



Green Hydrogen

PRODUCTION PLANTS

**Engineering at
service of
*sustainability***



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KERN SD

develops on-site green hydrogen production facilities tailored to meet customers' technical and economical requirements.

KERN SD plants are fully customisable in terms of production.

- KERN SD has its own know-how and technology to support its customers in the **development of integrated solutions for green hydrogen production** from the initial stages to implementation and commissioning.
- **The experience of the KERN SD technical team** goes back to the 1980s, with the construction of the **first water electrolysis plant** to produce hydrogen for a chemical industry in Switzerland.

The solutions offered by KERN SD use **alkaline or PEM electrolyzers**.

- ❑ **Alkaline electrolysis**: is the most developed and commercially available technology. It is based on the immersion of the two electrodes, separated by a diaphragm, in an alkaline liquid electrolyte that conducts OH⁻ anions.

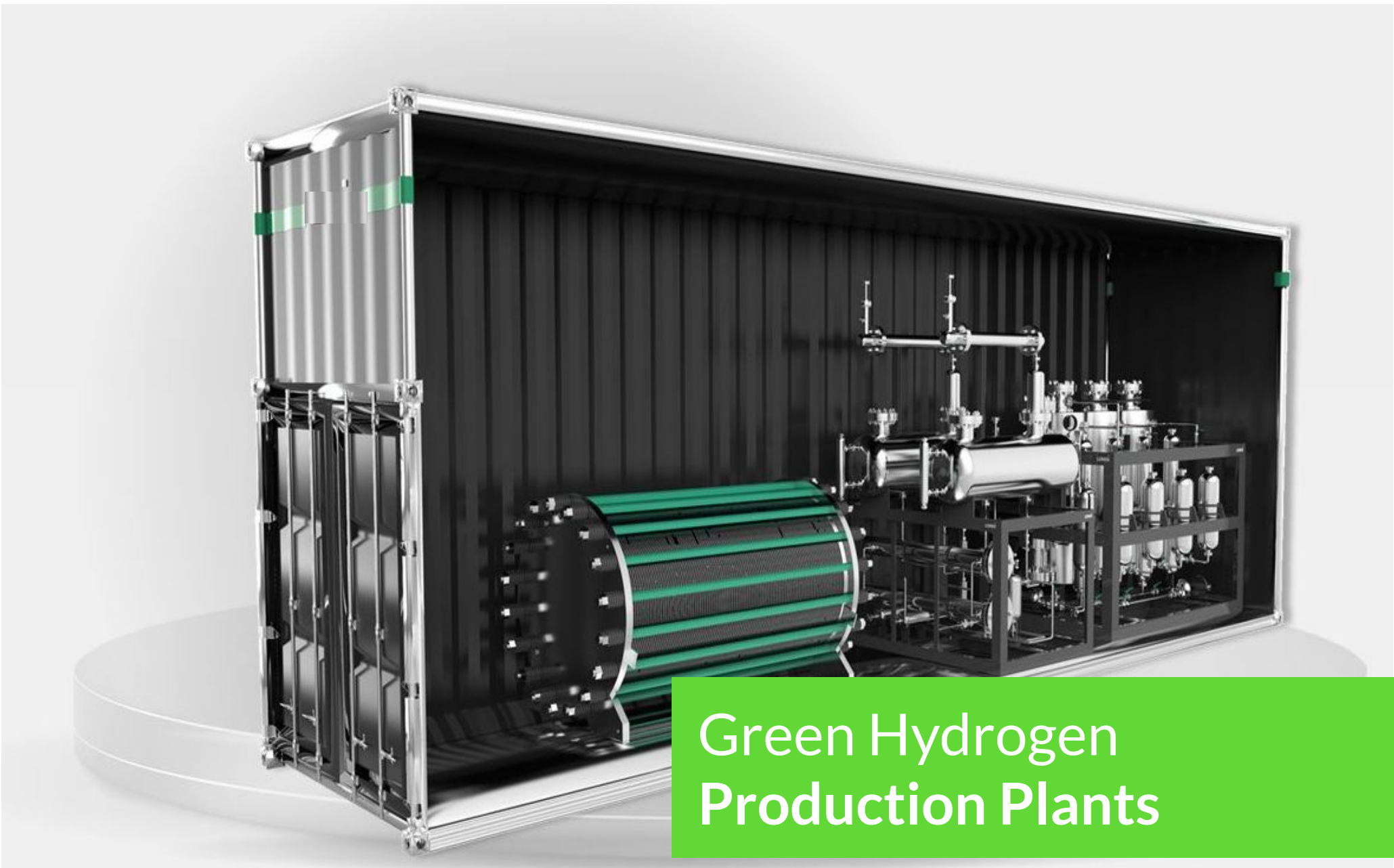
It is a simple and cheap technology, **easy to maintain** as no noble metals are needed and it is relatively stable.

- ❑ **PEM (Proton Exchange Membrane) Electrolysis**: is a type of electrolysis, which is fed with pure water and where the electrolyte is a solid polymeric membrane which conducts H⁺.

The **current densities** obtained are the **highest** and have a very fast and dynamic response, which are the necessary requirements for the accumulation of renewable energies, due to their fluctuating character.

The disadvantages are that the electrode materials are based on noble metals and the bipolar plates are made of titanium, both of which are expensive and have problems related to their scarcity and supply.

Today, PEM is the **ideal technology for storing excess renewable energy**.



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PLANT FEATURES

	Alkaline Electrolysis	PEM Electrolysis
Output	100 Nm ³ /h to 2.000 Nm ³ /h	5 Nm ³ /h to 200 Nm ³ /h
Output pressure Electrolyser	1,6 MPa	3,0 MPa
Flexibility	20-100%	0%-100%
H ₂ Purity	99,9995%	99,9995%
Materials	Built with high quality materials	
Monitoring	Fully automated and monitored plants	

- ON-SITE PRODUCTION
- CONTAINERIZED OR FIXED PLANTS
- MODULAR AND SCALABLE
- AUTOMATIC CONTROL
- SAFE OPERATION
- ECONOMIC SAVINGS (low operating and maintenance costs)
- HIGH ENERGY EFFICIENCY
- SIGNIFICANT REDUCTION of associated storage, handling and road transport risks
- HIGH PURITY PRODUCT
- NO ENVIRONMENTAL IMPACT

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In recent years, hydrogen has been playing a key role in global decarbonisation processes. Hydrogen is presented as a flexible and environmentally friendly energy carrier.

SOME APPLICATIONS

OF GREEN HYDROGEN

- **As a raw material in industry** - especially in chemistry, to make ammonia and fertilisers, in petrochemicals, in oil refining, and in metallurgy, to make steel.
- **As an energy storage system** - it can store surplus renewable electricity on a large scale at times when generation exceeds demand.
- **As a transport fuel** - there are currently buses running on H₂, but its application for shipping and aviation is extremely important, as these two sectors have high consumption of polluting fuels.
- **For electricity and home heating** - green hydrogen is capable of reaching temperatures that are difficult to achieve with other clean processes, and could be used to heat homes cleanly.