# Hydrogen in the Energy System Decarbonization

Webinar organised under the auspices of the
Experts' Group on R&D Priority-setting and Evaluation (EGRD) under the IEA

24 November 2021
2000-2245 (JST) 1200-1445 (Central European Time) 0600-0845 (US Eastern Standard Time)

Hosted by The Institute of Applied Energy

Hydrogen has been used mainly as feedstocks for industrial applications. Nowadays, hydrogen is expected to be introduced as a new energy carrier that will play a key role in the success of decarbonization, in the industrial, transportation, and building sectors, or as a sector coupling between these sectors. Countries around the world are developing new hydrogen strategies and policies to promote the use of hydrogen through cost reduction and demand creation. The production of hydrogen has traditionally been carried out by extracting hydrogen from hydrocarbon resources, but in the near future, the use of renewable energy sources and CO2-recovery fossil fuels will enable the reduction of CO2 emissions[1].

This webinar will look at the hydrogen in the clean energy transition from different angles: hydrogen strategies in energy and industrial policies, challenges in zero-carbon emission hydrogen energy carrier production with large-scale demand creation, research and development priorities in international cooperation.

Each session will start with presentations from leading experts followed by discussion.

**Expected outcomes**

The webinar will result in a summary report identifying the challenges and opportunities of addressing the energy system incorporated hydrogen energy carrier and will present perspectives for R&D planners and strategists. In addition, an executive summary will be presented to IEA's Committee on Energy Research and Technology (CERT).

**Registration**:

Registration for the event HERE (https://www.iae.or.jp/e/egrd/registration/)

| **Introduction: Opening and scene-setting remarks**<br>Moderator: Birte Holst Jørgensen, EGRD Chair | |
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| 20:00-20:20 | Welcome<br>- Toshiyuki Sakamoto, CERT vice chair, Institute of Energy Economics Japan<br>- Hidechika Koizumi, Director, International Affairs Division, Agency for Natural Resources and Energy Ministry of Economy, Trade and Industry<br>- Atsushi Kurosawa, Research Director, EGRD vice-chair, The Institute of Applied Energy<br>- Birte Holst Jørgensen, EGRD Chair, Technical University of Denmark<br>Introductory presentations:<br>Global Hydrogen Review 2021 – key highlights<br>- Uwe Remme, Head of IEA's Hydrogen and Alternative Fuels Unit, International Energy Agency<br>Mission Innovation's Hydrogen Mission<br>- Matthijs Soede, Clean Hydrogen Mission Director, European Commission |

[1] Global Hydrogen Review, International Energy Agency, 2021

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| **Session I: Introduction to hydrogen in decarbonization transition policies**<br>Moderator: Atsushi Kurosawa, EGRD vice chair<br>This session focuses on lessons learned from hydrogen strategies. | |
| 20:20-20:35 | Japan's vision and actions toward hydrogen-based economy<br>- Hiroki Yoshida, Deputy Director, Hydrogen and Fuel Cell Strategy Office, Advanced Energy Systems and Structure Division, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry |
| 20:35-20:50 | EU's Hydrogen Strategy<br>- Luca Polizzi, Policy Officer, Research and Innovation Policy on Hydrogen, European Commission |
| 20:50-21:05 | U.S. DOE Hydrogen and Fuel Cell Perspectives<br>- Eric L Miller, Senior Advisor, Hydrogen & Fuel Cell Technologies Office, Office of Energy Efficiency & Renewable Energy, US Department of Energy |
| 21:05-21:15 | Discussion |
| **Session II: Hydrogen value chain in energy system - from demonstration to commercialization**<br>Moderator: Johannes Tambornino, EGRD vice chair<br>This session focuses on status of demonstrations and bottlenecks towards commercialization. | |
| 21:15-21:30 | Hydrogen industrial value chain - production, transportation and utilization (tentative title)<br>- Motohiko Nishimura, Deputy General Manager, Hydrogen Strategy Division, Kawasaki Heavy Industries |
| 21:30-21:45 | WESTKÜSTE100 – Green Hydrogen on an industrial scale<br>- Michael Berger, Professor, University of Applied Science Westküste |
| 21:45-21:55 | Discussion |
| 21:55-22:00 | Break |
| **Session III: R&D priorities**<br>Moderator: Per Anders WIDELL, IEA<br>This session focuses on hydrogen related R&D priorities. | |
| 22:00-22:10 | System analysis - hydrogen opportunities in energy R&D (tentative title)<br>- Yuki Ishimoto, Vice Director, Hydrogen Energy Group, The Institute of Applied Energy |
| 22:10-22:20 | Mission Innovation hydrogen valley platform<br>- Mirela Atanasiu, Head of Unit Operations and Communications, Fuel Cells And Hydrogen Joint Undertaking, the European Commission |
| 22:20-22:30 | Research Gaps towards hydrogen commercialization – findings from Net Zero Emissions Report and Tracking Clean Energy Progress (tentative title)<br>- Jose M Bermudez, Energy Technology Analyst, Hydrogen and Alternative Fuels, International Energy Agency |
| 22:30-22:40 | Hydrogen TCP, the key to international R&D collaboration<br>- Marina Holgado, Hydrogen Technology Collaboration Program (Hydrogen TCP) Secretariat |
| 22:40-22:45 | Concluding Remarks – Birte Jorgensen, EGRD Chair & Atsushi Kurosawa, EGRD vice chair |

## The Institute of Applied Energy

The Institute of Applied Energy (IAE) is a nonprofit organization conducting technology related research in broad energy areas. To secure stable energy supplies and address global environmental issues, strategic planning and implementation from long-term and global perspectives are prerequisites. The IAE conducts studies and organizes projects with broad network among industry, academia and the government. The activities of IAE are supported by the contributions from industry members and research contracts with government agencies, private industries. https://www.iae.or.jp/e/

## IEA's Committee on Energy Research and Technology (CERT) and EGRD

The International Energy Agency's Committee on Energy Research and Technology (CERT) co-ordinates and promotes the development, demonstration and deployment of technologies to meet challenges in the energy sector. The CERT has established four working parties: the Working Party on Fossil Energy; the Working Party on Renewable Energy Technologies; the Working Party on Energy End-Use Technologies; and the Fusion Power Co-ordinating Committee. Experts' groups such as the EGRD are also created under the CERT. EGRD is an informal advisory group under CERT with the role of supporting CERT delegates with advice on R&D priority-setting and the linkage to governmental policy objectives, methods and approaches for evaluation of R&D activities, and understanding of emerging and systematic R&D topics. Recent topics include: Evaluating the impacts of energy innovation policies (2021), Circularity in the Clean Energy Transition (2021), The role of behavioural aspects for reaching net zero emissions by 2050 (2021), Energy infrastructures: public acceptance (2020), Energy Islands: Developing Renewable Energy Hubs (2020) and Energy Communities (2020). Workshop summaries are available here: https://userstcp.org/iea-egrd

Presentation speakers and moderators

**Birte Holst Jørgensen (moderator)**, Technical University of Denmark, is Chair of the IEA EGRD. She is an experienced researcher and practitioner in the field of new energy technologies and systems, where she has specialized in energy R&D strategies and technology policies at the national, European and international levels. She is responsible for scientific advice at DTU Wind Energy, including technical assistance to the Danish Energy Agency's Global Cooperation programme (offshore wind and RE integration). She is also Principal Coordinator of sustainable energy at the Sino-Danish Centre for Research and Education. Birte holds a PhD in Political Science (University of Copenhagen) and an MSc in Business Economics (Copenhagen Business School).

**Toshiyuki Sakamoto** is a Board Member and Director for Climate Change and Energy Efficiency Unit, the Institute of Energy Economics, Japan or IEEJ. He currently serves as a Vice Chair of CERT/IEA. He worked as a Japanese government official at Ministry of Economy, Trade and Industry or METI for 30 years. During that period, he mainly dealt with energy and climate policies in Japan and abroad. He joined the IEEJ in 2020 after working at two private companies related to energy supply. He holds a master's degree of engineering (the University of Tokyo) and a master's degree of business administration (the University of Michigan).

**Hidechika Koizumi** is Hidechika Koizumi is Director, International Affairs Division, Agency for Natural Resources and Energy (ANRE), Ministry of Economy, Trade and Industry (METI), Japan. He has long and rich experience in energy and climate change policy, having worked on international energy security, including close cooperation with the IEA, and international negotiations under United Nations Framework Convention on Climate Change (UNFCCC). He also engaged in trade and energy issues concerning US-Japan relations as a counselor at the Japanese Embassy to the United States. He earned a Master's degree in Public Administration at Woodrow Wilson School of Public Policy, Princeton University.

**Atsushi Kurosawa (moderator)** is Vice Chair of IEA EGRD. He is Director of the Global Environmental Programme, Research and Development Division, Institute of Applied Energy (IAE) in Japan. His research focuses on integrated assessments of global climate change and energy R&D strategies through the integrated assessment model GRAPE and the TIMES Japan model. He has held visiting and fellowship positions at many universities and institutes, including Stanford University, the Research Institute of Innovative Technology for the Earth, Kyushu University, the Japan Science and Technology Agency, the New Energy and Industrial Technology Development Organization and the University of Tokyo. He holds a PhD in Electrical Engineering (University of Tokyo), an MSc in Nuclear Engineering (Tokyo Institute of Technology) and a BSc in Nuclear Engineering (Nagoya University).

**Uwe Remme** is Head of the Hydrogen and Alternative Fuels Unit at the International Energy Agency (IEA) and leads the energy supply analysis and modelling within the Energy Technology Perspectives project. Before his current assignment, he was energy modeller at the IEA and contributed as lead author to various IEA publications. Prior to joining the IEA, he worked as researcher at the University Stuttgart. Uwe Remme studied chemical engineering at RWTH Aachen University, Germany, and Carnegie Mellon University, Pittsburgh, and completed a PhD degree in mechanical engineering at the University Stuttgart.

**Matthijs Soede** has a PhD in Chemical Engineering from Delft University of Technology. He began his career at SenterNovem, an agency of the Ministry of Economic Affairs in the Netherlands, advising companies, research organisations and universities on European programmes for research and development. In 2008, he was seconded to Industrial Technologies directorate in DG Research of the European Commission. After his secondment, he joined the European Commission as Senior Policy Officer in the Clean Energy Transition unit of DG Research and Innovation and has been responsible for offshore renewable energy technologies. He is representing the European Commission in the EIA Renewable Energy Working Party and is vice-chair of the IEA TCP on Ocean Energy Systems. Since 2021 member of the MI Clean Hydrogen Mission co-leads team and recently appointed as Mission Director.

**Hiroki Yoshida** is Deputy Director, Hydrogen and Fuel Cells Strategy Office, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry. Currently he is in charge of managing hydrogen-related projects for hydrogen society development and promoting international cooperation promotion. He engaged in international cooperation, space industry, industrial standards, small and medium enterprise, intellectual property, machine industry, strategic technology roadmap, information and communication electronics in his carrier. He joined UC San Diego Global Leadership Institute Program in 2015-2016.

**Eric L. Miller** is Senior Advisor at the Hydrogen and Fuel Cell Technologies Office of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, where he plays important roles in the Department's Hydrogen Energy Earthshot and H2@Scale Initiatives. He is also co-founder and Chair of the DOE Energy Materials Network, and a member of the OSTP Subcommittee on the Material Genome Initiative. With a background in applied physics and materials science, he has spent over 30 years in the research and development of hydrogen and other clean energy technologies, and is globally recognized as a pioneer in the field of solar hydrogen production.

**Johannes Tambornino (moderator)** is Vice Chair of IEA EGRD. He is the head of the Energy Strategies and Systems Analysis Unit at Project Management Jülich, where he is responsible for the R&D program on energy systems analysis funded by the German Ministry of Economic Affairs and Energy. He is leading a group that covers a broad range of topics along the energy innovation chain and currently serves as the German representative in the IEA Experts' Group on R&D Priority Setting and Innovation. He holds a PhD in Mathematical Physics and has actively pursued research in quantum gravity and cosmology at different laboratories in Canada, France and Germany before changing fields and devoting his time to energy-related issues.

**Michael Berger** got his Ph.D. (1986) and the Venia Legendi (1994) at the University of Duisburg, Germany, on Silicon Device Engineering. After several years in semiconductor industry he joined the University of Applied Sciences Westkueste, where he first became Dean of the Technology Department and then Vice President (2003 – 2016). Since 2018 he heads the Institute for the Transformation of the Energy System of his UAS. In 2021 he became the coordinator of the Center of Competence of Hydrogen Research in the state of Schleswig-Holstein. Dr. Berger is a board member of the project WESTKÜSTE100.

**Yuki Ishimoto** is Vice Director of the Hydrogen program, Research and Development Division, Institute of Applied Energy (IAE) in Japan. His research focuses on Hydrogen energy system analysis especially including large scale hydrogen transport using hydrogen carriers such as liquefied hydrogen, ammonia, liquid organic chemical hydrides (LCOH). He holds a Ph.D. in science (University of Tsukuba) and an MBA in technology management (Waseda University).

**Mirela ATANASIU** is the Head of Unit of Operations and Communication in the Fuel Cells and Hydrogen Joint Undertaking, FCH JU (Public-Private Partnership between European Industry and Research Community, and European Commission) since 2016. Previously, for more than 12 years she was a Senior Project Manager and Research Programme Officer in the FCH JU and European Commission (Directorate R&I/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.

**Marina Holgado** is a Project Engineer in ARIEMA Energía y Medioambiente (a Spanish SME focused on hydrogen technologies), where she has participated in national and international R&D projects. She has also collaborated in the Technical Secretariat of the Spanish Hydrogen Association (AeH2) and the Spanish Technological Platform for Hydrogen and Fuel Cells (PTEHPC). Since July 2020, she coordinates the Technical Secretariat of the Hydrogen TCP. Chemical Engineer and Energy Engineer with a Masters in Renewable Energies, Hydrogen Production and Fuel Cells.