

# European Consortium Launches DELYCIOUS Research Project to Optimize the Operation of Renewable Hydrogen Production Units

A consortium of eight European partners announces the launch of **DELYCIOUS (Diagnostic tools for Electrolyzers: Cost-efficient, Innovative, Open, Universal and Safe)** research project on 1 January, 2025 – aimed at developing advanced diagnostic and monitoring tools for water electrolyzers. The project, coordinated by Fraunhofer Institute for Wind Energy Systems IWES (Fraunhofer IWES), brings together leading research institutions and industry players from five EU member states.

As Europe accelerates its transition to clean energy, the Net Zero Industry Act identifies low-carbon hydrogen production as a strategic priority. DELYCIOUS tackles key challenges in water electrolysis technology, focusing on extending electrolyser lifespans and reducing operational costs under variable renewable energy sources.

## DELYCIOUS Innovation and Impact

The project pioneers innovative approaches by integrating Raman and Electrochemical Impedance spectroscopies with advanced physical and data-driven modelling. These tools will be validated across three major electrolysis technologies: alkaline (AEL), proton exchange membrane (PEMEL), and solid oxide electrolysis (SOEL), with a demonstration on alkaline electrolyzers beyond 100 kW.

*'DELYCIOUS represents one more step forward in making green hydrogen production more efficient and cost-effective', says **Aline Luxa, Coordinator at Fraunhofer IWES.** 'Our consortium's diverse expertise positions us to develop universal diagnostic tools that will be crucial for the widespread adoption of water electrolysis technologies.'*

### Expected impacts include:

- Advancing scientific knowledge in electrolyser diagnostics and fault detection.
- Building capacity through training new experts in renewable energy and AI-driven diagnostics.



Photo: Representatives of DELYCIOUS consortium partners

- Contributing to the development of renewable hydrogen production in Europe and the integration of renewable energies.
- Strengthening Europe's position in the growing renewable hydrogen market.
- Contributing to UN SDGs, particularly clean energy (SDG7), industrial innovation (SDG9), responsible production and consumption (SDG12), and climate action (SDG13).

## Strategic Roles of Consortium Partners

- **Fraunhofer IWES (Germany)** leads the project and will conduct large-scale validation testing on an AEL stack exceeding 100 KW, leveraging their extensive testing infrastructure at Hydrogen Lab Leuna and expertise in detailed modelling.
- **Air Liquide R&D (Innovation Campus Frankfurt, Germany)** contributes their expertise in performance analysis and data-driven approaches, leading the development of diagnostic algorithms and conducting lab-scale tests, as well as acting as Technical Coordinator.
- **ETA Florence (Italy)** manages the dissemination and communication activities, ensuring effective stakeholder engagement and knowledge transfer.
- **Dumarey Softronix (Italy)** develops the advanced control systems and innovative software solutions, with particular emphasis on diagnostic strategies and system optimization.
- **Horiba (France)** leads hardware integration, providing their world-leading expertise in spectroscopic instrumentation and high-performance optical components for process control.
- **University of Twente (Netherlands)** brings their rich experience in multiscale modelling and ceramic-based electrochemical devices, focusing on the development of multiphysics models for electrolyser diagnostics and fault detection, and SOEL testing.
- **SIVONIC GmbH (Germany)** provides specialized impedance spectrometers and ensures optimal impedance measurements for both laboratory and large-scale validation tests.
- **Stargate (Estonia)** contributes their novel alkaline electrolyser technology and expertise in electrochemical characterization methods, offering their systems for validation.

*By 2035, it is projected that 10% of water electrolysis capacity installed in the EU will utilize DELYCIOUS technology.*

## Key Highlights from the Project Kickoff Meeting



Credits @ ETA-Florence Renewable Energies

*Photo: Consortium partners presented at the Kickoff Meeting*

The DELYCIOUS project successfully organized a kickoff meeting on 16-17 January 2025 at Fraunhofer IWES in Hamburg, Germany.

**Day 1** focused on laying the groundwork for the project, including administrative structures, quality assurance, and reporting. Initial work package discussions highlighted the importance of effective communication, dissemination strategies, and data management practices.

**Day 2** delved into technical aspects, featuring updates on test rig configurations, device specifications, and coordination strategies for data sharing across electrolysis technologies. Key technical milestones and plans for Deliverables were outlined, ensuring a clear roadmap for the project's implementation.

## Acknowledgement and Disclaimer:

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The project will run until the end of 2027.

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## Consortium Partners

