

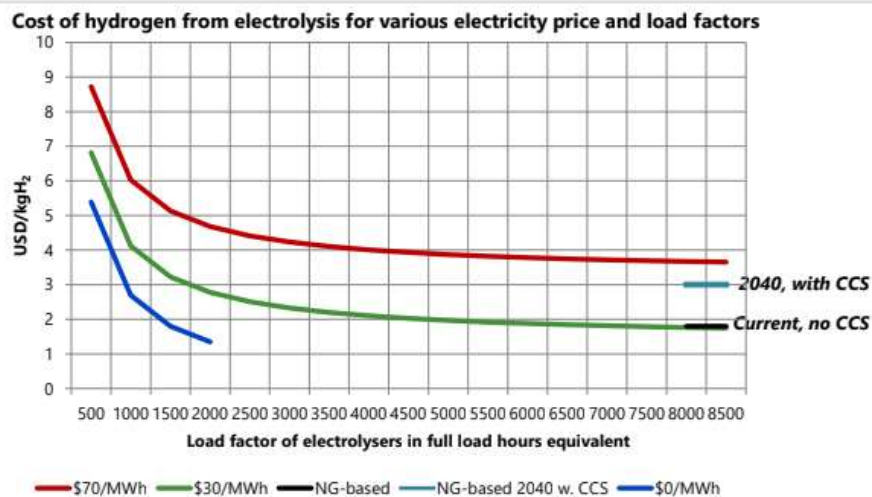
EUREC's comments on Area 2 'electrolysers' topic in special European Green Deal call

Phrases we like and why

Reduce the electrolyser CAPEX by 20% down to €480/kW and €700/kW for Alkaline and PEM electrolysers respectively, meeting the Fuel Cells and Hydrogen Joint Undertaking targets for 2024

CAPEX reduction is crucial. To compete against fossil-fuel-derived hydrogen (produced via a different process), the cost of the renewable electricity must be very low AND the electrolyser must be operated for the equivalent around 3000 full-load-hours per year so that it is not the capital cost of electrolyser that dominates in the overall cost of the hydrogen. This is illustrated in the slide from the IEA below.

Green hydrogen from water electrolysis can compete...



Beyond 20- 40% capacity factor the cost of electricity dominates the cost of hydrogen from electrolysis; With "surplus" electricity the cost of hydrogen increases rapidly if load factors fall below 3000 FLH

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"The performance and the durability of the electrolyser operating dynamically need to be assessed"

“Demonstrate the increased usage and economic impact of RES mix, addressing potential curtailment issues in Demand Response operation (if grid connected)”

It is especially important that electrolyzers are designed for dynamic operation.

Hydrogen’s contribution to the energy system will be enabled by cheap PV and wind (in Europe, particularly PV according to scenarios produced by LUT for Solar Power Europe). Huge PV capacities installed from 2030 will provide low cost electricity to power electrolyzers. These electrolyzers will run during daylight hours, as shown in the chart below.

The outline of the curves above and below the 0-axis is symmetric: electricity supply and electricity use is perfectly balanced in the system at every moment. But only a relatively small part of the total electricity generated is used for meeting ‘Power demand’, i.e. the demand for electricity used by appliances. Far more is used for fuel production, where hydrogen is relevant. The shape of that curve is a daily bulge: it rises during daylight hours as sunlight hits PV panels. So, to be relevant to a low-cost net-zero-carbon energy system, electrolyzers must, in addition to having low CAPEX

- be efficient and perform well at part load,
- be capable of ramping,
- be tolerant to frequent start-stops.

These challenges must be set more clearly in the topic’s ‘Technology Impacts’.

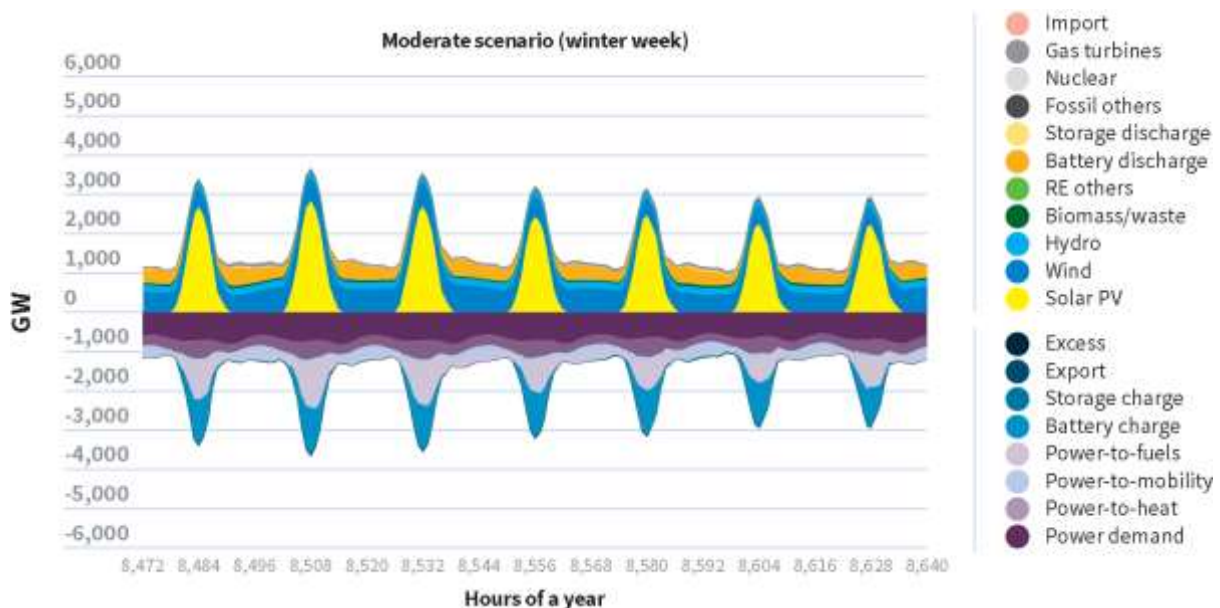


Figure 1 from [LUT’s study for Solar Power Europe](#), *100% Renewable Europe – How To Make Europe’s Energy System Climate-Neutral Before 2050* (Apr 2020). Shows output from modelling work for year 2050 under the ‘Moderate’ scenario.

Ideas/phrases we like less or that are unclear

The modules will then be assembled into a 100MW electrolyser system

While we understand the wish to demonstrate an economy of scale, this economy will derive mainly in the serial manufacturing of the twenty 4-5 MW modules, and not in the connecting-together of those modules to make a 100 MW ensemble.

The energy system may be globally better served if the electrolyser modules are spread out around the system, e.g. close to bottlenecks as alternative to more copper in the ground, close to centres of variable-RES-electricity production, and not just close to hydrogen end-users, as implied by the topic's reference to mobility hubs, fertiliser production plants etc.

The project could be required to test this hypothesis, comparing the system benefits of installing 50 MW in on place vs 10 x 5MW in various locations.

“Mandatory knowledge sharing activity”

The mandatory knowledge sharing activity seems insubstantial. It should be beefed up to match the rules of ETS innovation Fund, which will fund very similar demonstration projects.

Section 6.2 of the [first official FAQ](#) of the ETS Innovation fund says,

“The knowledge to be shared will cover the whole project cycle – from preparation to financial close; from entry into operation to operation. The likely areas of relevant knowledge to be shared are project management, procurement, permitting, construction, commissioning, performance, cost level and cost per unit performance, environmental impacts, health and safety, as well as needs for further research and development. More in-depth knowledge will be shared with all Innovation Fund projects of the same category and with any other project that has agreed to share information with the Commission on the same terms as the Innovation Fund projects”

Area 2 EGD demo call projects should be made to “share information with the Commission on the same terms as the Innovation Fund projects” and join an appropriate knowledge sharing club.

A general comment

The H2020 Green Deal call is for demonstration projects because they are seen as a quicker way to generate economic activity than low-TRL projects. Fair enough. But the first calls of Horizon Europe should redress the balance, particularly considering that ETS innovation Fund will fund installations of innovative low-carbon energy technology from this year.