

Solar systems for buses

- ▄▄▄ Reduction of CO₂ emissions
- ▄▄▄ Reduction of fuel consumption
- ▄▄▄ Green electricity
- ▄▄▄ Increased flexibility
- ▄▄▄ Extending the vehicle battery capacity in standby mode when using auxiliary consumers
- ▄▄▄ 3-year warranty on all Green Energy products



solarbus.pro™

A part of group  Green Energy



**NEW:
THE GREEN ENERGY APP
“MIPV.PRO SYSTEM”
FOR PROFESSIONAL MONITORING
OF SOLAR CELLS**

All info on page 4



Plug & Play solution versatile

Solar cell solutions for all segments of the transport industry

How about a plug + play solar cell system?

With our partner Green Energy, we are able to offer you an innovative concept – green, sustainable and CO₂-friendly. Your batteries are always charged and you are completely independent of the power grid.

The solution is called MIPV (Mobile Integrated Photo-voltaic). This new cell technology generates electricity even at the lowest light intensity – even before the eye catches daylight. The panels are insensitive and suitable for all common washing processes.

The result:

You have sufficient energy reserves for all relevant consumers at all times.

**1 KWH = 1 LITRE DIESEL FUEL =
2.68 KG CO₂ SAVING**



Why is it a good idea to install solar panels on your vehicle?

The reason is the increasing power consumption of modern vehicles. For example, a lot of electricity is consumed for coffee machines, televisions, computers, refrigerators, tools, tail lifts and the like, especially when the vehicle is stationary. Simply mount our CIGS solar cells on the roof – or wherever there is room for them – and generate your own green electricity. It's child's play to do it while you're driving or when you're parked in a car park! This saves fuel, protects the generator and you always have charged batteries.

Our technical solutions are ideal for mounting on the following vehicles:

- ≡ TRUCK
- ≡ Trailer/semitrailer
- ≡ Buses
- ≡ Transporters (delivery and assembly vehicles)
- ≡ Emergency vehicles
- ≡ Motorhomes and caravans
- ≡ Stationary installations (containers, crew cars and lighting installations)
- ≡ Refrigerated trailer

In the course of the introduction of Euro 6, modern battery management systems cause problems under certain conditions. For example, generators are only switched on when absolutely necessary. This leads to strongly fluctuating charging voltages and is detrimental to the battery capacity. Our CIGS solar cells solve this problem and allow you to remain mobile at all times. By the way: In combination with an inverter, the system makes it possible to operate 220 V appliances. This benefits tradesmen and professional drivers, for example.



You can find help on which system is the best solution for your vehicle and your needs on **page 13**.



CIGS solar technology*

Good yields even in diffuse and weak light

CIGS solar cells belong to the thin-film modules and impress with their great flexibility and durability – and fit perfectly on every type of vehicle. The four elements fused together (copper, indium, gallium and selenide) form the semiconductor layer in this technology.

These elements achieve the best efficiency of all thin-film modules and can achieve good yields even in low and difficult light conditions.

Advantages of CIGS modules:

- !!! 3-year warranty on all Green Energy products.
- !!! Flexible panels, **only 3 mm thick** and very light (max. 2 kg per solar panel).
- !!! Available as **12 V and 24 V solution**.
- !!! Suitable for use in the **temperature range from -40 to +85 °C**.
- !!! **Easy installation** in approx. 3 to 4 hours
- !!! Complete **Plug & Play** solution



*CIGS = Cu(In,Ga)Se₂ = Copper indium gallium (di)selenide = Copper indium gallium selenide)

All advantages at a glance

Evaluations via app

See what your own mobile solar cells are producing at any time: The Green Energy App reliably provides all data about the system's performance. In combination with the new charge controller (page 19), this app enables simple system monitoring and makes it clear to what extent environmental emissions have been reduced.

How and where can you get the Green Energy App?

The app is a service of Green Energy Scandinavia A/S and is available for download in the **Google Play Store** and the **App Store**. It offers professional monitoring of the solar cells – at any time, easily and conveniently via smartphone or tablet.



Cost reduction

- ||| Reduction of fleet costs in the areas of fuel and repair and maintenance work (e.g. for vehicle batteries and generators).
- ||| Avoidance of downtime for emergency services

Sustainability

- ||| Solar energy reduces CO₂ emissions
- ||| Avoidance of noise emissions in stationary operation (e.g. with refrigerated vehicles and general engine vibrations).
- ||| Extending the battery life
- ||| Protection of the engine and the attached parts
- ||| Flexible and independent of the power grid

Efficiency

- ||| Avoidance of deep discharges of the battery and downtimes caused by this

Fuel savings – Green Energy in customer use

Over the past months, Green Energy collected data from the monitoring systems of vehicles equipped with our MIVP system. This was compared with data from identical vehicle types or vehicles with identical driving behaviour without a solar system. The data was provided by our customers. They were collected from implemented systems of the vehicle manufacturers. (See from page 6)

An efficient team

The new charge controller and the Green Energy App



The mipv.pro app offers a **user-friendly and efficient** way to monitor and track the data from the new charge controller. By using the app, you can access important information and get a clear overview of your system's **energy consumption and yield**. This includes the **energy generated** in watts (W), the energy saved in **kilowatt hours** (kWh), the amount of **CO₂** saved, as well as the **battery power** in volts (V) and the **charging current** in amps (A). Multiple vehicle groups can also be easily created and managed via the app.

Product info page 19



Advantages charge controller

- \ \ \ Waterproof (IP65)
- \ \ \ Vehicle tracking (worldwide)
- \ \ \ IoT (Internet of Things) connection
- \ \ \ Compatible with all battery types
- \ \ \ After submitting the required information, the registration of the data in the app begins automatically
- \ \ \ Reporting and remote maintenance
- \ \ \ Automatic software updates

Application example:

Bus

OVG Oberhavel Verkehrsgesellschaft mbH
Annahofer Straße 1A
D-16515 Oranienburg

www.ovg-online.de



Heiko Moormann, Operations Manager OVG (l.)
Andre Schreiber, Operations Manager Workshop BVO

“OVG is responsible for public transport in the entire Oberhavel district. The vehicle fleet currently consists of 99 buses. Three of them have been equipped with a solar system from Green Energy. Two standard service buses and one articulated bus have so far delivered a consistently positive result in the test phase.

The compact and lightweight design is ideal for mounting on our vehicle roofs. **The fact that the system is both walkable and flexible means that it can be installed relatively quickly.** The system was able to keep the battery charge at the upper limit, even after long periods of standing and with various consumers. We have installed up to three generators in the bus, which are thus enormously relieved and have a longer runtime.

The investment costs seem high at first glance. But we can set the fuel savings and the just mentioned longer running times of generators and batteries against it. And of course we must not forget the **reduction of the CO₂ footprint!**”

Heiko Moormann,
Operations Manager OVG



*Thank you Heiko and André
for your report.*

One bus ran for seven months with a **640 Wp set** from Green Energy and was compared with two identical buses without a solar system – used in the same area.

Period	Vehicle	Distance	Consumption			Savings
			Total	l / 100 km	Stand mode	
01.05.2022 – 30.11.2022	1	31.190	13.892	44,54		
01.05.2022 – 30.11.2022	2	34.416	15.377	44,68		
01.05.2022 – 30.11.2022	3	41.285	17.426	42,21		990,84

File was provided by the client, stand mode was evaluated separately

The **saving of 2.4 litres per 100 km** results from evaluations from May to November. The savings in diesel fuel in the period under consideration were **990.84 litres**. If the solar set also produces the same average amount of electricity in the remaining months, the **saving in one year is 1,649 litres**. However, if one takes into account a reduced output in the winter season, an annual saving of approx. **1,400 litres (3.75 t CO₂)** is realistic.

Application example:

Bus

Görlitzer Verkehrsbetriebe GmbH (GVB)
Zittauer Str.71/73
D-02826 Görlitz
www.goerlitztakt.de



Sven Sellig, Head of Infrastructure Technology,
Deputy head of operations BOStrab

„I have been impressed by Green Energy's solar technology ever since it was first presented. We are very happy to take advantage of the opportunity to establish the topic of sustainability at the Görlitz public transport company and to play a pioneering role for other public transport companies.

At the beginning of this year, we carried out the first vehicle conversion and are currently in the validation phase. By implementing the solar cell solution, we are reducing the load on the batteries, extending their service life and optimizing the energy supply to the vehicles. In addition, savings result from the reduction in fuel consumption.

Our aim is to equip more vehicles with this technology from the fall. In addition to buses, our fleet also includes technical maintenance vehicles such as tower cars and rail cleaning vehicles. For these types of vehicles in particular, the solar cells can contribute to a significantly longer battery life.

Our fleet is comparatively young, which is why retrofitting the existing vehicles also makes particular sense. In addition to the savings on spare parts, we expect the solar cells to help stabilize costs at least at the current level in the face of rising diesel prices, and in the best case even enable further savings.

I am convinced that we have chosen the right path with Green Energy's solar technology, and I am particularly pleased to be able to continue to support and drive this project forward.“



Sven Sellig
Head of Infrastructure Technology,
Deputy head of operations BOStrab

*Thank you Sven
for your report.*

Application example:

Coach

FlixBus

Friedenheimer Brücke 16

D-80639 München

www.flixbus.de



Anuk Pradhan,
Product Manager Bus

„After launching the company in Germany in 2013, Flix has very quickly established itself as Europe's largest long-haul bus network. Thanks to our unique business model and the innovative technologies we use every day, we have already been able to expand into the USA, Canada and Brazil.

Flix is committed to helping shape the future of mobility by decarbonizing transportation and travel. Solar panels are a great way to make travel more sustainable. They help save fuel and CO2 emissions.

Green Energy has developed an efficient and innovative solar solution that can be adapted to any type of vehicle. EUROPART is very experienced and reliable in supplying vehicle parts for commercial vehicles. Moreover, like Flix, they have a large network throughout Europe, which makes us perfect partners.

We are pleased to be working with Green Energy and EUROPART and are committed to helping shape the future of mobility together.“

Anuk Pradhan,
Product Manager Bus



*Thank you Anuk
for your report.*



v.l.n.r. Karl Andreassen (CEO Green Energy Scandinavia A/S), Anuk Pradhan (Product Manager Bus, FlixBus), Yaroslav Volytsky (Head of Key-Account and Cooperation, EUROPART), Christian Gschwendtner, CEO, AGK Truck & Bus GmbH Bayern



Ready to get **GREEN ENERGY** on the road?
Our custom-made CIGS plug & play solar solution
for buses are available worldwide!

**Win a complete
960Wp CIGS plug & play solar solution
including installation!**
Visit our booth and enter the competition!

solarbus.pro™

A part of group



**Green
Energy**

For true professionals



Climate neutrality by 2050 – Corporate Sustainability Reporting Directive (CSRD)

Climate neutrality by 2050 – that is the EU's major goal. In order to achieve this, it is not only up to each and every one of us, but also up to the economy: It must act more sustainably and transparently. CSRD reporting is intended to make a significant contribution to this and takes a comprehensive approach to the topic of sustainability. This is because reporting not only discloses how a company's own activities affect the environment, but also takes a look at the areas of social and corporate governance – Environmental, Social and Governance (ESG).

What the EU's new CSRD means for companies

The CSRD expands existing rules on non-financial reporting. All companies listed on an EU-regulated market (except micro-entities) are affected by the new reporting requirements.

Reporting obligation as of January 2025* (as of reporting year 2024).

||| Companies that are already subject to reporting requirements within the meaning of the CSR-RUG.

||| Limited liability companies that are both

1. Are large, i.e. meet at least two of the three characteristics on the balance sheet date:

- Balance sheet total > 20 million euros
- Net sales > 40 million euros
- Average number of employees > 250

2. Are capital market oriented.

3. Have an annual average of more than 500 employees.

Reportable from January 2026 (as at reporting year 2025).

||| Large companies that are not yet subject to reporting requirements within the meaning of the CSR-RUG.

||| Limited liability companies, credit institutions and insurance companies that fulfil at least two of the three characteristics on the balance sheet date:

- Balance sheet total > 20 million euros
- Net sales revenue > 40 million euros
- Average number of employees > 250

* Source: www.deutscher-nachhaltigkeitskodex.de

With the fuel-independent power generation in hotel or standby mode of the tractors, a significant reduction in fuel consumption as well as CO₂ emissions is directly achieved.

These savings are thus included in the sustainability report.

Set an example in the industry!

Your commercial vehicles are not only capital goods, but also your business card with employees, customers and suppliers. By easily retrofitting mobile solar cell technology, you are also making a strong statement for more environmental responsibility in your company and in society. We are happy to help and support you.



This is what the solution looks like

The complete plug & play solution is ready to supply your vehicle with reliable power. A good investment in terms of sustainability.



The optimal solution for your buses

The right package solution for your needs: Choose a set that suits your vehicle and your needs. Your sales representative or the branch office near you will be happy to advise you.



640 WP SET
IDEAL FOR CITY BUSES

Daily consumption in city buses (example)

City buses have many electrical components such as ventilation systems, various light sources, interior and exterior destination displays, radios and cameras.

Possible solar energy

with solar cell set 640 Wp

Order no. 8000 300 640

10 hours of sun* = 6.40 kWh

10 hours of clouds = 3.20 kWh

10 hours of rain = 1.60 kWh

All of the systems mentioned work with electricity from the vehicle battery, which must be charged by the generator. For buses with diesel engines, our CIGS solar cell system delivers 600 kWh for the battery based on experience. This means a saving of approx. 600 litres of fuel per year.

The prerequisite is that the solar energy produced is used constantly. In an E-bus, the 24 V system has the same consumption. By eliminating the generator, the battery can be charged more efficiently, thereby increasing the performance of the battery and also achieving a greater range of the bus.



960 WP SET
IDEAL FOR COACHES

Daily consumption in coaches (example)

As with city buses, electricity consumption is also very high in coaches. There are also additional consumers such as microwaves, refrigerators, coffee makers, hot water tanks and USB ports per seat.

Possible solar energy

with solar cell set 960 Wp

Order no. 8000 300 960

10 hours of sun* = 9.60 kWh

10 hours of clouds = 4.80 kWh

10 hours of rain = 2.40 kWh

Since coaches usually have several generators that are relieved by the solar cell system, the fuel savings can be significantly higher compared to city buses. In our experience, our solar cells can generate 1,000 kWh. **This means a saving of about 1,000 litres of fuel per year.**

We recommend: Installation of a consumer battery and a 4,000 W inverter.

You will find the corresponding solar cell sets on the next page!

* Solar radiation: Central Europe



You can find more products from Green Energy here:



Sustainable energy generation, saves CO₂ and fuel



Solar cell set

- Charge controller Multivolt 12/24 V with intelligent charge control
- PV cables incl. cable attachments
- Adhesive and sealant for cable routing
- Cleaner

Without inverter. Please order additionally if required.

IDEAL FOR MINI-BUSES

Power	Scope of supply	Order no
380 Wp	4 x 95 Wp CIGS solar cells, 350 x 2150 mm, self-adhesive, circuit breaker 40 A, waterproof	8000 300 380

IDEAL FOR CITY BUSES

Power	Scope of supply	Order no
640 Wp	8 x 80 Wp CIGS solar cells, 350 x 1850 mm, self-adhesive, circuit breaker 60 A, waterproof	8000 300 640

IDEAL FOR COACHES WITH ENTERTAINMENT SYSTEM

Power	Scope of supply	Order no
960 Wp	12 x 80 Wp CIGS solar cells, 350 x 1850 mm, self-adhesive, circuit breaker 60 A, waterproof	8000 300 960



**AVAILABLE IN VARIOUS POWER LEVELS –
SUITABLE FOR LAPTOP TO WELDING
EQUIPMENT**



Inverter

Scope of supply

With remote control, cable length 4 m

e-certified

Input voltage	Power	Dimensions	Order no
12 V DC	1000 W	311 x 168 x 96 mm	8000 100 012
24 V DC	1000 W	311 x 168 x 96 mm	8000 100 024
24 V DC	1500 W	325 x 252 x 101 mm	8000 150 024
12 V DC	2000 W	325 x 252 x 101 mm	8000 200 012
24 V DC	2000 W	325 x 252 x 101 mm	8000 200 024

Input voltage	Power	Dimensions	Order no
12 V DC	3000 W	450 x 252 x 101 mm	8000 300 012
24 V DC	3000 W	450 x 252 x 101 mm	8000 300 024
12 V DC	4000 W	512 x 252 x 101 mm	8000 400 012
24 V DC	4000 W	512 x 252 x 101 mm	8000 400 024

Service parts/accessories

Description	Order no
Remote control	8000 900 022
Cable For remote controls, 10 m	8000 010 220



NEW!



Charge controller

Sustainable energy generation, saves CO₂ and fuel

e-certified

Electric current	Order no
40 A	8000 401 224
60 A	8000 601 224



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BY THE EUROPART GROUP**

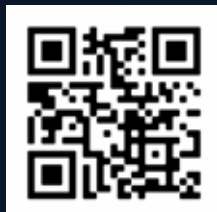
About Green Energy

Green Energy Scandinavia A/S specialises in the use of solar energy and offers a wide range of products that transform natural light into economically sustainable profit through CIGS technology.

- /// Green Energy/mipv.pro – < on the market for 10 years
- /// Group of companies with investor capital from USA, Norway and Denmark
- /// Headquarters in Denmark (Vejle)
- /// Over 10,000 installations, market leader in MIPV technology
- /// 65 employees
- /// Exports to 42 countries worldwide
- /// Since August 2021 Green Energy Scandinavia GmbH in Flensburg

solarbus.pro™

A part of group  **Green Energy**



**You will find us
online here:**

