



Australia-European Union Green Hydrogen Dialogue #5: Summary Paper Power-to-X and the Key Hydrogen Derivatives

The fifth Dialogue was a hybrid online/in-person event, with the EU and Australian introductory presentations highlighting the importance of green hydrogen in enabling production of derivatives that can be used to decarbonise hard-to-abate sectors such as maritime and aviation. Presenters shared their insights into the social and environmental dimensions of Power-to-X, the role of green methanol and renewable ammonia in developing green shipping corridors and the use of sustainable aviation fuel and green hydrogen in aviation. Australian project proponents shared insights on their project developments and challenges with offtake and funding. Concerns and questions around social license of green low-carbon synthetic fuels and green ammonia were discussed. The project team also highlighted key recommendations arising from previous Dialogue sessions.

The discussions primarily focused on these topics:

1. Building an enabling framework for renewable Power-to-X
2. Disruptive green hydrogen and derivative technologies for aviation sector
3. Green shipping corridors and scope of maritime emission trading scheme for maritime sector
4. Importance of gaining social license for green carbon molecule and scalability of direct air capture technologies for practical deployment.

Presenters providing the EU and Australian policy and industry context were:

- Bartłomiej Gurba, Policy Officer, Air, Rail, Water and Intermodal Policy Unit, Directorate-General for Climate, European Commission
- Sébastien Dubois, Head of Unit – Programme Development and Communications, EU Clean Aviation Joint Undertaking
- Jan-Hendrik Scheyl, Head PtX Sustainability & Certification, International PtX Hub
- Fiona Simon, CEO, Australian Hydrogen Council
- Leigh Holder, Director, Business Development, Yara Clean Ammonia
- Ignacio Hernandez CEO, HIF Global Asia Pacific

The European Climate Dialogues Project Director Ms Gabriele Wagner joined the session in-person, providing an overview of the international activities and aims of the Project. Professor Iain McGill, Director of the Centre for Energy and Environmental Markets, University of New South Wales moderated the session.

This summary paper provides an overview of the key discussion points and participant organisations for dissemination through project partner channels.

Discussion Topics

Green Corridors for Shipping

Incentivizing the use of green fuels and cleaner technologies can lead to considerable reduction in carbon footprint for maritime transportation. Currently both green methanol and renewable ammonia are considered as key to decarbonizing this sector, specifically in enabling green corridors to be developed. Participation in green shipping corridors can create market opportunities for companies by aligning with the growing demand for sustainable shipping solutions. However, implementing these corridors requires collaboration among various stakeholders, including governments, shipping companies, port authorities, and technology providers.

Insights from the EU indicate that considerable CO₂ emissions are rising from both inter-EU voyages as well as from global supply chains. As part of the Fit-for-55 policy package, the EU Commission has established a series of initiatives tailored towards reducing the GHG emissions from shipping sector, including extension of EU ETS scheme to the maritime sector as well as a FuelEU maritime initiative. The forthcoming EU Innovation Fund call will focus on EU maritime decarbonization projects, for which Australia can play a key role as a supplier of green fuels for the sector. Opportunities arising from green corridors include investments and business in green fuels, bunkering and charging sites for ports and industry, and the opening-up of further shipping and trade corridors. The challenges for the establishment of green corridors were outlined,





which include the need for infrastructure upgrades to support alternative fuels and zero-emission vessels, as well as the necessity for international cooperation to harmonize regulations and standards across jurisdictions.

Enabling Dimensions of Power-to-X

It was generally agreed that one of the first applications for green hydrogen would be for Power-to-X, either to generate derivatives for transportation or for direct end-use. Australian participants indicated that contrasting with the EU, the discussion in Australia around green hydrogen refers mostly to hydrogen derivatives and Power-to-X rather than direct uses for hydrogen, which has seen limited application and interest. To maximize the benefits of Power-to-X, an enabling framework encompassing standards, regulation, certification, policies and sectorial strategy is suggested.

A key advantage in enabling Power-to-X is that it builds upon on existing regulation and policies in each country, given considerable trade already in renewable methanol and ammonia. Furthermore, unlocking the true benefit of Power-to-X requires incorporation of sustainable dimensions including economic, social, governance and environmental (EESG) factors. It was also recognized that not all of the EESG dimensions would be covered by government policies and regulations and thereby there is scope and opportunity for all stakeholders to work together to ensure sustainable Power-to-X economy. Other ways to deal with the EESG dimensions include sustainable finance criteria, voluntary certification schemes, and market and subsidy instruments eg: the European Hydrogen Bank.

SAF and Hydrogen in Decarbonising Aviation

It was noted that both sustainable aviation fuel (SAF) and energy efficiency measures such as efficient engine operations will lead to considerable decarbonisation of the aviation sector. Green hydrogen can also potentially be used for short to medium range flights, either for direct hydrogen combustion or through fuel cells. However to enable this, safety concerns related to the handling, storage, and transportation of hydrogen also need to be addressed, along with the development of specific regulatory frameworks and safety standards for hydrogen-powered aviation.

Direct Air Capture

Critical to Power-to-X is the role of sustainable sources of carbon dioxide, which can be combined with green hydrogen to generate synthetic fuels to decarbonize both aviation and maritime sectors. Whilst there still remains questions on what constitutes sustainable sources of carbon dioxide, there is consensus that carbon dioxide captured using direct air capture (DAC) technology will meet emerging sustainability and stringent certification standards of green fuels. Scalability and cost-effectiveness of DAC however an issue, and questions were raised on how large-scale deployment can be incentivized or funded.

Key discussion outcomes

1. Hydrogen derivatives including renewable ammonia and methanol will play a key role in enabling green shipping corridors to decarbonise the maritime sector, which is seeing increased policy and funding support to reach net-zero.
2. To unlock the true benefits of Power-to-X, an enabling framework encompassing standards, regulation, certification, policies and sectorial strategy is required.
3. The role of direct air capture technologies in a future green fuel supply chain is critical and more investment and research is required to advance this.



Presenter bios

Gabriele Wagner

Director, European Climate Dialogues Project



Gabriele Wagner is the Team Leader of the EU funded EU Climate Dialogues Project (EUCDs) spearheading activities in 19 countries addressing climate policy relevant activities. She spent most of her career in developing and supervising international cooperation projects in over 32 countries related to global environmental issues with a focus on climate change mitigation and adaptation, biodiversity conservation and ecosystem services and on operationalisation global environmental agreements within the framework of multilateral and bilateral cooperation. She has been working over 27 years mainly for the World Bank and the German technical cooperation, GIZ, both in

the headquarters and in the field.

Professor Iain MacGill

**Joint Director, Centre for Energy and Environmental Markets (CEEM)
University of New South Wales**



Professor Iain MacGill is a Professor in the School of Electrical Engineering and Telecommunications at the University of New South Wales, and Joint Director (Engineering) for the University's Centre for Energy and Environmental Markets (CEEM). He leads work in research areas of sustainable energy transformation and renewable energy integration, and Distributed energy systems including 'smart grids' and 'smart' homes, distributed generation and demand-side participation. His research interests span energy and climate policy, and he is an invited expert on task forces and technical reference groups with the International Energy Agency, Federal Government's

Australian Energy Technology Assessment, the Australian Energy Market Operator and the Australian Energy Market Commission. Iain has a PhD (Electrical Engineering) from UNSW, and a M.Eng.Sc. (Biomedical) and B.E. from the University of Melbourne.

Bartłomiej Gurba

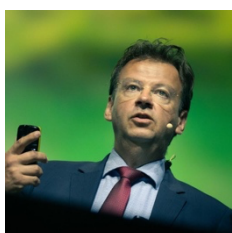
**Policy Officer – Air, Rail, Water and Intermodal Policy
DG Clima, European Commission**



Mr Gurba is Policy Officer within the Air, Rail, Water and Intermodal Policy Unit in DG Clima at the European Commission. His career at the Commission spans work at DG ENER as Team Leader for the Gas Team in the Wholesale Market Unit, and at DG Competition dealing with state aid in the area of Energy and almost 10 years dealing with internal gas and electricity markets, Renewables Directive, Energy Community and energy relations with Russia and Ukraine.

Sébastien Dubois

**Head of Unit – Programme Development and Communications
Clean Aviation Joint Undertaking**



Sébastien Dubois is the Head of Program Development and Communications for the Clean Aviation Joint Undertaking, a Public-Private Partnership and the European Union's leading Research and Innovation program for steering aviation towards a sustainable and climate-neutral future. He is responsible for defining, in coordination with members of Clean Aviation, the programming of the strategic content of the Joint Undertaking, for developing robust program content to deliver expected impact and benefits by 2035, and to establishing synergies with other European and international organizations.





Jan-Hendrik Scheyl
PtX Sustainability & Certification
International PtX Hub



At the International PtX Hub, Jan follows and engages in global and European processes on H2/PtX regulatory frameworks, with a specialization on the topic of certification and sustainability. One key topic Jan supports is how regulatory and policy frameworks can enable different countries around the world to benefit and participate in H2/PtX developments that fit each country context. Before joining the PtX Hub, he worked in sustainability consulting as a project manager, where he advised international clients on EU regulation, developed certification concepts, and conducted greenhouse gas emission calculations for fuel supply chains.

Dr. Fiona Simon
CEO
Australian Hydrogen Council



Fiona Simon is the CEO of the Australian Hydrogen Council (AHC), the peak body for the Australian hydrogen industry. AHC connects the hydrogen industry and its stakeholders in building a secure, clean and resilient energy future that sustainably produces and uses hydrogen within the energy mix. AHC's members are from a range of sectors, including energy, transport, consulting, banking and technology. Prior to joining the Australian Hydrogen Council, Fiona worked for close to 20 years in energy policy and regulation, specialising in energy retail competition and consumer protection matters. Fiona holds a Bachelor of Arts and a Doctor of Philosophy from the University of Melbourne and has published a well-regarded academic book on retail energy regulation in Australia.

Leigh Holders
Director – Business Development
Yara Clean Ammonia



Leigh Holder has led the Australian legal function of Norwegian-based Yara (the world's leading chemical company converting energy, natural minerals and nitrogen into essential products for farmers and industrial customers) for seven years, playing a central legal and commercial role on Yara Australia's M&A activities

Ignacio Hernandez
CEO
HIF Global Asia Pacific



Ignacio Hernandez is CEO of HIF Asia Pacific, leading HIF Global's activities in Australia and Asia. Prior to this role, Ignacio was CFO of AME, HIF's largest shareholder. Before joining HIF, Ignacio spent over 18 years as an investment banker in Australia and Chile with a focus on the infrastructure, energy and private equity sectors.

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Dialogue Participant Organisations

ACEN

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APA Group

APSMO

Asena

ASX

Australian Hydrogen Council

CEFC

Centre for Energy and Environmental Markets (CEEM), UNSW

Certscape

Clean Aviation Joint Undertaking

Climate-KIC Australia

Climate Zeitgeist

Decarice

DG Clima, European Commission

GHD

Global Centre for Climate & Security Governance (GCSG)

Global Counsel

GlobH2E

Greenhouse

GZE

HIF Global Asia Pacific

HYPE Certification

Institute for Sustainable Futures, UTS

International PtX Hub

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OTK

Ottareon Group

Parrington Group

Personal

Plasmaleap

Pollination

Positive Good

PT PLN (Persero)

Retired

Retired, Mining Engineering, Mining / Construction / Quarrying Machinery, Steelmaking and related activities

Sustain Intelligence

UNSW

University of Technology Sydney

Worley Consulting

Yara Clean Ammonia



CLIMATEKIC
Australia



GlobH2E
IRC Industrial Transformation Training Centre
for the Global Hydrogen Economy



Power Fuels
including Hydrogen
Network
DECARB HUB

