Interview with Michael Stusch, CEO of H_2-Industries

December 2018

Renewable energy is a key pillar in the fight against climate change. But sun, wind and other renewable energy sources are weather-dependent and require powerful energy storage facilities in order to meet base load requirements. We spoke with Dipl.-Ing. Michael Stusch, CEO of H_2-Industries in Munich (Germany), whose company has developed a revolutionary energy storage technology.

Mr Stusch, you are about to launch a new form of energy storage on the market. What does it involve?

Stusch: We store hydrogen, obtained from renewable energy sources by an electrolysis process, in an oil-like fluid called LOHC. This abbreviation stands for Liquid Organic Hydrogen Carrier. This carrier absorbs hydrogen chemically and can be safely transported and stored at ambient temperature and pressure for as long as we want. When we need the energy again, it can be released by chemically releasing the hydrogen from the carrier and turning it into electricity in a fuel cell.

Isn't this power-to-liquid-to-power process inefficient?

Stusch: The question is, what does inefficient mean? After all, the decisive factor is how much the electricity that I can recover from the stored form ultimately costs me. And in that sense our prices can't be beaten: it's much cheaper than batteries. The difference is in the capacity. Batteries are useful up to a capacity of about one megawatt hour. Above this capacity, you need the LOHC storage process, which is much cheaper and which also allows us to reach an order of magnitude that batteries can never achieve.

Storing hydrogen sounds like an explosive business. How do you get that under control?

Stusch: What do you mean by explosive?

By that I mean the risks involved when dealing with hydrogen, which is highly reactive and volatile, and can otherwise only be stored under high pressure and at low temperatures.

Stusch: Firstly, we store the hydrogen chemically. The LOHC+ in which the gas is contained can be stored completely safely under ambient pressure and at ambient temperature. Secondly, the LOHC+ has a flashpoint of 200 degrees Celsius, which means you can put the liquid on a table, hold a lighter up to it, and it still won't ignite. Therefore LOHC is very, very safe and not at all comparable to hydrogen under high pressure or liquid hydrogen, which must be kept at minus 254 degrees Celsius using large amounts of energy. Our process of storing hydrogen is the safest there is.

From your point of view, what is the advantage compared to conventional battery storage?

Stusch: Batteries continue to be necessary and we use them as well. We are even planning to build a battery cell production plant in Germany because we need batteries on a grand scale. They are used in each of our devices to deliver power and start up our LOHC systems in just a few milliseconds. I'll say it again: Batteries store small capacities, LOHC stores large capacities for a long time. A battery,

for instance, discharges when it is just lying around and not being used. That doesn't happen with LOHC.

Do you prefer marketing to the private sector or the industrial sector?

Stusch: Our technology is suitable for all sectors, both private and industrial. There are wonderful solutions for shipping, mining and off-grid plants. LOHC can also be used in rail transport, in the automotive industry, and even as a range extender for unmanned drones. Our technology allows the batteries to charge while they are in transit. Electric cars no longer need to be plugged in, they can simply be refuelled with LOHC. You do not need a charging station anymore. In any event, it would be hard to build a worldwide network of charging stations to provide the necessary energy capacity. That is not at all possible with the current networks, and will not be possible for a long time.

So far, I have always encountered hydrogen in connection with 'synthetic fuels'. Are you also attracted to this sector, or is your application limited to storing electricity?

Stusch: If you look at the automotive sector as a whole, the term 'synthetic fuels' is certainly the right expression. But the question is, how long would it take us to turn the automotive sector around? Vehicles would require the use of our range extender and the refuelling infrastructure would have to be rebuilt – whereas it's pretty easy to build an LOHC filling station. All that's needed is a new fuel pump and two separate diesel tanks, which already exist. The latter must be cleaned so they can be used to store LOHC. Then we can quickly and easily refuel cars with LOHC+ in the future. We will siphon off the LOHC- discharged. The car is refuelled in three minutes, as it is today, except that it will run emissions-free, since it will be electric.

Have you implemented the first projects yet?

Stusch: At present, we have a stationary installation in a detached house and are currently in the process of building a ship that runs entirely on LOHC technology. It will have a power of 600 kW and a range of 1,000 nautical miles at ten knots. This is our first showcase project, and will set sail at the beginning of 2019.

Where do the starting materials for LOHC storage come from – especially the carrier material and hydrogen?

Stusch: The starting material for LOHC is hydrocarbons. These are obtained from crude oil, natural gas and coal by processes already known. This means that we no longer have to burn coal to produce electricity, but can make much better use of it. We can greatly reduce coal-fired power – which is currently well over 40 per cent globally – and even see it fall all the way to zero. This will result in significantly reducing emissions of climate-damaging CO_2, which will help in the fight against climate change. Our process resolves the entire coal discussion and allows us to use coal to produce everlasting energy storage units – LOHC! LOHC can be recharged over and over again. This gives us the opportunity to store all the solar energy that we need on our planet in this material, thus ensuring the world's energy supply.

When will the breakthrough come? What is holding you back?

Stusch: For the past eight years, we have been involved in basic development, from research to component development. Now we are in the process of establishing series production for our LOHC energy storage units at various production sites throughout the world. We also want to build LOHC production facilities – we have even already found locations. At the same time, we are in discussions

with chemical companies. We are also seeking additional funding from government and private sponsors.

About H_2-Industries

H_2-Industries develops innovative, effective and environmentally friendly LOHC energy storage solutions. The company was founded in 2010 by entrepreneur Dipl.-Ing. Michael Stusch and is headquartered in Munich. Research, development and production are located in Hamburg.

The products from H_2-Industries make it possible to produce hydrogen with any (renewable) source of electricity and to store it at ambient pressure and temperature in the oil-like liquid organic hydrogen carrier (LOHC) safely and chemically. LOHC-bound hydrogen can be easily transported and released again when needed. LOHC technology makes it possible for the first time to store large amounts (up to several terawatt hours) of electricity safely and cheaply. This allows H_2-Industries to make renewable energy available everywhere, 24/7.

The aim of H_2-Industries is to industrialise LOHC technology, thus establishing hydrogen as a safe source of energy for the future.

Please direct any inquiries to:

Diane R. Riedel
Head of Global PR
Tel.: +49 89 215 43 70-40
dr@h2-industries.com

H_2-Industries SE
Theresienhöhe 30
80339 München

www.h2-industries.com