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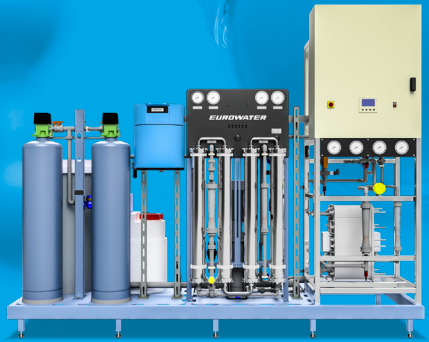
A GRUNDFOS COMPANY

Water treatment for green hydrogen



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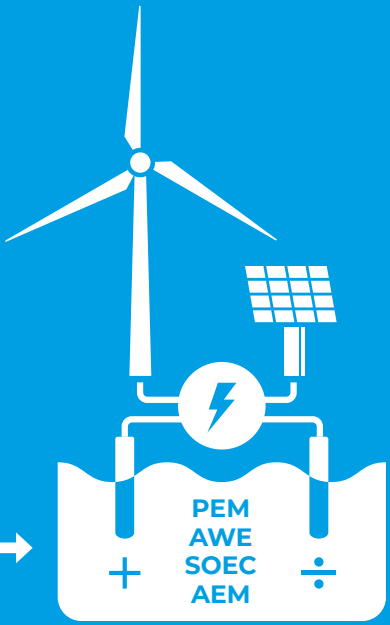
Water treatment plant



Water treatment is key

Successful hydrogen production relies on the right water treatment, which is influenced by the specific electrolyzer technology and water source.

With our expertise, standard products, and global service capabilities, EUROWATER ensures a reliable solution that spans from the water source to the core of the electrolyzer.

Groundwater

A stable water source, but it can contain iron, manganese and ammonium.

City water

Easy access for smaller projects, but contains chlorine and chloramine.

Treated waste water

Varies in quality and has a potentially high load of organics.

Sea water

High salinity and content of metal ions.

The water source

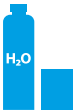
Depending on your location and size of the project you may have different water sources available. Each will come with different requirements for your water treatment system.

We help you choose the right water treatment solution based on your water source and electrolyzer technology.

How much water to source?

The amount of water required is a crucial factor in determining the impact of a green hydrogen production facility on the local water system. It is important to recognize that purifying water requires water itself.

Let's consider an example: a hydrogen plant designed to produce 1 tonne of hydrogen would need 9 m^3 of ultrapure water, obtained through the extraction of either 12 m^3 of groundwater, 13 m^3 of treated wastewater, or 30 m^3 of seawater.



1.4 m³

Groundwater

1.5 m³

Treated wastewater or surface water

3.3 m³

Seawater

1 m³

Ultrapure water
ready for electrolysis

1 m³

Ultrapure water
ready for electrolysis

1 m³

Ultrapure water
ready for electrolysis

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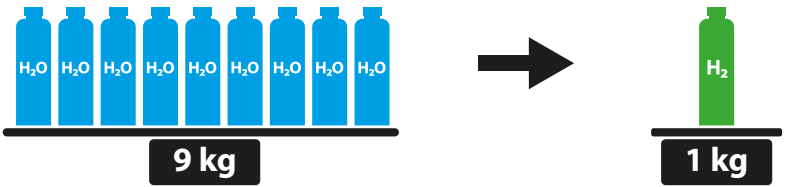
How much water to produce H_2?

Ultrapure water is the central feedstock for the production of green hydrogen. Furthermore, cooling water may be required in the process and system.

But how much water does it take to produce green hydrogen? The rule of thumb is 9 L ultrapure water for 1 kg of H_2.



Electrolysis of 9 kg ultrapure water results in 1 kg hydrogen.

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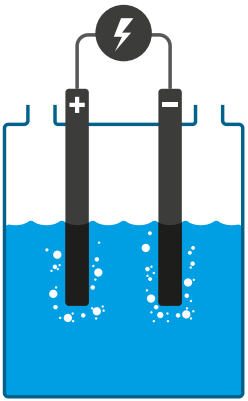
How much water per MW?

In order to design the water treatment system it is necessary to know the consumption rate of ultrapure water. The amount of ultrapure water needed per MW depends on how much energy the electrolyzer needs to convert the 9 L of ultrapure water into 1 kg of hydrogen.

Given that 9 L of water is required per kg hydrogen, it equals a consumption rate of 163-200 L/h of ultrapure water per MW electrolysis capacity.

Ultrapure water
0.2 m³/h



Electrolyser
1 MW

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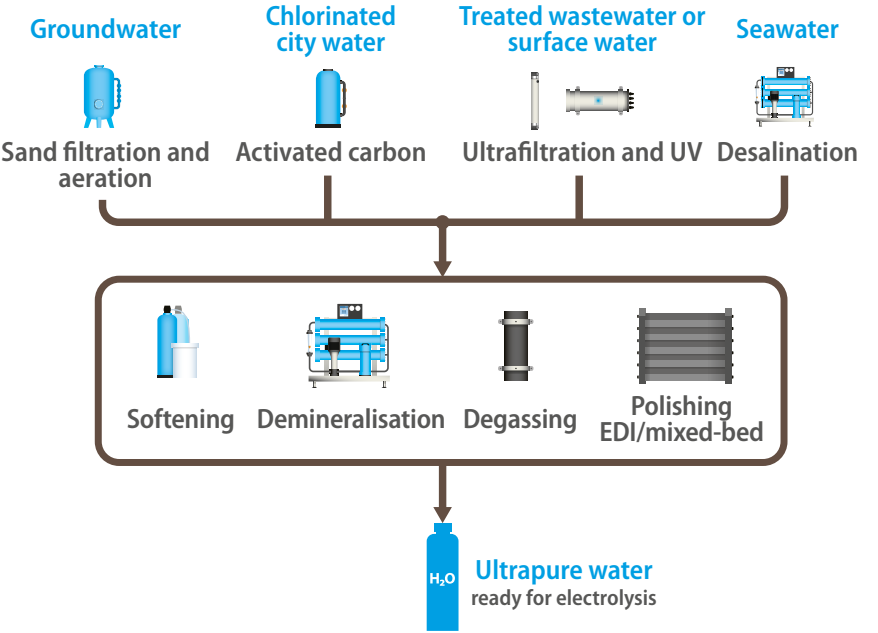
Water treatment for PtX

Water treatment for hydrogen production consists of a pretreatment step – determined by the sourced water – followed by polishing.

Depending on the electrolyzer technology the polishing steps can differ, but will consist of one or more treatment steps from softening to deionization.



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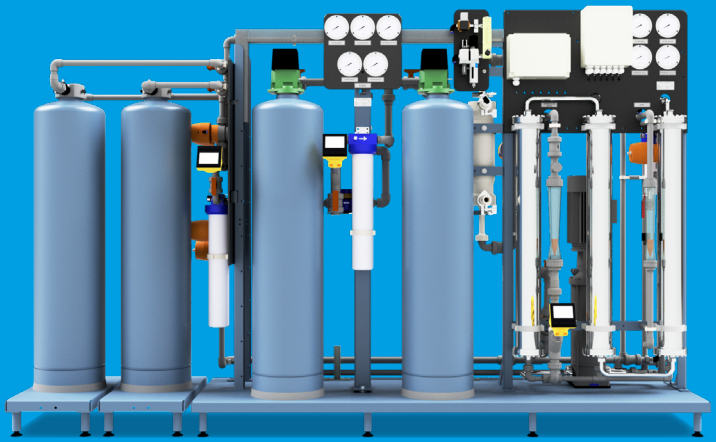
PEM Electrolysis | 1.2 MW

HyBalance

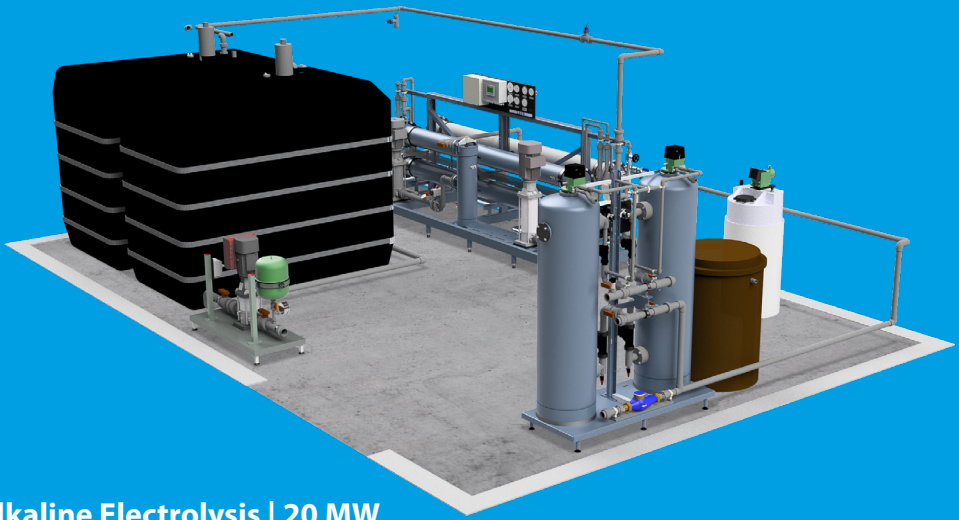
Water source: City water without chlorine
Plant capacity: 800 L/h
Conductivity: < 0.2 µS/cm



PEM Electrolysis | 5 MW

Standard unit

Water source:	City water without chlorine
Plant capacity:	1,200 L/h
Conductivity:	< 0.2 µS/cm



Alkaline Electrolysis | 20 MW

HySynergy / Everfuel 2022

Water source:	City water without chlorine
Plant capacity:	4,500 L/h
Conductivity:	< 5 µS/cm

PEM Electrolysis | 50 MW

European Energy / Siemens Energy 2023

Water source:	Groundwater
Plant capacity:	10,000 L/h
Conductivity:	< 0.1 µS/cm

What EUROWATER offers

ASSET MANAGEMENT

The right water treatment protects the electrolyzer by preventing clogging and deactivation of membranes.

KNOW-HOW

Extensive process knowledge of water treatment for electrolysis technologies, such as AWE, PEM, SOEC and AEM.

STANDARD UNITS

In-house production of standard and modified units for fast delivery, comprehensive documentation and spare parts in stock.

SERVICE

International service organisation with on-call service in more than 15 countries in Europe.

Pure water treatment - since 1936

EUROWATER develops and manufactures reliable water treatment plants – and has been doing so since 1936. Our plants are designed and manufactured on a quality principle of longevity and minimal need for maintenance.

Since 2020, EUROWATER has been part of the Grundfos Group and embraces Grundfos' global ambition to pioneer solutions to the world's water and climate challenges and improve quality of life for people.

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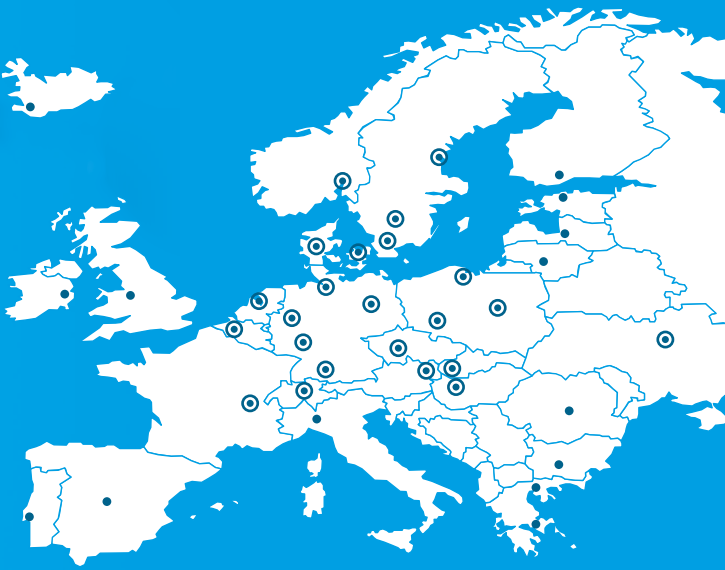

Pure Water Treatment