

Current Projects dealing with the PV-Integration in Trucks

“Lade-PV” – Development of vehicle-integrated photovoltaics for on-board charging of electric commercial vehicles

In the “Lade-PV” project we are investigating the market-ability of photovoltaic applications in freight transport.

- development of suitable module technologies
- implementation of safe power electronics
- energy forecasting and measurement campaign
- practical test with evaluation

“PV2Go” – Citizens Science Campaign to measure solar radiation on traffic routes

To determine the irradiation potential on vehicles, we are measuring solar irradiation with 90 sensor boxes on vehicles which are traveling on German roads as part of a citizen science campaign. The project work involves:

- creating a spatial model of the solar potential on traffic routes on a daily and annual basis, including the local shading situation
- irradiation measurements carried out on commuter, personal and commercial vehicles
- matching measured data with satellite-based irradiation data

Further Information about Current Projects



project website “Lade-PV”



project website “PV2Go”



Contact

Marc Andre Schöler
Vehicle-Integrated PV
Phone +49 761 4588-2196
pvmod.ripv@ise.fraunhofer.de

Fraunhofer Institute for Solar
Energy Systems ISE
Heidenhofstr. 2
79110 Freiburg, Germany
www.ise.fraunhofer.de

Integrated Photovoltaics

Solar Modules Integrated in Trucks and Vans

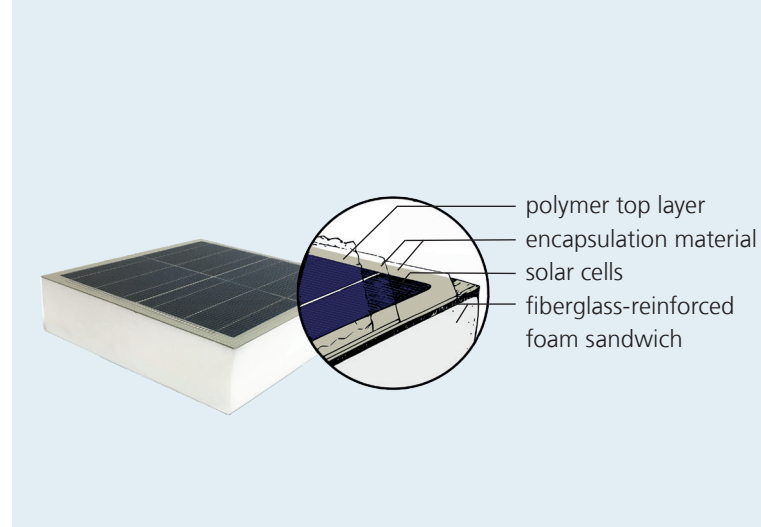
Integrated Solar Modules Save Fuel or Electricity

In recent years, photovoltaic modules have become increasingly attractive for the transportation industry due to reduced prices and technological innovations. The roofs of large commercial vehicles are particularly suitable for the integration of lightweight photovoltaic (PV) modules.

At Fraunhofer ISE, we develop photovoltaic modules for vehicle integration. The solar modules can be integrated into the box body, giving priority to the roof area, of electrically powered vans or trucks with internal combustion engines. In conventionally powered trucks, the PV electricity generated can be used, for example, to cool the transported goods. In purely electric vehicles, the solar electricity is fed into the vehicle battery, increasing the driving range.

Our Services for Logistics Companies, Vehicle Manufacturers and Suppliers

- consulting on PV technology
- design and development of prototypes for integrated PV
- determination of the solar energy yield for regions, routes or roads
- reliability tests on PV modules
- on-board power system integration (drive train of electric vehicles, auxiliary power units)
- energy and load management, power electronics and battery systems
- power yield and cost analysis
- coordination and management of R&D projects with industry partners



Schematic of a lightweight module for trucks.

High Demands on Solar Technology

We develop solar systems hand in hand with the vehicle's electronics and optimize the solar modules for the stress exposure and requirements particular to road traffic:

- complete integration of the solar modules into the vehicle body
- extra slim design, only 2 mm additional height
- low module weight of 120 kg in total (for 34 m² roof area on a 40-ton truck)
- adapted module technology for high stability under extreme thermal and mechanical loads
- melting of snow and ice on roof surfaces possible
- all safety requirements of both photovoltaic and vehicle standards are met

Saves Diesel Fuel and Extends Range of Electric Vehicles

A measurement campaign conducted by Fraunhofer ISE in 2017 showed that a typical 40 ton diesel-powered truck trailer in middle European latitudes can save between 1500 and 2100 liters of diesel annually through integrated PV modules.



Electric-powered truck and mini truck, both with integrated photovoltaic modules.

Our current yield calculations for electric vehicles show even higher impact on fuel saving in direct feed-in. The location-dependent calculations for Northern and Southern Europe resulted in the following additional ranges for an 18 ton electric truck (system size 3.5 kWp) and a 3.5 ton van (system size 2.17 kWp) due to integrated PV under favorable conditions:

18 ton electric truck

- Seville region, Spain: approx. 5272 km per year
- Stockholm region, Sweden: approx. 3084 km per year

3.5 ton electric van

- Seville region, Spain: approx. 11450 km per year
- Stockholm region, Sweden: approx. 6637 km per year

In Southern Europe, amortization of load vehicles with integrated PV modules is already possible after four years.

We offer a comprehensive range of services for photovoltaic applications in the mobility sector: from yield forecasts through the development of solar PV modules or electronics up to economic feasibility studies. Using our many years of experience in module technology, we determine the most appropriate high-performance and efficient materials and technologies for the application.