

Smart Electrolysis

Key Technology for the Energy and Mobility Transition

Hydrogen is an excellent source of energy and indispensable intermediate step for numerous chemical processes, such as the production of synthetic fuels. Hydrogen can also be generated very easily by water electrolysis using green electricity. For this reason, efficient electrolyzers will in future play a key part in terms of electricity and mobility for the energy transition.

The alkaline electrolyzer conceptualized by IAV is optimized for use in grids involving fluctuating electricity generation, such as from wind turbines or photovoltaic systems. Being highly dynamic, it can cushion short-term generation peaks and convert excess electricity into hydrogen. Modular in design, the electrolyzer has an output that can be matched to the respective demand across a broad range. The specially developed control system permits automated operation adapted to the specific requirements.

The electrolyzer conceptualized by IAV permits carbon-neutral mobility, making it the perfect component for effective and sustainable sector coupling. It can supply green, sustainable hydrogen to public filling stations and those used for local passenger transport and commercial fleets. It also provides a key to producing synthetic fuels in a sustainable way. These can be blended with conventional fuels or replace them in the foreseeable future, significantly reducing CO₂ emissions from vehicles powered by internal combustion engines.

Hydrogen for future technology

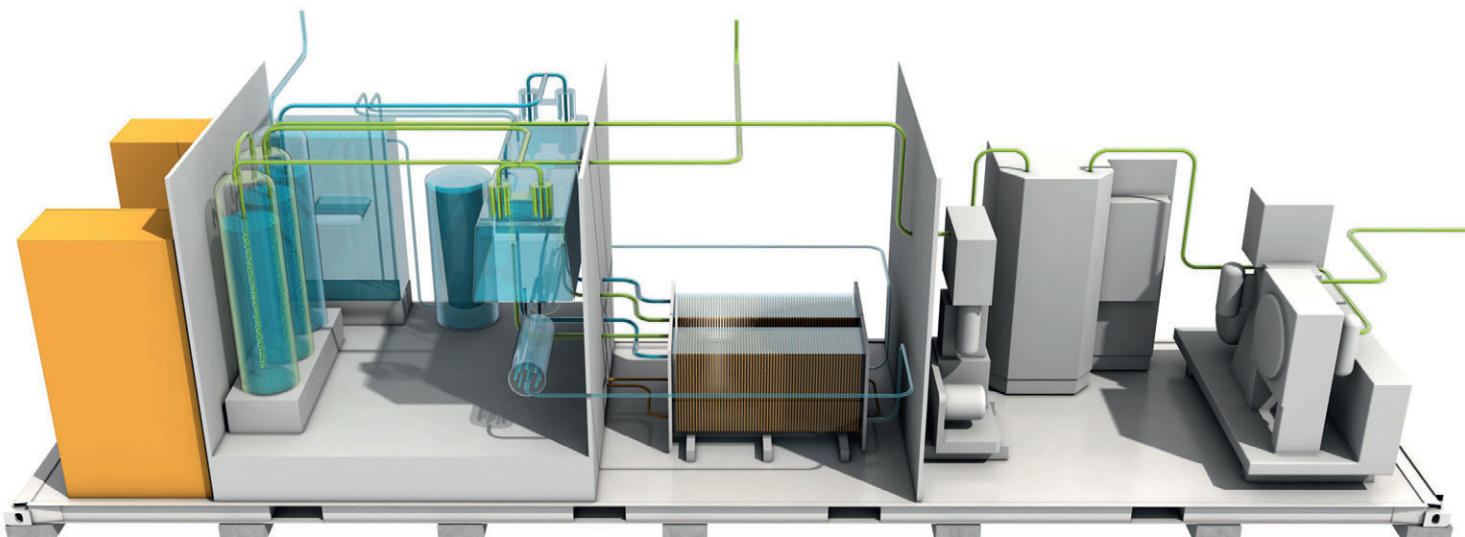
Fuel cells, e-fuels, energy storage systems, reconversion to electricity and methanization: these are only a few of the applications demonstrating the potential of hydrogen. Given its unique qualities and uncomplicated production through water electrolysis, hydrogen will play a key part in tomorrow's energy system. This makes it all the more important to provide efficient and cost-optimized electrolyzers that combine a high level of dynamics and long service life.

Supported by:

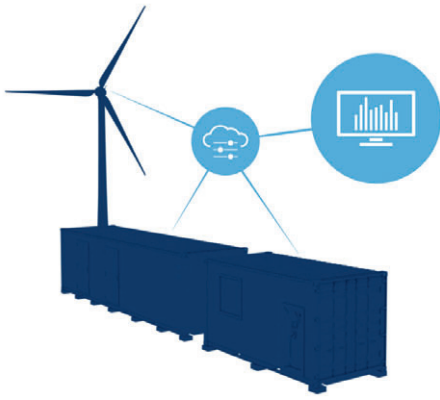


Federal Ministry
for Economic Affairs
and Energy

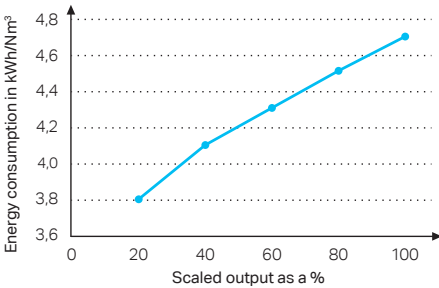
on the basis of a decision
by the German Bundestag



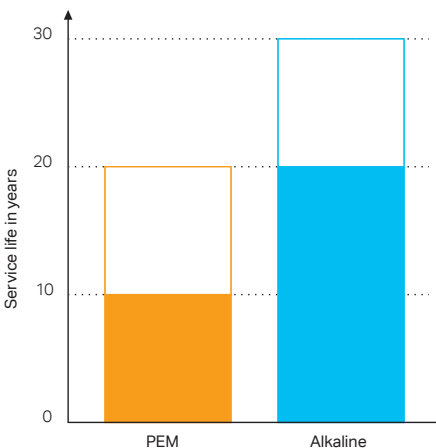
Automated and Optimized Operation



Highly automated: the operation is optimized and adapted to the availability and costs of electricity and to the demand for hydrogen



Highly cost-effective: the electrolyzer conceptualized by IAV combines reliable technology with a high level of efficiency



Maximum service life: the electrolyzer conceptualized by IAV guarantees long service life and low maintenance costs

The electrolyzer conceptualized by IAV permits highly automated operation, adapted individually to both the availability and costs of electricity and also to the demand for hydrogen. Furthermore, the heat produced in the process can be recovered and used for heating water, among others.

A comparison with other technologies shows that the alkaline electrolyzer involves only minimum investment costs, without compromising on performance. It comes with a dynamic previously only familiar from PEM electrolyzers, while also impressing with high levels of efficiency and the long service life alkaline technology is known to provide.

The entire electrolyzer system conceptualized by IAV is accommodated in a standard container. It is easily installed and ready to use in a very short period of time. There is also an optional unit for gas conditioning that cleans the hydrogen and compresses it to more than 50 bar.

Parameter	Unit	Value
H ₂ delivery pressure	bar	1.15 or 50 with optional gas conditioning
Rated electric input	kW	230
H ₂ volume	Nm ³ /h	47
H ₂ volume	kg/d	100
O ₂ volume	kg/d	800
H ₂ delivery quality		Moist or 5.0 with optional gas conditioning
Heat recovery	kW/°C	50/70
Modulation range	%	20 to 100
Dynamic (at operating temperature) % nom. load/s		20
System efficiency	%	60
Ambient temperature	°C	-25 to +40
Service life	years	20
Dimensions (L x W x H)	m	6.1 x 2.5 x 2.9 m + roof cooler plus container for optional gas conditioning
Drinking water connection	kg/h	100
Power supply		AC 3~ 400V + N + PE

Electrolyzer output data under standard conditions