

1st Information Exchange

Workshop between Clean Hydrogen Partnership and NEDO on Electrolysis R&I

Date: 18 November 2024

Location: Brussels

Invited Attendees: 8 participants from NEDO and 10 from Japanese companies; 5 participants from the Clean Hydrogen JU and 14 from EU companies / Institutions

Minutes

This workshop marked the first occasion to discuss detailed ideas for possible collaborations in the field of electrolysis as a mutual area of interest following the signature of the [collaboration agreement](#) concluded between the Clean Hydrogen Partnership (CH JU) and NEDO on 3 June 2024.

Event opened by Ms. Valerie Bouillon-Delpoite and Mr. Eiji Ohira.

Ms Mirela Atanasiu was Master of Ceremony and also presented an overview of CH JU activities on electrolysis - 79 projects supported by 290.3M Euro. Largest novel electrolyser demonstration project operates 10MW PEMEL or foresee 20-30 MW AEL. Emphasis on off-shore (10MW PEMEL demo) and on sea water electrolysis (low TRL). Performance, safety, sustainability and circularity are important criteria for competitiveness of electrolysers.

Ms Mirei Isaka presented an overview of Japan's R&D activities on electrolysis, based on the recent Hydrogen Society Promotion Act and Japan's Basic Hydrogen Strategy, including the promotion of electrolysis technologies. Japan also considering decarbonization of hydrogen production with CCUS, besides renewable electrolysis. NEDO promotes demonstration projects on electrolysis including 1.5MW PEMEL in Yamanashi and 10MW AEL in Fukushima, aiming for scaling up. Work also on low TRL material development and establishing testing platforms are in progress.

Performance of electrolysers: Evaluation, methodologies, facilities

Mr. Pietro Moretto (JRC) presented the evaluation, methodologies and facilities for testing the performance of electrolysers. He covered the evaluation framework and flagged the challenges for projects to reach the targeted performance indicators while it is not clear how measurements are taken. Hence the need for harmonised testing that the JRC is facilitating. Project <https://cleanhypro.eu/> is developing an open platform for testing materials while the JRC is developing a platform for testing electrolyser stacks up to 30kW and 30 bar.

Mr. Tetsuhiko Maeda presented the AIST support to the evaluation of electrolysers and in particular the Green Innovation project. Degradation to be studied in testbed for 500kW PEMEL operating with renewables, followed by MW scale AEL. Emphasis on degradation and gas cross over. Facility suitable for collaborations.

A discussion followed on possible areas of collaboration where issues like evaluation of AST, gas cross-over, performance for fluctuating input were mentioned. The importance of publicly accessible testing facilities was flagged. A specific area for collaboration could be the definition of testing protocols

where the IPHE could also be invited to contribute. Not clear what mechanism could be used to implement such a collaboration (grant? Study?)

Safety-related framework in electrolysis

Mr. Alberto Garcia of the CH JU presented an overview of safety related legislation / directives and RCS related to electrolysis, referring also to ISO and IEC standards relevant to electrolysis. The main safety hazards of electrolyzers were listed as well as the risk assessment methodologies. He also mentioned the collaboration with the JRC (incl. those related to HIAD, the Hydrogen Incidents and Accidents Database) and as well as the activities performed by European Hydrogen Safety Panel (EHSP).

Mr. Kenji Oyamada presented an overview of the safety standards developed by the High Pressure Gas Safety Institute of Japan (KHK). KHK is happy to share safety information, including important accident reports, and intends to deepen the cooperation on hydrogen safety with the JRC. In 2024 collaboration was established with S. Korea on H₂ and NH₃ safety. Gas cross-over was highlighted as a major safety concern, referring to a 2019 incident in S. Korea.

In the follow up brief discussion, Alberto Garcia proposed three points for cooperation.

1. HIAD: KHK and JRC/ EHSP (representing the CH JU) could share information about hydrogen-related incidents/ accidents thanks to the Memorandum of Cooperation between KHK and JRC (to be signed shortly). In this respect the KHK – JRC collaboration is understood as part of/ as a means to implement the NEDO – JU collaboration on safety on electrolysis, and beyond.
2. Cooperation in upcoming projects on safety of electrolysis, to be identified on a regular basis, e.g., based on the topics included in the CH JU annual calls for proposals – similarly to the cooperation between CH JU and US DOE/ Hydrogen and Fuel Cell Technologies Office (HFTO).
3. Exchange of information with regards to the quantification and assessment of potential H₂ emissions (wanted or unwanted) along the H₂ chain – in the context of NHYRA project.

As a result of the exchanges, the first two points proposed for cooperation seemed to be welcome by all the parties/ attendees, but concerning the last point, Laurent Antoni, IPHE Director, mentioned that a new task on H₂ leakages is about to be launched at IPHE, and this seemed to be a better place to cooperate (globally) in these aspects, instead of bilaterally between NEDO-JU.

Sustainability activities relevant to electrolyzers

Mr. Javier Dufour gave an overview of sustainability related projects of the CH JU (eGHOST, SUSTAINCELL), of the collaboration with the JRC and of the European Hydrogen Sustainability and Circularity Panel (EHS&CP). Emphasis is on moving towards sustainable-by-design fuel cell and hydrogen products as well as on establishing a durable and sustainable component supply chain.

Mr. Daisuke Izuhara gave a presentation on a PEM Electrolyzer using Hydrocarbon (HC)-based Electrolyte Membrane developed by TORAY Industries. This company is producing various materials related to H₂ production, transportation, storage and use. TORAY has developed a HC based membrane with superior performance compared to traditional PFAS/fluorine-based membrane (higher efficiency, current density, lower cross-over). Toray and Yamanashi prefecture have been promoting the demonstration of Japan's first MW class of PEM electrolyzer in cooperation with Kanadevia (previous Hitachi-Zosen). In 2025, 16MW demonstration is planned in collaboration with Siemens Energy and Kanadevia (TORAY membrane in their PEM electrolyzers).



In the follow up brief discussion it has been emphasised about the harmonisation of life cycle analysis, H₂ leakage and reduction/substitution of PGM/CRM from electrocatalysts and of PFAS-based materials in ionomers and membranes.