Supplemental Project Notice

GRID INTEGRATION OF HYDROGEN ELECTROLYSIS

PROJECT HIGHLIGHTS

- Timely information on the main electrolysis technologies, their costs, operation and performance.
- Development of use cases and considerations on constraints associated with electrolysis.
- Guidance on defining parameters associated with electrolysis to be included in resource adequacy and system planning models.
- Support members in making capital investment decisions on electrolysis technologies.

Background, Objectives, and New Learnings

Global energy demand is growing each year with many countries setting ambitious targets on the road to decarbonization and with renewable hydrogen playing a key role in pursuing the path to "net zero emissions" by 2050.

Renewable hydrogen refers to hydrogen produced via electrolysis from renewable energies, resulting in very low-to-no greenhouse gas emissions. The electrolysis separates hydrogen and oxygen from water and the hydrogen thus generated can be used as a feedstock, fuel for mobility, energy storage (including large-scale storage), in industrial processes, or as a vector for decentralized energy production.

With more than 1,000 hydrogen projects announced (76% of which are expected to be operational by 2030), there are a number of challenges to overcome. These include the development and cost of the technology, scale-up of hydrogen production facilities, regulation, market development as well as the integration of electrolysers into the electricity system to provide society with affordable, safe, and sustainable energy.

In relation to power system integration, there are many uncertainties associated with the massive development of large-scale renewable hydrogen projects and their impact on resource adequacy, dispatch constraints, and parameters to be considered in power system planning and analysis.

This project aims to analyze and provide the best available data to grid planners so that they can improve production cost, adequacy, power flow, and RMS stability analyses with respect to electrolysis.

Benefits

The potential benefits of this project include:

1. Gain a better understanding of electrolysis technologies, associated costs, operational constraints, and capacity for development and expected growth.
2. Development of use cases and considerations on constraints associated with electrolysis
3. Support electric companies in developing more robust resource plans involving electrolysis technologies.
4. Guidance on defining parameters associated with electrolysis to be included in resource adequacy and system planning models.

Project Approach and Summary

The project will cover three main topics:

Topic 1: Technology & Performance

- Overview of main electrolysis technologies, literature review of costs and development timeframe, and review of operational constraints and performance.

Topic 2: Dispatch strategy

- Provide principal use cases for electrolysis and associated dispatch constraints that could be applied to a production cost model.

Topic 3: Steady state and Transient performance

- Provide guidance on parameterization of generic models suitable to represent large scale electrolysis in power system analysis applications.

Three milestone meetings are expected to take place during the project to update project participants on progress, review deliverable drafts, and results.

Deliverables

Each participant in this project will receive the following deliverables:

- Electrolysis Technology & Performance Summary & Data sheet (Technology Brief)
- Summary of credible electrolysis use cases and related dispatch strategy (Briefing document)
- Recommendations for electrolysis load model parameterization (Briefing document)
- Workshop to disseminate final project results

The non-proprietary results of this work will be incorporated into EPRI's Transmission and Distribution Operations and Planning R&D programs and made available to the public for purchase or otherwise.

Price of Project

The price of the project is $40K per funder. A minimum of four participants is needed to begin the project. The project is eligible for Self-Directed Funding (SDF) and Tailored Collaboration (TC) funding.

Project Status and Schedule

The project is expected to kick off in Q1 2024, pending signing up the minimum number of participants, with an estimated project duration of seven months between kickoff and completion.

Who Should Join

Organizations involved in planning and operating the grid that are in interested in gaining a better understanding of the state of the state of development and deployment of electrolysis technologies, production costs and dispatch constraints, and the impact on the power system of massive and large-scale development of electrolysis projects.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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