

QualyGridS Report Summary

Project ID: 735485

Funded under: H2020-EU.3.3.8.3.

Periodic Reporting for period 1 - QualyGridS (Standardized Qualifying tests of electrolyzers for grid services)

Reporting period: 2017-01-01 to 2018-06-30

Summary of the context and overall objectives of the project

In the course of EU decarbonisation with increasing renewable energy share the electricity sector will experience demand and generation-driven fluctuations. The conversion of excess electricity to hydrogen (and vice versa) can help facilitate the integration of large shares of intermittent renewable sources into the electrical grid. Water electrolyzers (WE) can produce hydrogen from excess or low-cost electricity and can provide balancing load in electricity grids. The hydrogen is used as feedstock for chemical industry or as a fuel for mobility, storage of hydrogen and conversion back to electricity when needed or feeding into the gas grid.

Electricity grid services are used by grid operators to achieve reliable and effective operation of electricity grids. The requirements of grid services can vary from service to service and from region to region. Usually a grid service requires that a supplier or consumer of electricity like e.g large scale electrolyzers should make an increase or decrease of its power according to the grid service request.

However, an analysis of performance requirements, the definition of standardized tests for water electrolyser qualification and the development of business models combining various electrolyser uses are important issues still to be solved and are addressed by QualyGridS.

By making available qualification tests for water electrolyzers to manufacturers and their customers and showing possible business models, selling tools and arguments will be obtained to convince future clients, operators and users. The initial roadmap for developing and implementing grid services by water electrolyser system at different levels (regional, country and European) will constitute a guideline for the decision makers and paves the way in the political processes.

More detailed objectives are:

- Review of electrical grid service requirements
- Testing protocols ready for international standard + Performance Indicators
- State of the art PEM and alkaline electrolyser systems tests for protocol and electrolyser qualification
- Analysis of business models and market opportunities in EU states
- Project results communication and interaction with relevant stakeholders

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

An overview of technical aspects of electricity grid services and the evaluations based on known water electrolyser capabilities which services of which country are relevant were prepared. Various European regions were considered.

A first set of testing protocols was submitted for water electrolyzers performing relevant grid services supported by the results

of some initial electrolyser tests. Protocols and Performance Indicators were described for basic characterisation of grid service relevant parameters, FCR, aFRR, mFRR and DSR grid services.

Alkaline electrolysers manufactured by the partner Industrie Haute Technologie, IHT, and located at Aragon Hydrogen Foundation (≤ 25 kW) and IHT facilities (≤ 120 kW) will be tested. The test benches capabilities were prepared for the relevant tests. A PEM water electrolyser system (≤ 35 kW) that was designed and manufactured by ITM incorporated the recently developed "MegaStack" platform (MEP). The electrolyser is now running in DTU labs where the testing facilities were upgraded for the tests. Also used for testing is a PEM water electrolyser (≤ 50 kW) operated by DLR (manufacturer Hydrogenics). It is ready and tests started. Finally a NEL alkaline water electrolyser system (300 kW) is close to being ready and will also soon produce test results.

For the techno-economic analysis and evaluation of business cases two national Swiss and two international symposia with a focus on the grid service markets have been organized, providing a direct link with international experts and a sound information base for the evaluation of the European grid service markets. In a survey amongst 36 TSOs and 143 DSOs it was found that there is hardly any established market for DSO/BRP/peer-to-peer grid services. For the TSO grid services, an evaluation identified the economically most attractive candidates.

A dissemination and exploitation plan for the project was set up, updated and published. Dissemination was done via a web site, symposia and presentations at conferences.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

Testing protocols for water electrolysers performing electricity grid services in a variety of countries were to our knowledge were not yet publically available. Therefore the draft of such protocols as well as the suggestions of performance indicators is a progress beyond the state of the art. Until the end of the project the experimentally evaluated testing protocols will be published and ready to submit to standardisation organisations.

The testing protocols will be applied in 3 alkaline and 2 PEM electrolysers collecting experience of testing and impact of the different systems and with focus on a variety of aspects. The results will be used to improve the testing protocols. Public reports and papers will be prepared to share the new knowledge. The manufacturers in the project will have standardised test results for what grid services their electrolysers are suitable which provides them with a selling argument.

The existing data base describing grid service markets in Europe has been extended by own primary research, leading to a reliable overview of prices and market conditions. By the end of the project, a detailed analysis of the grid service business logic and the potential contribution of the grid service markets for water electrolysers to a reduction of the hydrogen production cost will be achieved.

Workshops for disseminating the project results and findings on water electrolyser protocols and testing as well as on market aspects are planned in the last year of the project.

A stronger penetration and integration of water electrolysers for electricity grid services in Europe will be prepared by the overall work of this project.

Related information



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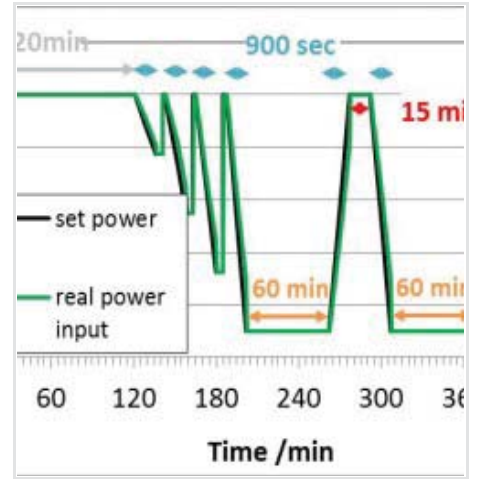


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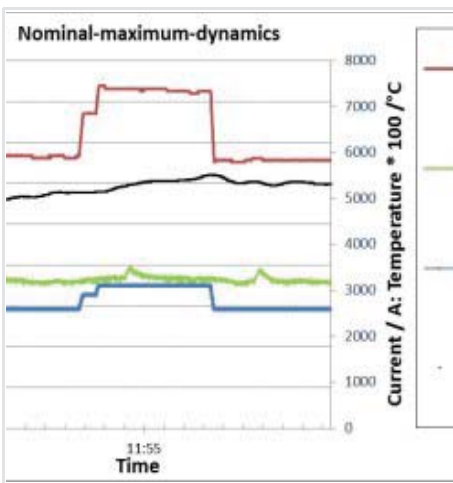


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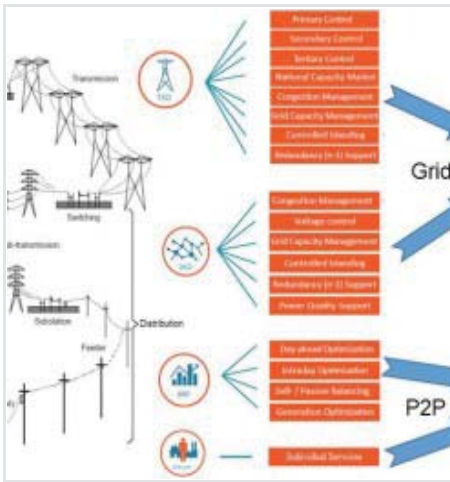


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