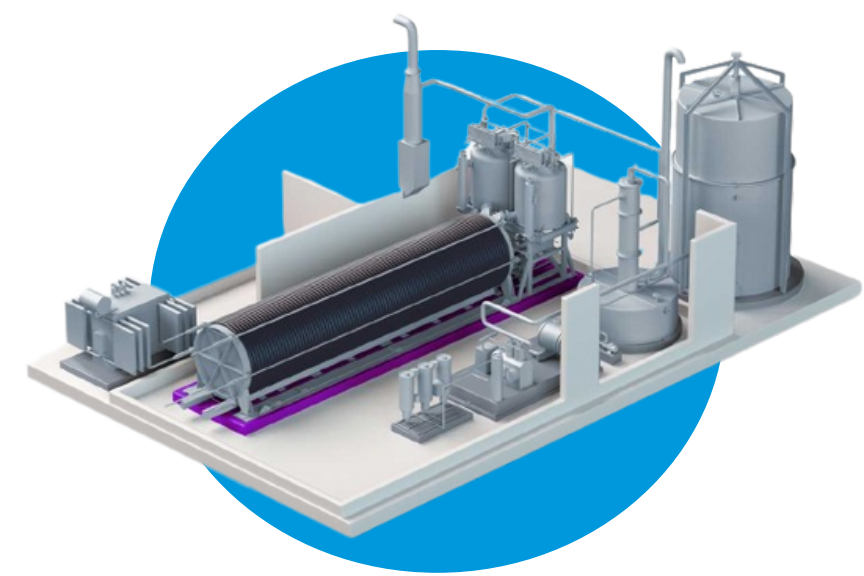


| The challenge of green hydrogen production

Faced with the challenges of energy transition, hydrogen represents a promising alternative for decarbonizing many sectors of activity, particularly those where direct electrification is not possible. To fulfill its purpose, we must be able to produce it in a sustainable way.

Renewable electricity combined with the electrolysis of water represents a major solution for creating carbon-neutral green hydrogen. **HEF supports the development and industrialization of electrolyzer solutions, reducing dependence on precious metals and optimizing performance.**



In an electrolyzer cell, the water molecule is broken down into dioxygen (O_2) and dihydrogen (H_2) using an electric current from a renewable source.

The electrolyzer refers to the assembly formed by the stack (serial assembly of several cells) and the Balance Of Plant which enables the general operation of the unit (power generators, compressors, pumps, water treatment, etc...).

DID YOU KNOW?

By 2050, demand for green hydrogen produced from water electrolysis should account for 20% of global energy demand.

| Coating solutions combining productivity and cost optimization

Each cell in an electrolyzer contains PTLs and bipolar separator plates. They play an essential role in flux distribution and electric current conduction. They operate in a noxious and corrosive environment. The use of surface treatments is essential to optimize performance and guarantee durability.

The mature PVD/PECVD technology developed by HEF enables the reduction of the precious metal's quantities used without compromising their performance. Our vertical integration model positions us as a strategic partner. Today, we offer competitive solutions and innovate for tomorrow's generations of hydrogen systems.

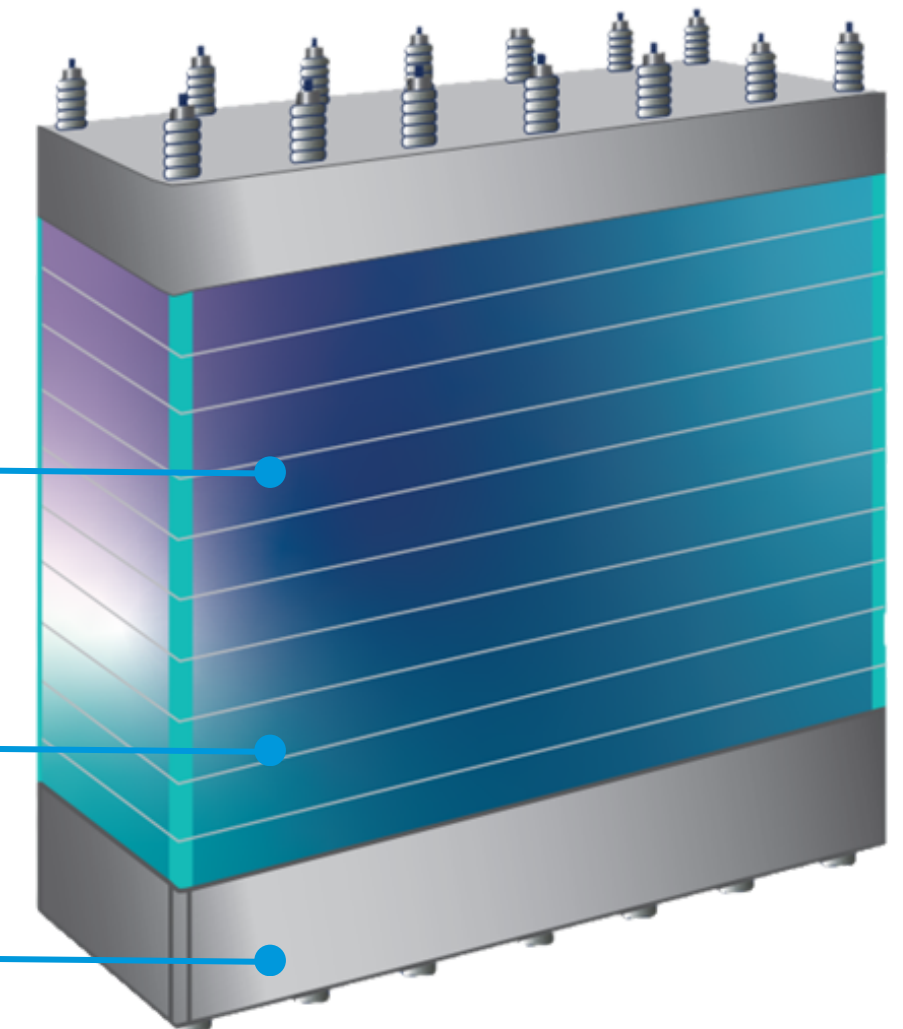
The group's others area of expertise in surface functionalization allow to tackle materials challenges of all electrolyzers technologies. We think outside the box, pushing the boundaries to find unique and solutions.

	Certess ELEC EA	Certess ELEC EP
Separator plate / PLT material	Titanium	Titanium
Interface Contact Resistance after treatment	<1 mΩ.cm²	<1 mΩ.cm²
Coating thickness	20 – 200 nm	20 – 200 nm

Tailor-made solutions fitted to your needs.

High-volume production at ultra-competitive prices.

high-performance, sustainable solution.



| Innovation for hydrogen technologies



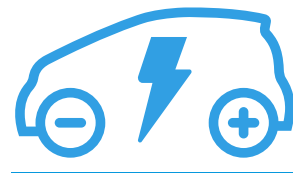
HEF's industrialisation teams have developed an automated in-line processing machine of for high productivity based on our validated coating process. This robust, high-performance machine is designed to meet the challenges of hydrogen production while optimizing costs and materials.

A first pilot plant is currently being set up in France, close to the company's head office, to meet our customers' growing needs for hydrogen equipment coatings. Large-scale deployment is planned before 2025.



Performance

Coatings developed by HEF guarantee electrical conductivity, corrosion resistance and durability of parts in their environment



Environment

HEF reduces the ecological footprint of systems by reducing and substituting the use of precious metals



Economically competitive

In-house-developed hydrogen coating machine combines high productivity and economic competitiveness



Customized solution

For the past 5 years, HEF has mobilized its research and development capabilities to offer unique, tailor-made solutions to its partners