Enabling Renewable Hydrogen in Europe

- Determine the optimal mix of renewables, electricity storage, hydrogen, and grid connection through the development of a new site design tool
- Improve pre-feasibility level plant designs for different production capacities of electrolyzer systems
- Provide analysis, recommendations, and guidelines on electrolyzer performance and degradation impacts from flexible operation
- Conduct renewable hydrogen-related sustainability, safety, and environmental assessments

Background

Hydrogen produced using renewable energy has the potential to enable economy-wide carbon reduction by lowering emissions in hard-to-decarbonize applications. This collaborative project aims to bring together organizations leading efforts to accelerate the role of renewable hydrogen for a decarbonized and sustainable energy economy. These efforts represent early phases of a broader energy transformation, as stakeholders spanning manufacturing, operations, maintenance, and end-use are quickly learning how to plan for and adopt renewable hydrogen technologies. By forming a collaborative, EPRI seeks to support an accelerated adoption curve for renewable hydrogen that could lead to lower costs and better access to clean and reliable energy for society.

Working with participating organizations, EPRI plans to identify and address gaps and limitations that could act as barriers for creating a sustainable hydrogen economy. Recent commercial investments and projects will be reviewed and will serve as a basis for identifying ways to optimize designs, improve operations, and increase efficiencies.

Benefits and New Learning

This project is expected to produce valuable tools and resources with the potential for immediate application, leveraging near-term hydrogen deployment activities while supporting the creation of a sustainable energy economy. New insights and deliverables should include:

- Modeling and design tools for energy technologies and systems, technology roadmaps and guidelines for the selection of renewable hydrogen production technologies
- Applied research learnings to support optimal operation and reliability of assets in the design, engineering, operation, and maintenance phase of assets
- Learnings on the optimization of renewable electricity and hydrogen production for grid balancing services and ancillary services
- Knowledge of manufacturer offered and commercially available solutions for small-, medium-, and large-scale electrolyzers
- Case studies on the main uses of hydrogen in industry, sustainable mobility, hydrogen injection into the natural gas grid or the use of fuel cells for grid balancing and/or ancillary services
- Industry user forums and information resources to disseminate learnings, issues, and best practices in real time

Objectives and Project Approach

The project is organized in four pillars covering key challenges to accelerate the deployment of renewable hydrogen in Europe:

1. Optimization of the mix of renewable energy and hydrogen production, considering site location and size, hydrogen demand, grid connection, operational flexibility, site type, technology constraints, and power prices, along with weather-related variables at specific locations
2. Engineering references for projects at different scales (from tens to hundreds of MW).

3. Electrolyzer performance and degradation, including the development of a tool to estimate degradation rates for alkaline and PEM technologies with variation of operational pattern, degradation test procedures guidelines, and the creation of an industry electrolysis degradation database
4. Sustainability, safety, and environmental assessments to better understand associated impacts

The project will engage a dozen entities involved in the development of renewable hydrogen projects, including large and smaller companies, developers, and manufacturers. All participants are expected to share knowledge and experiences on the topics included in the project.

Deliverables

The results will be presented in 14 deliverables, including tools, case studies, guidelines, best practices conclusions, and recommendations that will help organizations to take decisions regarding the hydrogen initiatives under development. The project will also initiate the creation of an industry electrolysis degradation database.

Price of Project

The project contemplates different costs depending on the size and nature of the entity, differentiating consistently between:

- Large companies from the electric, oil and gas sector
- Medium and small companies from the electric, oils and gas sector
- Renewable developers
- Vendors

The estimated budget for the project is $2.4 M which will be covered by the members and participant contribution according to its size and nature.

Project Schedule

The start date for this project is February 2023. It is expected to take 24 months to complete.

Who Should Join

Organizations interested in gaining a better understanding of some of the fundamental challenges of renewable hydrogen production project development and that can apply the results to their near-term project decisions. Key players in the energy landscape who are potential users of the technology (electricity and gas utilities, oil companies, developers, etc.) and/or are involved technology development.

Contact Information

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