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New area of business: Bosch to develop components for hydrogen electrolysis

Technology for hydrogen generation expected to go into production in 2025

- Bosch to develop the stack – the core component of an electrolyzer
- Bosch to invest up to 500 million euros in this new area of business by the end of the decade
- Stefan Hartung: “Our intention is to use Bosch technology to support the rapid expansion of hydrogen production in Europe”

Stuttgart and Renningen, Germany – When it comes to green hydrogen, Bosch is stepping on the gas: in the interest of effective climate action, the company is planning not only to use this new fuel, but also to be one of the companies producing it. This is why Bosch is branching out into the development of components for electrolyzers, which use electrolysis to split water into hydrogen and oxygen. Ideally, the electricity for this purpose is generated from renewable sources such as wind or photovoltaic power, in which case the result is known as “green hydrogen”. “We cannot afford to delay climate action any longer, so we aim to use Bosch technology to support the rapid expansion of hydrogen production in Europe,” said Dr. Stefan Hartung, chairman of the board of management of Robert Bosch GmbH, at the presentation of the company’s [annual figures](#). “To do this, we will leverage our know-how in fuel-cell technology,” added Dr. Markus Heyn, member of the board of management of Bosch and chairman of the Mobility Solutions business sector. Drawing on this expertise, Bosch will assign the development of electrolyzer components to the Mobility Solutions business sector, investing up to 500 million euros in this venture by the end of the decade. In light of energy diversification, the move away from fossil fuels, and the need to reduce CO₂ emissions, demand for green hydrogen is growing rapidly – not only in energy-intensive industries such as steel, chemicals, and heavy-duty freight, but also in private real estate. According

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to the EU, demand is set to rise to some ten million metric tons a year by 2030. Bosch forecasts that the global market for electrolyzer components will increase to a volume of around 14 billion euros over the same period, with Europe set to see the highest rates of growth. To help business and society reduce dependency on fossil fuels and harness new forms of energy, Bosch intends to invest some three billion euros in climate-neutral technology, such as electrification and hydrogen, over the next three years.

Bosch is to develop the stack - the core component of an electrolyzer

As in the fuel cell, the key component of an electrolyzer is a stack, which comprises several hundred individual cells connected in series. In each of these cells, electricity is used to split water into hydrogen and oxygen. This is the reverse of what takes place in a fuel cell, where electricity is generated by combining hydrogen and oxygen. In both cases, the chemical reaction is facilitated by means of a proton-exchange membrane (PEM). Bosch is collaborating with a number of partners to develop a way of combining the electrolyzer stack with a control unit, power electronics, and various sensors to create a “smart module”. With pilot plants scheduled to commence operation in the coming year, the company plans to supply these smart modules to manufacturers of electrolysis plants and industrial service providers from 2025 onward.

Using a simple process, Bosch will incorporate a number of these compact modules. They can then be used both in smaller units with capacity of up to ten megawatts and in gigawatt-rated onshore and offshore plants – whether in new-build projects or in existing plants for conversion to the production of green hydrogen. To maximize the efficiency of hydrogen production and extend the service life of the stack, the smart modules are to be connected to the Bosch cloud. At the same time, the use of a modular design for the electrolyzers is expected to make maintenance more flexible: any scheduled work will require the shutdown of certain sections of the plant only, instead of the entire facility. Bosch is also working on service concepts that will include the recycling of components in order to promote a circular economy.

Bosch can use its strengths in mass production and economies of scale

Unlike many of the electrolyzer components currently on the market, the Bosch smart modules will be mass produced. As such, the manufacturing operation will generate economies of scale. “Two key factors are involved in ramping up hydrogen production: speed and cost,” Heyn said. “This is where we can play to our strengths, thanks to our expertise in mass production and our automotive know-how.” Bosch is now planning to start volume production as quickly as possible at a number of European locations. These include Bamberg and Feuerbach (Germany), Tilburg (Netherlands), Linz (Austria), and České Budějovice (Czech Republic).

Bosch portfolio expansion will safeguard jobs

The ongoing transformation of the automotive sector presents a huge challenge for the industry as a whole. As ever, Bosch's response here is to innovate. In entering a new field of business – one that will add a nonautomotive wing to its mobility solutions business – the company is seizing the opportunity to further safeguard employment. In the coming years, this expansion into electrolyzer components is expected to create work for hundreds of associates. “In fact, we’re doing three things at once,” Heyn said. “We’re making an important contribution ecologically, economically, and socially.”

Bosch is working on mobile and stationary fuel cells

Bosch firmly believes in hydrogen as a future fuel, and is also working on both stationary and [mobile fuel cells](#). One intended use for the former is as small, on-site power plants for cities, data centers, shopping malls, business parks, and as charge spots for electric vehicles. Bosch plans to use mobile fuel cells to facilitate the climate-neutral shipping of goods and commodities, initially by truck. The company's portfolio of vehicle-related products in this field ranges from individual sensors to core components such as the [electric air compressor](#), the stack, and complete [fuel-cell modules](#). Production is expected to start this year.

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Basic information:

Mobility Solutions is the largest Bosch Group business sector. It generated sales of 45.3 billion euros in 2021, and thus contributed 58 percent of total sales from operations. This makes the Bosch Group one of the leading automotive suppliers. The Mobility Solutions business sector pursues a vision of mobility that is safe, sustainable, and exciting, and combines the group's expertise in the domains of personalization, automation, electrification, and connectivity. For its customers, the outcome is integrated mobility solutions. The business sector's main areas of activity are injection technology and powertrain peripherals for internal-combustion engines, diverse solutions for powertrain electrification, vehicle safety systems, driver-assistance and automated functions, technology for user-friendly infotainment as well as vehicle-to-vehicle and vehicle-to-infrastructure communication, repair-shop concepts, and technology and services for the automotive aftermarket. Bosch is synonymous with important automotive innovations, such as electronic engine management, the ESP anti-skid system, and common-rail diesel technology.

The Bosch Group is a leading global supplier of technology and services. It employs roughly 402,600 associates worldwide (as of December 31, 2021). The company generated sales of 78.7 billion euros in 2021. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. With its more than 400 locations worldwide, the Bosch Group has been carbon neutral since the first quarter of 2020. The basis for the company's future growth is its innovative strength. At 128 locations across the globe, Bosch employs some 76,100 associates in research and development, of which more than 38,000 are software engineers.

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