

Photovoltaics for on-board charging

The Lade-PV project aims to investigate the profitability of photovoltaics use as an additional power source in commercial electric vehicles (EVs). A photovoltaic converter connects the PV solution to the in-vehicle CAN network(s) to manage the battery charging.



Figure 1: I drive electrically powered by photovoltaic on my roof (Source: Fraunhofer ISE)

The [complete article](#) is published in the [September issue](#) of the CAN Newsletter magazine 2022. This is just an excerpt.

Solar power produced on the vehicle can help to save power coming from the EV battery and, thus, improve vehicle's CO₂ emission balance. To demonstrate the marketability of PV (photovoltaic) applications in freight transport, several German companies teamed in the Lade-PV project sponsored by the Federal Ministry for Economic Affairs and Climate Action (German: Bundesministerium für Wirtschaft und Klimaschutz, BMWK). The project managed by Fraunhofer Institute for Solar Energy Systems ISE has started in summer 2019 and should end in summer 2022. Participating parties are Fraunhofer Institute for Transportation and Infrastructure Systems IVI, TBV Kühlfahrzeuge, Sunset Energietechnik, Alexander Bürkle, as well as M&P Motion Control and Power Electronics.

In the project, suitable lightweight PV modules for subsequent on-roof mounting and full integration, as well as CAN-based components for power electronics are being developed. The cost-effective production of large PV-module quantities in a production line is conceptually developed. The modules and components are installed in electric commercial vehicles to conduct practical tests. First implementations of the concept are already under testing on the street-legal vehicles. An energy prediction model should estimate the irradiation potential and enable a cost analysis. The project's aim is to demonstrate energy savings of more than 5 % thanks to additional PV usage.

Connecting to the CAN in-vehicle network

The involved power electronics were adapted to the automotive requirements. Project partner M&P Motion Control and Power Electronics developed a DC power converter that collects and controls the solar power delivered by the PV modules. The converter is connected to the in-vehicle CAN network and manages the power exchange with the electric vehicle battery. Thus, the battery can be charged by the available solar power and the mileage provided by a battery-charge is increased. In refrigerated vans, the energy delivered by the PV solution can be also used for the electric Peltier cooling of the load.

PV modules and power electronics

The goal of the project is to develop particularly light and robust PV modules for subsequent on-roof mounting and full integration. The application-optimized modules should be able to be produced in the price category of standard modules or even cheaper (less than 0,4 €/W respectively less than 75 €/m²). For this purpose, innovative material combinations for lamination are evaluated and tested. The targeted full integration of the PV modules into the roof surface saves additional costs for framing and material. To test the roadworthiness of the modules, relevant tests according to the relevant IEC standards are adapted and conducted.

If you would like to read the full article, you can [download](#) it free of charge or you [download the entire magazine](#).



Figure 2: The refrigerated van from TBV uses integrated PV modules to support the refrigeration of the compartment (Source: TBV Kühlfahrzeuge)