High-power charging system for electric buses

Around 67 percent of all global CO₂ emissions are produced in cities. Over half of the world's population already lives here, and urbanization is rapidly increasing. As a result of this trend, cities – and above all megacities – will play a key role in reducing greenhouse gas emissions and air pollution. Cities throughout the world are developing environmental protection plans aimed at achieving climate-neutrality. Oslo and Copenhagen, in particular, are considered trailblazers when it comes to climate protection. The Norwegian capital plans to reduce its CO₂ emissions by up to 50 percent within four years. This climate protection goal can be reached, however, only when inner-city personal traffic is considerably reduced and public transport services are further expanded and rely on vehicles that produce no local emissions. The main lever in achieving this will be to convert the city’s bus fleet, almost exclusively run with combustion engines, to electric operation.

The central prerequisite for using electric buses for urban transport is having an adequate charging infrastructure. Siemens has developed a pantograph/charging solution with grid connections specifically for bus lines. The high-power charging stations (HPC) can charge the bus batteries within four to ten minutes at regular intervals, enabling them to complete a full day of scheduled service. The battery is charged at the end station with just enough energy to ensure that the bus can reach the other end station of the line. The advantage here is that smaller batteries can be used, reducing weight and thus saving energy as well as providing more space for passengers. The buses are fully charged overnight at the depot.

Charging is done via charging masts installed at the line’s end stations. The bus drives to a specified place beneath the charging mast. The pantograph on the
charging station then lowers to the bus roof, where four charging contacts are installed in two parallel lightweight tracks that conduct the electricity to the batteries. The battery management system on the bus automatically connects with the charging station per WLAN and the charging process begins. When sufficient energy is on board, the pantograph automatically returns to its starting position in the charging station and the bus can resume its service.

The safety of the passengers and driver are ensured at all times. With the help of a remote monitoring system, the availability, alarm and operating status of each vehicle as well as the energy consumption per vehicle can be controlled at all times, and malfunctions can be detected at an early stage. The charging system can operate autonomously or, using an OCPP (Open Charge Point Protocol), be connected with a control center via an Internet Protocol (IP) with GPRS. The HPC system is delivered as a turnkey installation including all electrical and structural work and its integration into the power grid. The charging infrastructure can operate with buses from various manufacturers. Vehicles from different bus manufacturers can be charged at one charging mast, ensuring operators maximum flexibility in selecting their bus fleet.

Selected bus routes in Hamburg (Germany), Stockholm and Goteborg (Sweden) and Montreal (Canada) are already electrified with Siemens technology. These systems supply, for example, buses manufactured by Solaris, Volvo, VDL and NewFlyer with electricity. In Hamburg, Siemens’ charging system charges vehicles from Solaris and Volvo at the same station.

This background information, press pictures and further information on eBus are available at www.siemens.com/press/ebus

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