

# Success is stacking up for large-scale electrolysers



**Projects funded by the Clean Hydrogen Partnership are developing advanced megawatt-scale electrolysers to meet the standards required for hydrogen production at industrial sites. These electrolysers are used to produce hydrogen on a larger scale using intermittent electricity sources, specifically for industrial purposes and in challenging conditions.**

## Scaling up production

Green hydrogen production is increasingly recognised as a sustainable solution for various industrial and commercial applications, including steelmaking, chemical processing, transportation and power generation.

Based on their experience, electrolyser manufacturers have improved materials, enhanced performance and increased durability – reducing costs.

Scaling up of these production processes will be the next big challenge, as integration with renewable energy sources requires more sophisticated systems and energy storage solutions.

## Project leaders towards clean green hydrogen production

Scaling up the technology has resulted in a 6 MW proton exchange membrane (PEM) electrolysis installation that produced almost 1 000 tonnes of hydrogen over

the demonstration period. Thanks to improved dynamic operation characteristics the cost of hydrogen was reduced by 50 %.

The H2FUTURE, DEMO4GRID, REFHYNE and DJEWELS projects focused on developing low-temperature PEM or alkaline electrolysers ranging from 3 MW to 20 MW for a range of industrial applications.

For high temperature solid oxide electrolysers (SOEL), the emphasis was on increasing electrolyser capacity to the MW scale. Projects GRINHY and GRINHY2.0 aimed at improving components and systems, gaining in-depth understanding of fuel stack performance and reducing capital expenditure as well as integrating the systems in a steel production plant.

MULTIPLHY is currently building on the GRINHY2.0 project's results by manufacturing and demonstrating a multi-MW high-temperature electrolyser which will be installed in a bio-refinery in the Netherlands.

## SAFETY FOREMOST FOR ALL ELECTROLYSER INSTALLATIONS

Pilot MW-scale electrolyser installations, such as the ones supported by the Clean Hydrogen Partnership, yield crucial safety data for handling more sophisticated electrolyser systems in challenging environments. Deploying electrolysers in industrial plants and integrating them with renewable energy facilities requires innovation, skills and unique engineering to ensure the high level of safety required in industrial courtyards.

## BUILDING UPON EXPERIENCE

Ongoing successful projects lead to improved electrolysers, increased safety standards and procedures and allow the familiarisation of industry with the new generation of electrolysers.

**The goal?** Developing large scale GW electrolysers with lower cost and increased efficiency and durability.

**Key results?** Successive scaled up projects are proving the technology and physically demonstrating the advances of hydrogen production and its contribution to reaching climate goals.



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## KEY ACHIEVEMENTS

### LARGER CAPACITIES

of electrolysers to increase hydrogen production and reduce cost

### DYNAMIC OPERATION

demonstrated

### DURABILITY

and efficiency tested

### SAFETY STANDARDS

and procedures defined

### MONITORING

and diagnostic tools developed

### REDUCTION IN CAPEX

and operating costs

### INTEGRATION

with industrial processes

## IMPACT

### PROMOTE HYDROGEN USE

in many more sectors.

**LOWER** footprint in terms of m<sup>2</sup> per MW installed.

### TECHNOLOGY

validation opening up new markets for electrolyser OEMs

### INTEGRATION

with renewable energy sources such as wind, solar and hydropower, allowing them to penetrate hard to abate sectors and reducing dependence on fossil fuels

### GREEN DEAL PROJECTS

with three 100 MW electrolysers

### REAL-WORLD PERFORMANCE

validating and demonstrates performance, efficiency and reliability and alignment with climate goals

### ELECTROLYSERS UNDER OPERATIONAL CONDITIONS

allowing fine tuning for larger scale deployment and safety procedures

**ADVANCING ELECTROLYSER TECHNOLOGY** attracts attention to projects aligning with climate goals



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