TECNALIA develops a pioneering electrolyser to test hydrogen production technologies

Designed entirely by the research and technological development centre, this prototype is an experimental hybrid bench to test the components of an electrolyser and it will also be capable of producing green hydrogen from its facilities in Donostia-San Sebastian.

3rd June 2025. The TECNALIA research and technological development centre has developed an innovative electrolyser capable of testing different hydrogen production technologies. It is an experimental bench for companies to test the various components of an electrolyser, mainly its core or stack, operating at approximately 50 kW and with a hydrogen production capacity of around 1 kg/h. With its commissioning, TECNALIA has already started tests and demos with national and international companies at its facilities.

The electrolyser is located in the laboratory specialised in the development of technologies for the generation, storage, transport, distribution, use and safety of hydrogen that TECNALIA launched last year at its facilities in Donostia-San Sebastian. More than 50 projects are currently being developed for the research and validation of hydrogen technologies, as well as their scaling up to accelerate their industrialisation.

Of the four technologies capable of producing green hydrogen, this experimental bench is capable of testing two different ones: alkaline and AEM electrolysis. Designed entirely by TECNALIA, this prototype will be able to test the electrolyser stack as well as balance the plant components under different operating conditions. It also includes advanced tools to monitor key process parameters.

According to Ekain Fernández, Head of Hydrogen Technology at TECNALIA, "we work closely with companies to achieve competitive green hydrogen production. To this end, we research and develop innovative electrolysis technologies with the aim of reducing hydrogen costs while we support companies with the testing and modelling of electrolysers for their implementation in industry. The launch of this novel electrolyser is a major step in our commitment to contributing to the development of hydrogen economy.

While the prototype design is flexible to test both Alkaline and AEM electrolysis, TECNALIA has the expertise to develop prototypes for other technologies such as PEM.

More than 80 hydrogen projects in 5 years

In the past five years, TECNALIA has participated in more than 80 hydrogen projects in different fields: generation, distribution, transport, storage, uses and safety.

It is currently working on the design, development and operation of electrolyser prototypes for companies and has more than 70 researchers specialising in hydrogen-related projects.

Its manufacturing and testing know-how contributes to the development of advanced models for electrolysers and hydrogen systems. The aim of these models is to optimise the sizing of hydrogen plants and hydrogen refuelling stations while guaranteeing cost-effectiveness and safety standards.

In this regard, it is worth highlighting the HYNNOVA initiative, which seeks to develop advanced technological solutions for the modular design and efficient management of large-scale renewable hydrogen production plants. Headed by BOSLAN, the project includes the collaboration of 12 companies and TECNALIA is in charge of testing the electrolyser stack to improve the competitiveness of renewable hydrogen by reducing its levelised cost. HYNNOVA is supported by the Basque Government through its Hazitek programme.