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GW - Hydrohub GW Scale Electrolyser

A conceptual design, fit for implementation in 5 industrial regions, for a 1-GW electrolyser plant that is ready for start-up in 2030 and that delivers H2 at an economically viable cost level.

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Partners Dow, Gasunie, Nouryon, OCI Nitrogen, Yara, Ørsted, Frames, MTSA, TNO, Imperial College London, Utrecht University, Eindhoven University of Technology, SDR, North Sea Port, Provincie Groningen, Groningen Seaports, Port of Rotterdam, Provincie Zuid Holland, Gemeente Rotterdam, Stedin, Deltalinqs, Port of Amsterdam, Provincie Noord-Holland, Gemeente Amsterdam, Tata Steel

Budget 2.8 M€

Duration 2018-2022

Incentive

In the energy system of the near future a key role will be played by renewable electricity. This will feed the platform for green value chains with H_2 as intermediate for products (e.g. via the syngas platform or the ammonia platform), for mobility and for heating. The key technology in this value chain is H_2 production via electrolysis. Hydrogen production via electrolysis is currently done only at MW scale.

However, to match the demand for green hydrogen of the Dutch industry and to play a significant role in buffering the future intermittent power supply, a significant scale up is required of the electrolyser capacity at least to the GW scale.

Objective

Develop a conceptual design and a transparent cost estimation methodology, fit for implementation in 5 industrial regions, for a 1-GW electrolyser plant that is ready for start-up in 2030 and that delivers H_2 at an economically viable cost level (reduction of levelized cost of hydrogen including total installed cost -CAPEX is essential).

Approach

In this project input from science partners, industrial partners and industrial regions is combined.

Results

- Cost roadmaps for PEM and Alkaline.
- A first design and operating model to support optimisation of a 1-GW plant.
- The infrastructural consequences, including plot size, of incorporating a state-of-the-art (2020 level) 1-GW plant in 5 industrial clusters.
- A plot plan for a state-of-the-art facility for PEM and Alkaline.
- A reference design package (2020 level) for PEM and Alkaline.
- Total installed costs for a 1-GW facility has been determined for Alkaline (€ 1400 /kW) and PEM (€ 1800 / kW).

Next steps

- Cost development including learning rates 2020-2030 for PEM and Alkaline.
- Determine effect of innovations on future design.
- Develop advanced design 2030 level.
- Determine total installed costs 2030 level.
- Asses levelized costs of hydrogen 2020-2030.

Institute for Sustainable Process Technology

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