# Press Release



**The NEFTON Project Develops Charging Components Rated Up to 3,000 Amperes**

## Foundations Laid for 3 MW Fast Charging of Trucks

**Road freight transport accounts for 7.5 percent of Germany's greenhouse gas emissions, which is why the electrification of this sector is a key lever for climate protection. The expansion of a high-performance charging infrastructure is crucial for the acceptance and everyday usability of fully electric commercial vehicles. In the "NEFTON" project, a charging current of 3,000 amperes was achieved for the first time, paving the way for charging capacities of more than one megawatt in the future. To this end, in addition to a highly efficient, bidirectional megawatt charging station, components capable of handling charging currents of up to 3,000 amperes were developed and successfully tested. The consortium has summarized the results in a report.**

While charging capacities of 11 kilowatts are sufficient for a standard charge and 120 to 400 kW for a fast charge for passenger cars, electric trucks require significantly larger amounts of energy. This poses a particular challenge for the power grid and the associated charging infrastructure. The Megawatt Charging Standard (MCS), with 1,250 volts and 3,000 amps, applies to this power class. In current technology, this potential has not yet been fully realized at charging stations; the state of the art is around 1 MW of charging power.

The partners in the collaborative project "NEFTON—Commercial Vehicle Electrification for Transport Sector-Optimized Grid Connection" have developed a user-specific, cost-optimized commercial vehicle concept and its drive and charging system in accordance with the MCS. To this end, data was first collected and converted into user and requirement profiles. Based on this, simulation models for vehicle and powertrain design were created to analyze and evaluate various concepts. In addition to technical feasibility, the systems were compared in terms of efficiency, cost, and sustainability.

From MAN Truck & Bus's perspective, the results achieved in the NEFTON project represent an important milestone for the future of commercial vehicle charging. For the first time, a complete charging path was operated stably at 3,000 amperes in a test bench setup located close to the vehicle. "This will make it possible in the future to recharge enough energy for a range of more than 400 kilometers in about 10 to 15 minutes," explains Fabian Schweizer, project manager at MAN. However, this requires a new generation of battery systems specifically

designed for very high charging power. The project results are being directly incorporated into the further development of production-ready high-current charging solutions.

A test bench for high-current experiments was set up at the Technical University of Munich (TUM) to experimentally investigate the charging of electric trucks in the megawatt range. Both individual components and the entire charging path were tested at currents of up to 3,000 amperes and evaluated for their thermal capacity. The tests confirmed that the systems used can operate reliably even under high electrical and thermal loads. "With the successful setup of our low-voltage test bench and the achievement of 3,000 amps, we were able to make an important contribution to the further development of megawatt charging technology. This lays a crucial foundation for preparing 3-MW charging for industrial use," explains Prof. Malte Jaensch.

## New laboratory infrastructure enables high-performance testing

The higher power classes in the megawatt range require not only new charging and vehicle technology, but also new testing technology with higher connected power ratings. Fraunhofer ISE has 40 MW of connected power capacity at its low- and medium-voltage test facilities. As part of the NEFTON project, Fraunhofer ISE's megawatt laboratory has expanded its portfolio to also test high-power charging systems with regard to the required grid connection conditions. Fraunhofer ISE's test facilities were used in the project in collaboration with the Technical University of Munich and MAN to examine prototypes for DC contactors rated for up to 12 kA short-circuit current and to operate the entire electromechanical system—from charging cables, connectors, and distribution equipment to the vehicle batteries—under rated conditions of 3,000 A and up to 1,250 V.

Due to the high short-circuit power levels, particularly in conjunction with battery systems, special structural safety precautions are required for these tests: Because of the risk of arcing, shock waves, and flying debris, the testing is conducted remotely and in protected rooms. "The new test benches are integrated into the existing infrastructure of the megawatt laboratory, allowing us to test not only individual charging stations but also larger systems," explains Dirk Kranzer, project manager at Fraunhofer ISE. In particular, integration into the fault-ride-through test facility—which simulates brief voltage dips—allows for testing of all control-related requirements of the grid connection conditions.

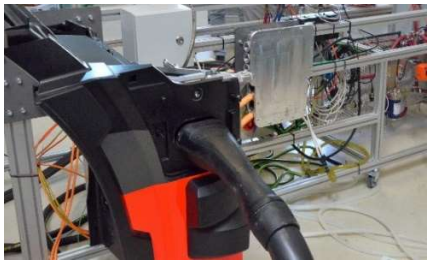
## Charging Stations as Hybrid Power Plants

This is important because large consumers such as megawatt charging stations are increasingly being utilized to support the grid. Since these MW charging systems are installed in the megawatt range alongside stationary storage systems and photovoltaic systems for economic reasons, they must be regarded as hybrid power plants. The optimal integration of storage and PV allows freight forwarders to begin the transition to electric trucks without having to wait for the grid to be fully expanded. To this end, Fraunhofer ISE also conducts planning studies that not only take energy efficiency into account but are also optimized for the economic requirements of logistics operations. According to a recent study, logistics companies that rely on a combination of PV and stationary battery storage to electrify their fleets can reduce their annual electricity costs by up to 62.5 percent.

## More Information

**Project Web site:** https://nefton.de/

**https://www.ise.fraunhofer.de/en/research-projects/nefton.html**



**As part of the project, the entire system—from the charging cable, plug, and distribution system to the vehicle batteries—was successfully tested at currents up to 3,000 A and voltages up to 1,250 V. © Fraunhofer ISE**

**Truck charging at a megawatt-level fast-charging station. © MAN Truck & Bus SE**

**Closing meeting of the NEFTON collaborative project. © Fraunhofer IS**

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