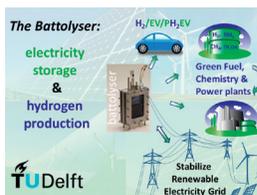


# The Battolyser: an Integrated Battery Electrolysis system

The intermittent nature of renewable energies demands a creative approach to the challenges of both short- and long-term storage, and large-scale delivery of electrical power. Now a team at Delft University of Technology's Faculty of Applied Sciences has created a device that combines the high efficiency of a battery with the production capacity of hydrogen-fuel to create the Battolyser: the world's first integrated battery electrolysis system.



## Two for the price of one

“Storing renewable energy is a challenge because the amount of energy produced varies enormously both on a daily and a seasonal basis,” says Fokko Mulder, Professor of Materials for Integrated Energy Systems. “Ideally we want a large-scale electricity storage system that can store or supply energy at every moment of the day and night, throughout the year.”

Currently, storage of energy can either be short-term in e.g. a battery, which delivers electricity efficiently but is soon used up, or long-term in e.g. fuel, preferably a carbon-neutral one. “In the Battolyser we have both those components in one device,” says Mulder. “So it’s a battery that when fully charged, produces hydrogen by electrolysis, but can still also discharge as a battery.”

## A disadvantage becomes an advantage

The battery-part of the Battolyser is based on a nickel-iron cell with a potassium-hydroxide electrolyte. “The nickel-iron battery has been around a long time but in the past, people complained about the hydrogen production, which they tried to suppress.” Furthermore, with progressive charging, the entire nickel anode

and iron cathode gradually form reduced iron and nickel oxy-hydroxide which happen to be excellent catalysts for the electrolysis of water. So with a little out-of-the-box thinking, Mulder and his team realised that the catalytic action of these electrodes, when charged, could be made to work to their advantage. “Electricity and hydrogen have always been regarded as two separate, even competing, solutions for energy storage but the Battolyser integrates the two, storing and supplying electricity in the short-term, and then producing hydrogen which can be made into other organic substances such as ammonia for longer-term storage.”

## Using nature not fighting it

Another advantage is that the storage component can be very easily switched over allowing electricity to be supplied on demand. What’s more, the overall efficiency is very high, at around 80-90% compared to around 70% for normal static batteries. “The strength of the Battolyser is that it combines the best of both worlds,” says Mulder. “It’s a long-life battery combined with long-life electrolyser which unlike other batteries, works with the natural processes.”

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