

Haru Oni - a blueprint for the international production of E-Fuels?

Markus Speith, Head of Sales and Business Development for Power-to-Liquid, Siemens Energy

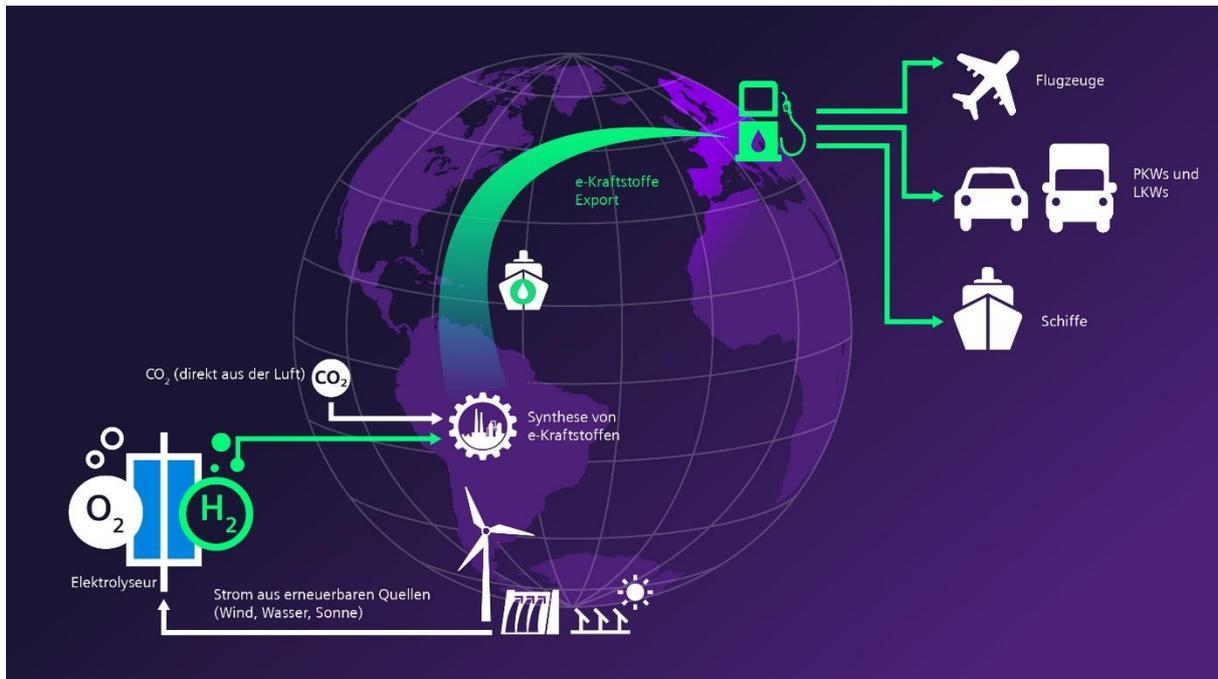
It is a flat and barren land, says Markus Speith of Siemens Energy. "It's impressive how strongly the landscape is shaped by the wind. The trees there really lean in one direction." Speith has already been to Patagonia twice, in the extreme south of Chile. Construction work for the Haru Oni project is soon to begin on the land. The idea behind it is to produce synthetic fuels from wind, water and air alone. At the moment, however, there is hardly anything to be seen of it. In this grandiose landscape on the Strait of Magellan, which connects the Atlantic and Pacific Oceans, mainly sheep graze.

The wool trade once made the region rich. In nearby Punta Arenas, with 120,000 inhabitants one of the southernmost cities in the world, this can still be seen in the cityscape. This is where the wool barons built their magnificent villas in the 19th century. Today, the region lives mainly from trade and tourism. In the future, perhaps also from green energy. Until now, there has been no way to connect the site around Punta Arenas to the Chilean electricity grid. It is too remote for that. A few years ago, the idea was born to "convert the large supply of wind energy into molecules and make the electrical energy transportable", says Speith. That is now what is to happen.

In the second half of the year, construction work for Haru Oni will begin in Patagonia. In 2022, the pilot plant is to produce 130,000 litres of petrol. They are then to go to Europe via the nearby port. However, this petrol is only a "partial stream"; the production of methanol as a basic material is much larger. Siemens Energy sees itself as a co-developer of the project, the main developer is the Chilean energy company AME. Another Chilean company is also involved, namely the national oil and gas producer ENAP. A lot of know-how comes from Siemens Energy: the PEM (Proton Exchange Membrane) electrolysis, which is used to produce hydrogen, and the wind turbines to generate green electricity from Siemens Gamesa. Hydrogen is synthesised with CO₂ extracted directly from the air (Direct Air Capture). This produces methanol. The basic substance is eventually processed into petrol. "At the plant you can drive up in a car, fill up and then drive to Punta Arenas," says Speith.

Is there anything comparable in the world? "No, in this constellation it is unique." Individual building blocks like wind turbines, electrolysis or methanol synthesis,

none of that is new, he says. But integrating the entire value chain as an isolated solution and coordinating it technically is. Worldwide, there are actually only a few projects that produce methanol from renewable sources. In Iceland, for example, there is a commercial power plant that produces green hydrogen by electrolysis and synthesises it with CO₂ from local geological sources. But this company is relatively small. The project in southern Chile is in a different league.



The Project Haru Oni. Source: Siemens Energy

Siemens Energy AG's contract is worth 22 million euros, which includes a good 8 million euros from the German Federal Ministry for Economic Cooperation and Development (BMZ). It is the first hydrogen project to be funded under the German Hydrogen Strategy (NWS). In addition to Siemens Energy, Porsche plays an important role in the project as an investor and purchaser of the E-Fuels. The company wants to use the synthetic petrol in motorsports and, in the future, also in the production of sports cars such as the Porsche 911. Just like its parent company Volkswagen, Porsche is also focusing on battery-electric mobility for the future. However, in order to quickly achieve climate targets, a solution must also be found for approximately 1.3 billion combustion vehicles that exist worldwide. To this end, Porsche is taking a second approach with the additional use of synthetic fuels, so that in the future it will also be possible to supply Porsche's existing vehicles with climate-neutral fuel.

Getting Haru Oni up and running is the first step. The production of methanol and climate-neutral fuels will then be further expanded. According to Siemens Energy, the scaling up looks like this: The pilot plant, as mentioned, is to start in

2022 with a capacity of 130,000 litres of petrol. Two years later, the volume is to increase to 55 million litres, and in the following phase, it will reach ten times that amount, i.e. 550 million litres of petrol. "We are then talking about 1 million tonnes of methanol per year," says Speith. "That is also the common size of plants that produce fossil-based methanol."

Seen from Europe, there are few regions on this planet further away than southern Chile. Does this long transport route make any economic sense at all? According to Markus Speith, transport costs play a relatively minor role. The decisive factor is the electricity production costs. "And here we expect values well below two-dollar cents per kilowatt hour. And that is also the real reason why we went into this region." Speith is talking about more than 70 per cent annual full load hours for the wind power plants. "We think we can already get into an economic range with the first commercial phase." According to Speith, however, this also depends on the regulations of the consumer countries. The price of a litre of petrol in the commercial development phase of the project should be in the range of 1.3 to 1.5 euros - before taxes. And taxes are crucial when it comes to economic viability. Speith would like to see a tax advantage for the climate-neutral fuel from Chile, such as exists in Germany for Autogas (LPG). Or even a complete tax exemption. "To really make this attractive at the pump."

The plans fit in with Chile's green hydrogen strategy. In the South American country, the mining sector has traditionally been strong. Chile has now prescribed a shift from extracting non-renewable resources to producing clean and renewable fuels. The national strategy names the potential. There is talk of 160 megatons of green hydrogen per year. Chile, with a north-south extension of more than 4,000 kilometres, points to photovoltaic plants, for example in the Atacama Desert, and wind power in Patagonia, where Siemens Energy is now active.

Siemens Energy is going even further in its planning. Power-to-X, i.e. the production of synthetic fuels, is for the company the decisive building block on the way to a climate-neutral world. Green hydrogen and CO₂ are used to produce E-Fuels, such as e-methanol, e-methane, e-diesel, e-kerosene or carbon-containing base materials from the chemical industry. The strategic approach for Siemens Energy is the so-called sector coupling. The energy industry, the chemical industry, heavy industry and the transport industry could be brought together through power-to-X. "Sector coupling and Power-to-X are the way towards closed CO₂ cycles and CO₂-neutral infrastructures," says a Siemens Energy brochure. The company presents a systemic business model for the

future. And promises a smooth transition from fossil fuels to a climate-neutral world. That's the big picture.

Siemens Energy's power-to-X strategy is aimed at areas of application where battery-electric propulsion has its limits, i.e. heavy goods traffic, air traffic and shipping. Ireneusz Pyc from Siemens Energy expects that in ten years' time the cost price per litre of synthetic fuel will be one euro.

Haru Oni in southern Chile is a first step on this path and a "blueprint for the development of comparable projects worldwide", says Markus Speith. These projects are already in the pipeline. In January this year, Siemens Energy signed a Memorandum of Understanding (MoU) with partners in Abu Dhabi. Here, too, the focus is on the production of green hydrogen and climate-neutral fuels. A demonstration power plant based on photovoltaics is to be built near the showcase city of Masdar City in the United Arab Emirates. And when you know that the airlines Etihad and Lufthansa are also involved, you know at the same time that things are moving in the direction of climate-neutral paraffin.

Markus Speith, Siemens Energy, [in an interview](#)