

# HYDROGEN ENERGY

## Hydrogen: the Working Gas

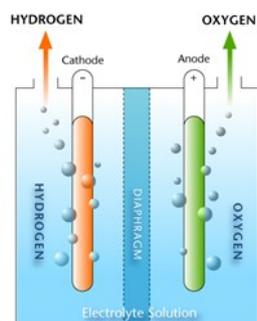
Hydrogen is a gas now used in a number of manufacturing/industrial processes and as a fuel to create electricity through a fuel cell.

The production of hydrogen gas is achieved using electrolysis. The device to create hydrogen is called an electrolyser.

Hydrogenics through the European division manufacture electrolysers for industrial application and large scale hydrogen fuel cell power systems.

### What are Electrolysers?

Electrolysers are devices that produce hydrogen and oxygen through the process of electrolysis. Electrolysis is an electrochemical reaction that splits water into Hydrogen and Oxygen, using electricity. It is a 100% emission free and carbon-free process.

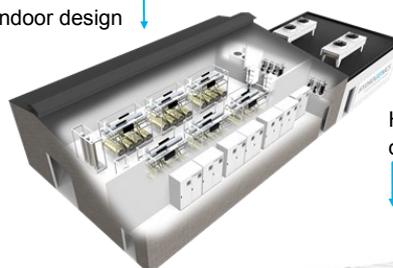


Electrolysis - the process

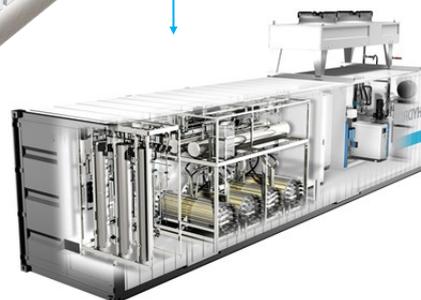
The electrolyser



Indoor design



HySTAT-60 (60 Nm<sup>3</sup>/h) or 5.4 kg/h



### On-site and Containerised Facilities

Electrolysers can be installed inside a building or in a fully containerised system for the onsite production of hydrogen.

Electrolysers are rated on their capacity to create a normal cubic metre of hydrogen gas in one hour (*shown as xxx Nm<sup>3</sup>/hr*).

The containerised package requires an incoming power source from either grid or a sustainable source to provide power for the electrolyser plus a regular water supply.

The production system will firstly remove any minerals or contaminants in the water before the electrolyser creates the hydrogen.

The hydrogen then goes through a cleaning process which creates a gas with of 99.998% purity. With the addition of an oxygen clean and capture system it is possible to create and store oxygen at a medical grade level.

The addition of fuel cells into the container creates a self-contained power supply for remote power requirements.

All of the Hydrogenics containerised systems are designed and customised to a client's particular requirements.



Hydrogenics can provide assistance with the layout of a hydrogen production facility in an existing building or provide designs for purpose built rooms or buildings.

## Hydrogen Uses

High quality hydrogen is required for a large number of industrial processes. Electrolysers therefore have a wide variety of industrial applications, such as metallurgy, power plants, the food industry and in the production of electronic components.

Several European countries mix hydrogen gas into their natural gas supplies at a rate of 10% of volume for a hotter cleaner burning gas.

Electrolysers can also be used to supply hydrogen to fuel cells. As they are on-site, electrolysers remove the need for external hydrogen supply, enabling independence and self-sustainability of power generation.

## System Design

The Electrolyser package is designed and built to meet a client's specific production needs.

This requires an evaluation of type of application, gas purity, maximum and minimum output requirements, pressure requirements and other site operating considerations. (See questionnaire).

## Hybrid Power Systems

Sustainable power systems such as solar PV and wind power have limitations with maintaining a base load level of power.

A solar PV system coupled to a fuel cell and electrolyser can provide a base load level of power on a 24/7 basis. The hybrid system can be designed to be an efficient and sustainable power supply for remote regions and for off-grid locations.

## Electrolyser Capacities and Power Requirements

Model	H <sub>2</sub> Production	Output Pressure	Water Consumption	H <sub>2</sub> Purity	Power Req. per hour	Input Voltage
EL1000	1nm <sup>3</sup> /hr	30bar (437psi)	0.8l/hr	99.940%	4kW	AC (240V) or DC
EL2000 (2xEL1000)	2nm <sup>3</sup> /hr	30bar (437psi)	1.6l/hr	99.940%	8kW	AC (240V) or DC
EL4000	Avail. Dec 2014					
HyLYZER 1	1nm <sup>3</sup> /hr	0-7.9bar (0-115psi)	1l/hr	99.998%	6.7kW	AC (240V) or DC
HyLYZER 2	2nm <sup>3</sup> /hr	0-7.9bar (0-115psi)	2l/hr	99.998%	13.4kW	AC (240V) or DC
HySTAT 10-10	10nm <sup>3</sup> /hr	4-10bar (58-146psi)	15-20l/hr	99.998%	54kW	3 phase AC or DC
HySTAT 15-10	15nm <sup>3</sup> /hr	4-10bar (58-146psi)	22.5-30l/hr	99.998%	81kW	3 phase AC or DC
HySTAT 30-10	30nm <sup>3</sup> /hr	4-10bar (58-146psi)	45-60l/hr	99.998%	156kW	3 phase AC or DC
HySTAT 45-10	45nm <sup>3</sup> /hr	4-10bar (58-146psi)	67.5-90l/hr	99.998%	234kW	3 phase AC or DC
HySTAT 60-10	60nm <sup>3</sup> /hr	4-10bar (58-146psi)	90-120l/hr	99.998%	312kW	3 phase AC or DC
MEGAWATT	220nm <sup>3</sup> /hr	4-10bar (58-146psi)	350l/hr	99.998%	1MW	3 phase AC or DC



## Standards & Codes

**Hydrogenics Europe NV** — manufacturers of HySTAT electrolyser are certified to the following Bureau of Veritas Standards:

- ISO 1400:2004 [cert No BE008440-1];
- OHSAS-18001 2007 [cert no BE008441-1];
- ISO9001:2008 [cert no BE008349-1].

They are compliant with European Directives and international codes & standards. A copy of the full document (HySTAT™ Electrolyser Codes & Standards) is available on request from [info@alberfield.com.au](mailto:info@alberfield.com.au)

## Installation and Maintenance

Installation is carried out by a Perth-based team trained in all aspects of the work.

Maintenance is minimal and Alberfield will provide a service contract to ensure maintenance is carried out correctly and on time.

Alberfield also offers training to maintenance teams operating in a remote environment so the procedures can be carried out during regular maintenance operations on other equipment.

## Alberfield Plus+

As a technical consultancy Alberfield can assist you to design the best hydrogen manufacturing and storage system for your current and future needs.

## WA Contact Details

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