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# Techno-economic evaluation of electrolysers for hydrogen production

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## Abstract

Electrolysers are the most promising technology to intensively scale up (low-carbon) hydrogen production from electric power. The design of an electrolyser and its balance-of-plant is highly dependent on the project individual boundary conditions, such as power source type, required product quality, economic parameters, etc.

In the work being presented, a tool has been developed which condenses these issues to only three dimensions. Together these dimensions can visualize the techno-economic optimum for any electrolysis project despite electrolysis technology, business case or any other boundary condition.

The tool is based on the two key variables *specific CAPEX* and *specific power demand* as the main driver of OPEX. The cell degradation as a third dimension can be optionally added (degradation leads to an increase of specific power demand over time). Generally, higher efficiency comes along with higher CAPEX. This dependency is essential and an individual characteristic of any technology and supplier. However, usually suppliers provide proposals for only one individual design which most probably does not lead to the (initially normally unknown) optimum for the business case. Nevertheless, both above mentioned key variables and their dependency can be derived from suppliers' electrolyser proposals.

On the basis of generic but realistic data, the author demonstrates that neither the cheapest nor the most efficient electrolyser leads generally to the best economical results. The main outcome of the tool is a curve indicating the optimal setups of CAPEX and efficiency available on market. This curve gives a first indication about the optimum and enables the user to shortlist suppliers. Combining the results of this tool and the business case sensitivity towards CAPEX and OPEX, the user is able to identify the individual techno-economical optimum.