



Bosch to cooperate in large-scale production of fuel cells for trucks and cars Alliance agreed with stack manufacturer Powercell

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- ▶ Stefan Hartung: “Bosch is entering the market for mobile fuel cells and is pushing ahead with their commercialization.”
- ▶ Bosch and Powercell to jointly continue the development of stacks.
- ▶ Bosch to manufacture jointly developed stacks under license for the automotive market.
- ▶ By 2030, the share of electric vehicles worldwide powered by fuel cells will be as high as 20 percent.

Stuttgart, Germany – Bosch is entering the market for mobile fuel cells and paving the way for the breakthrough of this technology in trucks and cars. One crucial component here is the stack. As the core of the fuel cell, it converts hydrogen into electrical energy. To further improve and manufacture these stacks, Bosch has now formed an alliance with Powercell Sweden AB, the Swedish manufacturer of fuel-cell stacks. Under the agreement, the two partners will work jointly to make the polymer-electrolyte membrane (PEM) fuel cell ready for production. Bosch will then manufacture this technology under license for the global automotive market. The stack will complement the Bosch portfolio of fuel-cell components, and is to be launched in 2022 at the latest. “In the fuel-cell domain, Bosch already has a strong hand, and the alliance with Powercell makes it even stronger. Commercializing technology is one of our strengths. We are now going to take on this task with determination and develop this market,” says Dr. Stefan Hartung, member of the Bosch board of management and chairman of the Mobility Solutions business sector. Over the long term, the mobile fuel-cell business is potentially worth billions of euros for Bosch. It estimates that as much as 20 percent of all electric vehicles worldwide will be powered by fuel cells by 2030. “With the combined weight of its clout and expertise, Bosch will provide our fuel-cell technology with the chance to gain a foothold in the automotive market. We couldn’t imagine a better partner than Bosch for this,” says Per Wassén, the Powercell CEO.

Fuel-cell technology for trucks and cars

Bosch believes the best opportunities for broad adoption of fuel-cell technology are in the commercial-vehicle market. The EU's fleet requirements for trucks call for a reduction of CO₂ emissions by 15 percent on average by 2025, and 30 percent by 2030. Bosch's view is that this target can only be reached by electrifying more and more of the powertrain. The fuel cell can play a decisive role here. Once they have become established in trucks, Bosch fuel-cell powertrains will then increasingly find their way into passenger cars. But for this to happen, the cost of fuel-cell systems needs to be progressively reduced. The biggest cost item is the stack. It accounts for nearly two-thirds of the total cost of a fuel-cell system. "Through commercialization and widespread marketing of this technology, Bosch will achieve economies of scale and push down costs," Hartung says. Costs also have to fall when it comes to hydrogen. Currently, this fuel is mainly produced for industrial applications, at a kilogram price that frequently exceeds five euros. As production grows, the price should fall. One kilogram of hydrogen contains as much energy as about three liters of diesel. For 100 kilometers, a modern 40-ton truck requires seven to eight kilograms of hydrogen.

Bosch as a systems supplier with a broad portfolio

It uses green electricity, the production of hydrogen can be climate-neutral. Various industrial enterprises are working to perfect this process. In addition, there is a small network of more than 60 hydrogen filling stations in Germany, and this number is set to rise. The hydrogen tank can be refilled with highly compressed gas in a matter of minutes. In the fuel cell (or fuel-cell stack as an assembly of such cells is called) the hydrogen reacts with oxygen. The end result – apart from water as a by-product – is electrical energy. This can be used either to recharge a battery in the vehicle or to directly power the electric motor. By flexibly combining two or more stacks, the power requirements of all kinds of vehicles can be covered, from passenger cars to heavy trucks. With its 60 associates, Powercell is gradually moving from manual production of fuel cell stacks to ramp-up of a semi-automatic production. Powercell has developed cutting edge fuel cell technology and its stacks provide an output of up to 125 kilowatts. Headquartered in Göteborg, Sweden, the company was spun off from the Volvo Group in 2008. It already supplies fuel cells for use as prototypes in trucks and cars. Bosch also has a lot of expertise in fuel-cell technology. The supplier of technology and services sees itself as a systems supplier, and already has a broad portfolio of components for fuel cells in trucks and cars. These include an air compressor with power electronics and a control unit with sensors.

Further alliance for stationary fuel cells

As well as PEM fuel cells, Bosch is already actively involved in solid-oxide fuel cells (SOFC). Since the middle of last year, Bosch has been working with the the British specialist [Ceres Power](#) to further improve SOFC technology for applications such as distributed power supplies to factories and computing centers. The idea behind the technology is to have small power stations set up throughout cities, as well as in industrial areas. Because these standardized plants are highly flexible, they will be able to cover peak demand better than conventional plants. The aim is for one SOFC module to generate 10 kilowatts of electrical power. Where more electricity is needed, any number of modules with the same output can simply be interconnected.

Mobility Solutions is the largest Bosch Group business sector. According to preliminary figures, it generated sales of 47 billion euros in 2018, and thus contributed 60 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 accident-free, emissions-free, and stress-free, and combines the group's expertise in the domains of 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 410,000 associates worldwide (as of December 31, 2018). According to preliminary figures, the company generated sales from operations of 77.9 billion euros in 2018. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected manufacturing. 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 deliver innovations for a connected life. 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 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. At 125 locations across the globe, Bosch employs some 69,500 associates in research and development.

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