Press release

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Hannover Messe 2025: Bosch embraces hydrogen production

Using Bosch industrial excellence to achieve economies of scale in stack production

- Bosch and FEST exhibit electrolysis system with Hybrion stacks at Hannover Messe.
- International customer orders of some 100 megawatts even before official sales launch.
- Bosch's industrial excellence ensures scalability of hydrogen production.

Stuttgart and Hannover, Germany – Whether in the chemicals, transportation, steel, or energy industries, there is enormous potential for decarbonization if hydrogen is used as an energy source – especially if it is produced using renewables. With an expected global capacity of 100–170 gigawatts by 2030, electrolysis is a strategic growth field for Bosch, despite the slowdown in the ramp-up of the hydrogen economy. To mark its entry into this market, the company is showcasing technology for electrolyzers at Hannover Messe. Bosch is premiering two Hybrion PEM (proton exchange membrane) electrolysis stacks as a modular container solution integrated into an electrolysis system. Such stacks are at the heart of the electrolyzer. The complete system, with an output of 2.5 megawatts, is supplied by FEST, based in Goslar, Germany. "To counter climate change, we need alternatives to fossil fuels. Green hydrogen, produced with renewable energy, will play a vital role in massively reducing carbon emissions in the industrial, transport, and energy sectors. Producing this hydrogen requires electrolysis systems – and Bosch's Hybrion stack is the key component for them," says Dr. Stefan Hartung, chairman of the board of management of Robert Bosch GmbH.

Robert Bosch Benelux
Henri-Joseph
Genessestraat 1
BE- 1070 Brussel

E-mail peter.detroch@be.bosch.com
Telefoon +32 (0)2 525 5346

Corporate Communications Benelux
www.bosch-press.be
www.bosch-press.nl

Bosch aims to apply its fuel-cell expertise to hydrogen production. The company wants to use its experience in volume production to achieve economies of scale and reduce costs in the future. In 2025, it is planning to work on several projects in Europe with various partners. Even before the official sales launch in April, Bosch has already acquired orders amounting to some 100 megawatts – for example, Neuman & Esser will be integrating 16 Bosch Hybrion stacks into an electrolyzer with a capacity of 20 megawatts. Bosch is also working with companies including AKA Energy Systems, Andritz, Pietro Fiorentini, Hyter, H2B2, iGas, IMI, Nikkiso, and Técnicas Reunidas. “Hydrogen is a strategic growth field for Bosch – we expect sales revenue to run into the billions by 2030,” says Markus Heyn, member of the board of management and chairman of Bosch Mobility.

Bosch Tilburg plays crucial role in electrolyzer stack development

The Bosch electrolyzers have strong dutch roots. The Bosch Electrolyzer R&D center is based at Bosch Thin Metal Technologies in Tilburg. This subsidiary within Bosch develops the electrolysis stack, a central part of electrolysers, with a holistic approach. Additionally, this location also develops and manufactures bipolar plates which are welded or stacked together. In electrolyzers, these bipolar plates supply water to the anode, transport hydrogen from the cathode, and provide electrical conduction between the cells. These plates have excellent electrical conductivity, are impermeable to gas, and withstand harsh, acidic environments.

The full Hybrion stacks will initially be manufactured at the Bosch location in Bamberg, Germany. For each unit, over one hundred electrolysis cells are arranged in layers. For this, Bosch has developed a special clamping tool that greatly simplifies and accelerates the manufacturing process. Each stack has an output of 1.25 megawatts and can produce up to 23 kilograms of hydrogen per hour from water and electricity. This is enough for a 40-ton truck with a fuel-cell powertrain to travel around 250 to 300 kilometers. In the individual electrolysis cells, a proton exchange membrane – made using a special polymer – separates the anode and cathode from each other. To produce hydrogen, ultrapure water is first fed into the anode side of the PEM electrolyzer. As a result of electrical voltage at the two electrodes, the water at the anode reacts to form oxygen and free electrons and protons. The protons cross the membrane and combine with the electrons to form hydrogen gas at the cathode. Bosch’s Hybrion PEM electrolysis stacks are suitable for hydrogen production in modular systems producing 1 megawatt, but also for large, gigawatt-scale industrial plants.

A FEST electrolyzer with integrated Bosch PEM electrolysis stacks is set to go into operation at the Bamberg plant as part of a hydrogen cycle in 2025. Bosch

intends to use the hydrogen produced there for the endurance testing of mobile fuel-cell stacks, which are also manufactured in Bamberg. The power generated during that testing will in turn flow into the electrolyzer, thus closing the cycle. The hydrogen itself is initially intended for the company's own use.

Bosch offers a broad portfolio of products and solutions for hydrogen

Bosch has an exhaustive hydrogen portfolio. "In developing hydrogen technologies, Bosch also relies on its proven expertise in industrial technology. We offer solutions from industry for industry," says Tanja Rueckert, member of the Bosch board of management. Bosch Manufacturing Solutions, for example, offers water treatment systems that can be used to produce the ultrapure water required for electrolysis. These systems use thermal and electrochemical processes to remove impurities such as salts or metals from the water. Bosch is also actively using hydrogen in mobile fuel cells and hydrogen engines. Together with FirstElement Fuel, the U.S. market leader for the commercial operation of liquid hydrogen filling stations, Bosch Rexroth has achieved an important technology milestone for refueling infrastructure. CryoPump stations cut operating costs by up to 70 percent, bringing them down to an economical level, while shortening refueling processes for heavy trucks to around ten minutes.

Press photos and infocharts are available on the Bosch Media Service at www.bosch-press.com.

Contact person for press inquiries:

Peter De Troch,

E-mail: peter.detroch@be.bosch.com

The Bosch Group is a leading global supplier of technology and services. It employs roughly 417,900 associates worldwide (as of December 31, 2024). According to preliminary figures, the company generated sales of 90.5 billion euros in 2024. Its operations are divided into four business sectors: Mobility, Industrial Technology, Consumer Goods, and Energy and Building Technology. With its business activities, the company aims to use technology to help shape universal trends such as automation, electrification, digitalization, connectivity, and an orientation to sustainability. In this context, Bosch's broad diversification across regions and industries strengthens its innovativeness and robustness. Bosch uses its proven expertise in sensor technology, software, and services to offer customers cross-domain solutions from a single source. It also applies its expertise in connectivity and artificial intelligence in order to develop and manufacture user-friendly, sustainable products. With technology that is "Invented for life," Bosch wants to help improve quality of life and conserve natural resources. The Bosch Group comprises Robert Bosch GmbH and its roughly 470 subsidiary and regional companies in over 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. Bosch's innovative strength is key to the company's further development. At 136 locations across the globe, Bosch employs some 86,900 associates in research and development, of which nearly 48,000 are software engineers.The company was set up in Stuttgart in 1886 by Robert Bosch (1861–1942) as "Workshop for Precision Mechanics and Electrical Engineering." The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant upfront investments in the safeguarding of its future. Ninety-four percent of the share capital of Robert

Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The remaining shares are held by Robert Bosch GmbH and by a corporation owned by the Bosch family. The majority of voting rights are held by Robert Bosch Industrietreuhand KG. It is entrusted with the task of safeguarding the company's long-term existence and in particular its financial independence – in line with the mission handed down in the will of the company's founder, Robert Bosch.

Additional information is available online at www.bosch.com, www.iot.bosch.com, www.bosch-press.com.