In hydrogen production, a key focus of funding is green electrolysis with other pathways such as biomass reforming, direct splitting of water using sunlight (photocatalysis) and renewable waste to hydrogen projects also being explored. In recent times, anion exchange membrane electrolysis and solid oxide electrolysis has received considerable attention, with a research theme for alkaline electrolyzers being pressure management.

The EU adopts a technology agnostic approach to green hydrogen production and funding for research and emerging technology programs which are developed through co-design with industry. It was recommended that Australia adopt a similar approach to its hydrogen R&D funding schemes.





The EU Clean Hydrogen Partnership has since 2019 funded the global Hydrogen Valleys initiative for collaboration and information on innovative large scale flagship projects. Of the 91 Hydrogen Valleys listed on the H2V platform across some 34 countries (<https://h2v.eu>), 60 were located in Europe and four in Australia. The aim of the Hydrogen Valleys Platform is to promote the emergence and implementation of value chain integrating hydrogen projects and to facilitate international collaboration and information for project developers.

Questions were raised by participants on the viability of liquid organic hydrogen carriers (LOHCs), which are receiving considerable attention in Europe but not considered in Australian hydrogen projects. In Europe, some companies are presenting the business case for LOHC for funding, but project developers and technology suppliers in Australia have indicated that LOHCs are currently not cost-competitive with ammonia, the prevalent hydrogen carrier, albeit they may be more viable than liquified hydrogen for long-distance shipping of hydrogen.

Manufacturing Scaleup

A key EU focus has been on technology scaleup, which has seen a recent increase in the scale of EU electrolyser deployment. For example, the first trials for the deployment of high temperature electrolysis within Neste Biorefinery in Rotterdam, Netherlands in 2015 were for 150 kW, which by 2019 scaled up to 2.4 MW.

The scaling up of localised manufacturing capacity has been a strategic focus for the EU. The EU has a target of approximately 100 GW of electrolyser capacity by 2030, with a further target of 25 GW per year of manufacturing capacity by 2025. The EU Electrolyser Partnership was established to tackle this challenge and coordinate collaboration, comprising 20 European electrolyser manufacturers as well as 24 companies across the supply chain. As a result, the manufacturing capacity in the EU of electrolysers has been reported to be ~21 GW per year by 2025, a considerable feat considering that the manufacturing capacity in 2022 was less than 2.5 GW per year. Considerable funding supports electrolyser and component manufacturing in EU, such as the €1.4 billion in the Innovation Fund for clean tech manufacturing. However, inflationary pressures were eroding some of the gains arising from economies of scale for hydrogen electrolyser manufacturing. The EU has also ratified the Net-Zero Industry Act which mandates 40% of clean technology used in Europe has to be locally manufactured by 2030.

Existing EU-Australia Partnership

The Australian Hydrogen Council highlighted the number of EU companies involved in the hydrogen industry in Australia, including both as project developers as well as technology providers such as BOC, Iberdrola, Thyssenkrupp, Engie, Siemens, Yara, Air Liquide and others. For example, technology provider BOC is working alongside ATCO to develop hydrogen based peaking power generation as part of a South Australian government supported project. Similarly, the Abel Energy Bell Bay Methanol project is using Thyssenkrupp technologies. And it was further noted that European capital is also involved in the financing and investment of many Australian projects.

With export being the focus for the majority of Australian hydrogen projects, it was noted that EU off-take would play a pivotal role in shaping Australia's hydrogen economy. Unlocking demand and off-take agreements remains key, which could be assisted through a mechanism such as H2Global to support international business collaboration and exchange across the hydrogen value chain.

Critical Role of Ports and Hubs

The critical role of ports and hydrogen hubs (or hydrogen valleys as referred in EU) was highlighted by presentations and in discussions during the Dialogue. As is the case for the Port of Rotterdam, the German federal state of Bremen, with its ports and infrastructures, will be a key hub of the European Hydrogen backbone





and the German hydrogen core network. Given that Germany expects to import the majority of its future hydrogen demand, the development of import infrastructure at its ports is crucial.

However, there are challenges associated with the build-up of hydrogen import infrastructures in the ports, such as: (1) space limitations leading to competition with other potential uses such as offshore wind, and especially (2) insufficient financing of port infrastructure, which is an issue for all major German sea ports.

It was suggested that collaboration between hydrogen importing/exporting ports in the EU and Australia could provide opportunities for knowledge exchange on good practices and standards for handling hydrogen and derivatives, particularly ammonia, which is becoming the carrier of choice for global export-focused hydrogen projects.

As the majority of the shortlisted/announced projects under the Australian Hydrogen Headstart and regional hydrogen hubs programs were around existing port locations, the need to develop port infrastructure for hydrogen exports would likely be reduced in Australia.

Government Initiatives

The range of enabling government policies in both Australia and EU were outlined by the respective government speakers. The Australian Net Zero Authority has been established to co-ordinate and support Australia's commitment to 43% emission reduction by 2030 and to reach net-zero by 2050. The 2019 National Hydrogen Strategy was recently reviewed to reflect three key changes: (1) Enhanced focus on domestic decarbonisation, (2) updates on international developments following growing global policy support, and (3) a focus on domestic value-adding, given high shipping costs. Initiatives in growing Australia's hydrogen industry include (1) \$2 billion Hydrogen Headstart program, (2) \$0.5 billion in hydrogen hub initiative, (3) \$38 million Guarantee of Origin scheme, (4) national hydrogen infrastructure assessments, (5) legal frameworks reviews, (6) First Nations Clean Energy Strategy and (7) a review of skills and training. Currently, 15 projects have reached FID, with a combined investment of AUS \$225 billion. The Australian government is actively pursuing numerous hydrogen partnerships including Singapore, Germany, South Korea, Japan, India, USA, UK and Netherlands.

In the EU, the focus has been on market development for hydrogen, with priorities in the decarbonisation of existing hydrogen use cases, such as fertiliser production, followed by decarbonisation of hard-to-abate sectors that cannot be directly electrified (such as steel and long-distance transport). As the demand for low-carbon hydrogen is expected to grow significantly by 2050, EU has adopted numerous policies including (1) definition of renewable fuels of non-biological origin, (2) methodology to assess greenhouse gas emissions savings including Renewable Energy Directive (voluntary scheme), (3) domestic auctions for import of hydrogen (results due in April). EU priorities for international collaboration include supporting decarbonisation and the energy transition in partner countries (signing up to 10 MoUs), setting up frameworks for a functioning and global rules-based hydrogen market, and reducing EU supply uncertainty in order to develop industrial supply chains at competitive prices.

Participants raised questions about the EU policy on green ammonia, this being a policy focus proposed in next EU mandate. It was stated that AUS green ammonia producers were raising concerns that consumers are not ready to pay green premium, whereas the European farmers are yet to raise any concerns or objections to this. It was recommended that lessons be drawn from the green steel market in Germany, where buying green steel was found to increase cost of cars only nominally.





Standards and Certification

A major discussion point during the Dialogue was the issue of hydrogen certification and the need to ensure that EU and Australian GO certification schemes were coherent and interoperable. Given that the Australian scheme is still under development, it was recommended that the scheme be designed around the regulation settings of numerous overseas markets (including Asia-Pacific and Europe).

Australia was already a participant in Mission Innovation and multilateral forums such as the International Platform on Hydrogen Energy (IPHE), to ensure coherence in certification schemes. In Europe, certification schemes are voluntary, and it remains yet to be seen how this will shape up in the next few years. Questions on the suitability of using carbon based synthetic fuel from a sustainability certification perspective was raised, an issue to be further explored further in the Dialogue on Social Licence.

KEY DISCUSSION POINTS:

1. **Research and Development** is being supported in the EU with funding distributed across the value chain, in the private sector, at universities and research institutions, and at start-ups. Funding is technology-agnostic and is allocated towards technologies of both high and low TRL. Funding projects are co-designed with industry.
2. **Technology Scaleup** in the EU is mostly focused on scaling electrolyser production and deployment, especially on achieving local manufacturing capacity. A partnership of manufacturers and other companies across the supply chain is being established.
3. **The Australian H₂ Economy** can be unlocked through EU offtake agreements, that will provide a demand for the local production of green H₂. H₂ Global can play a role to assist in matchmaking.
4. **Ports and Hubs** are crucial infrastructures for the hydrogen economy. Challenges for implementation include lack of space and competition with other uses, as well as access to financing (for port infrastructure). Engagement and collaboration is proposed between Australian and EU port initiatives to share knowledge and practices, for example, the North Sea Hydrogen Valley Ports and Ports of Rotterdam and Flanders and Hydrogen Valley's program.
5. **Enabling Policies** in the EU and AUS should include investment and market development for hydrogen in hard to abate sectors such as fertilisers production. Concerns have been raised by ammonia producers of consumer reluctance to pay green premium for ammonia, however car manufacturers such as BMW have shown that they are willing to pay for green steel. Policy should further define aspects such as what constitutes renewable fuels of non-biological origin (RNFBOs).
6. **Certification Schemes** have been and are in development in the EU and AUS. It is important for mutual recognition and coherence between these schemes, which must also be designed to facilitate export to markets which may not have such a scheme in place. It was noted that the EU has adopted voluntary schemes to assess greenhouse gas emissions for hydrogen production.





PRESENTER BIOGRAPHIES:

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Clean Hydrogen Partnership**



Mirela ATANASIU is the current Executive Director ad interim of the Clean Hydrogen Partnership (which has taken over the predecessor Fuel Cells and Hydrogen Joint Undertaking, FCH JU), a Public-Private Partnership between European Commission and the European Industry (Hydrogen Europe) and Research Community (Hydrogen Europe Research). She is also the Head of Unit of Operations and Communication since 2016. Previously, for more than 12 years she was a Senior Project Manager and Research Programme Officer in the Joint Undertaking and European Commission (Directorate Research and Innovation/Energy), following on a background experience as researcher in the Energy sector in Romania. She holds an M.Sc. in Chemical Engineering/Materials Science and an M.Sc. in Economics/Cybernetics and Economic Analysis.

LEIGH KENNEDY

**General Manager – Industry and Supply Chain Development
Australian Hydrogen Council**



Leigh Kennedy is AHC’s General Manager – Industry and Supply Chain Development who is working collaboratively across Australia to de-risk domestic demand, domestic uptake of technology and grow a nationally networked Hydrogen Technology, Equipment and Technology (HETS) industry that can be promoted globally.

Before joining AHC, Leigh worked for NERA and developed a regional hydrogen technology cluster network that has fast tracked shared industry learnings and grown Australia’s industry network.

Leigh has also worked with Austrade’s international network and government partners to drive Austrade’s renewable energy and hydrogen global foreign direct investment attraction and facilitation strategy and assist clients deliver on their Australian expansion plans.

AGNESE DAGILE

**Team Leader in International Relations,
Directorate General for Energy
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Agnese Dagile has been a European Commission professional for over 15 years. Since 2023, she has been involved in developing international hydrogen markets, as well as energy relations with India and Central Asia at the Directorate General for Energy. In the past, she has negotiated and followed the implementation of structural reforms and investments from EU funds into the EU member states, implemented European economic governance and the European Semester, oversaw the implementation of the Cohesion policy, and provided EU pre-accession assistance to Latvia.

She has further organised public diplomacy activities for the integration of the Baltic countries into NATO and cooperated with the civil society organisations in Ukraine, Georgia, Armenia, Azerbaijan, Belarus and Russia on EU and security topics. For over 10 years, she has delivered lectures on EU integration, EU policies, and International relations at Riga Stradins University, Riga Graduate School of Law and University of Latvia.





THILO KRUPP
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Thilo Krupp holds a master's degree in Sustainable Economics & Management (MA). He is an advisor for hydrogen and decarbonisation at the Ministry of Economic Affairs, Ports, and Transformation for the German Federal State of Bremen. His focus includes port development for the expansion of offshore wind energy and hydrogen imports, alternative fuels, and international cooperation. With seven years in the offshore wind energy industry, Mr. Krupp brings a wealth of experience to drive sustainability and economic growth.

SIOBHAN MCGARRY
Policy Officer
Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW)
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Siobhan McGarry is a Policy Officer in the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, where she focuses on up-scaling the EU's electrolyser manufacturing capacities in line with its renewable hydrogen production targets.

Prior to joining the team in 2021, she worked in the European Commission's Directorate-General for Justice and Consumers and the Service for Foreign Policy Instruments and was also a consultant specialising in helping clients from third countries deepen their relations with the EU.

REBECCA THOMSON
Director, Hydrogen Guarantee of Origin and Trade section
Hydrogen Branch
Department of Climate Change, Energy, the Environment and Water (Australia)



Rebecca is currently the Director of the Guarantee of Origin and Trade team in the Hydrogen Branch at the Australian Department of Climate Change, Energy, the Environment and Water. Her team is responsible for leading the development of Australia's Hydrogen Guarantee of Origin Scheme. Rebecca is a public policy professional with over 10 years' experience in climate and energy policy and the clean energy transition, both in Australia and internationally. Previous roles have included working on Australia's Renewable Energy Target scheme, policy for industrial sector emissions and lead roles in climate change reviews. Rebecca has worked for the New Zealand Government on the design and implementation of the New Zealand Emissions Trading scheme. Rebecca holds a Graduate Diploma in Environmental Management from the University of Tasmania and a Bachelor of Commerce/Bachelor of Asian studies from the Australian National University.





DIALOGUE PARTICIPANT ORGANISATIONS

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DG ENERGY European Commission

Bureau Veritas

CSIRO

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Aurecon

German Australian Chamber of Commerce

German Australian Hydrogen Alliance

Griffith University

HYPE Certification

Iberdola Australia

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University of Technology – Institute of Sustainable Futures

Climate KIC Australia

University of New South Wales

NSW Decarbonisation Innovation Hub

European Climate Dialogues Project

