DELYCIOUS

Clean Hydrogen Partnership

Co-funded by the European Union

D7.3 Algo and HMI Requirements

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About DELYCIOUS

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. In DELYCIOUS, the development of cost-efficient, innovative, open, universal, and safe diagnostic tools to investigate the chemical and electrochemical properties of electrolysis systems is foreseen. This project combines Raman Spectroscopy (Raman) and Electrochemical Impedance Spectroscopy (EIS), to explore the chemical and electrochemical properties of electrolysis systems. By using both physical and data-driven modelling, it will be possible to identify important degradation parameters. To ensure that the diagnostic tools work effectively in various temperature ranges and across various electrolysis technologies, three technologies namely Alkaline Electrolysis (AEL), Proton Exchange Membrane Electrolysis (PEMEL), and Solid Oxide Electrolysis (SOEL) are addressed in this project, with a demonstration on alkaline electrolysers beyond 100 KW.

Consortium

Fraunhofer IWES

Coordinator

Air Liquide

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SIVONIC

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Publishable Summary

Within DELYCIOUS, the role of bridging the communication between the plant and the algorithm is embodied by the Electrolyser Management System (EMS). The development of the EMS requires the definition of two main interfaces: Plant sensors/EMS and EMS/Algorithm. The latter is the focus of the present Deliverable.

This interface has to be constructed as such that the electrolyser plant data (common sensoristic, voltages, advance monitoring diagnostics) are transmitted to the algorithm to process them and extract the information related to the SOH. Additionally, the processed data needs to be displayed in near-real time to the plant operator using a Graphical User Interface (GUI) in the EMS software.

Herein the proposed solution focus on establishing a secure, real-time, and reliable communication channel for two primary exchanges:

- **Data Ingestion**: Receiving raw data streams from the electrolyser equipped with the Raman and Electrochemical Impedance Spectroscopy (EIS) modules, via the EMS for further processing by the algorithm.
- **Result Publication**: Publishing the algorithm's output (State of health KPIs, estimations) back to the EMS for visualization.

The proposed communication framework will leverage the AWS MQTT Broker, acting as a bridge between the EMS and the Algorithm. This solution allows for near-real time data transfer, scalability and data security.

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