

## About Enapter

We have reached a turning point in our understanding of energy. Solar and wind are the cheapest ways to generate power. In the future, fossil fuels will no longer be burnt to generate energy. While change is happening, most innovations in energy are related to electricity, which only accounts for 30 percent of total energy consumption. The other 70 percent of global energy demand is met by fuels and gases.

Green hydrogen is the solution the energy industry needs to satisfy the demands of traditionally fossil fuel dominated sectors. Hydrogen is an energy carrier that can be used in fuel cells, engines, turbines, boilers and industrial applications, or be transformed into any kind of power fuel, effectively coupling all sectors.

Hydrogen production has expanded to approximately 70 million tons each year, but is predominantly created from fossil fuels, resulting in significant carbon dioxide emissions. Creating affordable hydrogen energy from renewables is the key issue Enapter is poised to solve.

To this end, Enapter designs and manufactures highly efficient hydrogen generators. Our patented Anion Exchange Membrane (AEM) electrolyser offers lowest-cost hydrogen production. We combine advantages of competing technologies including low-cost materials without the need for noble metals, high current densities, fast response, long lifetime. Enapter's special advantage is the ability to produce small electrolysers cost-effectively. This comes from our patented operation with a dry cathode, allowing for high purity, pressurized hydrogen production directly from the stack, and dramatically simplifying the balance of plant.

While other manufacturers of electrolysers are limited by their technology and produce large-scale electrolysers for industrial projects, Enapter is leveraging its technological advantage to make electrolysers a product or commodity. An analogy: Our competitors are developing systems similar to that of early computing mainframes, which were considered the future of computing in the 1980's. Like the introduction of the revolutionary personal computer, Enapter is establishing a commoditized product that is small, modular and scalable – the building block for the future of energy. A mass-produced AEM electrolyser is believed to have similar cost reduction potential like solar panels or microchips.

Solar and wind allowed customers to become prosumers and produce electricity locally where it is needed. Enapter's distributed AEM electrolyser closes the gap: it couples all sectors making a green gas that can be used for energy storage, heating, cooling, transport or industrial feedstock.

Our goal: produce hydrogen for €1.50 or less per kilo, we believe that is the point of no return for fossil fuels.

Enapter's disruptive business model is based on three pillars. Enapter will continue AEM electrolyser technology development with a focus on R&D and building valuable intellectual property. Secondly, we will increase production capacity through serial fabrication and then move to mass fabrication. Thirdly, Enapter will maintain a strong focus on software. In the energy system of the future, hardware and software are inseparable.

**Mission:** Enapter's mission is to replace fossil fuels with affordable green hydrogen. Enapter's goal is to make hydrogen from renewable energy as cheap as possible.

**Vision:** Enapter envisions carbon-free energy systems fueled and powered by sustainable renewable energy sources only. In this vision, hydrogen as an energy carrier is key to providing independence, reliability and security for all sectors (power, heat and transport) in any energy system.

### **Company key dates**

- November 2017: Enapter is created, 11 employees
- October 2018: Enapter is a winner of the Shell New Energy Challenge
- November 2018: EL 2.0 electrolyser launched
- April 2019: Enapter wins World Energy Council and DENA (German Energy Agency) Award
- September 2019: Enapter starts serial fabrication of the EL 2.0
- January 2020: Enapter wins Handelsblatt Energy Award in Industry
- February 2020: Enapter announces the launch of EL 2.1

### **Company facts**

- 4 locations worldwide
  - Pisa, Italy: manufacturing and R&D
  - Berlin, Germany: marketing, communications
  - Bangkok, Thailand: business development, design
  - St. Petersburg, Russia: software development
- 5<sup>th</sup> location, coming soon: in Tokyo Japan.
- Team size in 2020: 85
- Technology deployed in 30 countries

### **Technical facts on Enapter technology**

- 1x EL produces about 1kg in 24hours
- 100 x EL would produce 100 x 365 days = 36 500 kg of hydrogen per year.

### **Enapter in Japan**

Enapter sells its AEM electrolyser as a white-label branded system. Its customers are large corporates. Sales in Japan started in 2016. The use cases for Enapter's electrolyzers in Japan are in power to electricity storage, providing backup energy for infrastructure support in case of natural disaster. In the mobility field, the AEM generates hydrogen for forklift refueling station.

### **Hydrogen market in Japan**

- Hydrogen volume: METI estimated in 2017 that the present demand of H<sub>2</sub> will rise from 200 to 4,000 tons /year in 2020. In 2030, it projects 300,000 tons/year in and 5 to 10 million ton/year in the long term.
- The Institute of Applied Energy estimates that the hydrogen demand in Japan in 2050 will be 53 Mtoe, resulting in a 13% share of the total primary energy supply

### **Green Hydrogen in Japan**

- METI set the goal for efficiency of water electrolysis is go from today 5 kWh/Nm<sup>3</sup> to 4.3kWh/Nm<sup>3</sup>
- Enapter is already today at 4.8kWh with the EL2.0 and will be at 4.4kWh with the EL 2.1,

This means: Enapter is already today very close to METI's efficiency goals for 2030!