

## **SOLAR ENERGY USE EFFICIENCY IN TRANSPORT**

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Solar energy is certainly one of the most promising renewable energy sources today. As the development of cars and other electric vehicles only increases, the next logical step is the ability to charge them in a more environmentally friendly way thanks to solar energy.

In recent years, technology in mechanical engineering has been developing at a breakneck pace. Combined with the depletion of natural resources, switching to electric vehicles seems like a more than reasonable choice for humanity. It can be noted that although electric vehicles require a lot of electricity to operate, they are a less polluting mode of transport. But today we know how to produce electricity from renewable energy sources, i.e. solar energy [1].

Charging stations powered by photovoltaic panels can be used as slow or fast charging for all electric vehicles, regardless of their brand. This solution is often intended for individuals: you will have to install your own panels and charging station for your own consumption.

There are several methods for charging electric vehicles using solar panels, these are virtual solar charging and direct self-consumption.

The first method uses a virtual storage system, which is sometimes used for self-consumption PV installations. The principle is to feed excess electricity directly into the grid so that it can be used and therefore not wasted. Essentially, energy is not “stored” but is an alternative to using batteries, which are in limited production. The goal here is to use this virtual storage to power electric charging stations in close proximity to the PV park. Through these terminals it will be possible to charge cars. Some companies have already started developing similar projects, such as Tecsol and Sunchain with Mobelsol.

The second way to charge electric vehicles with solar energy is through direct self-consumption. This involves installing solar panels

directly at the charging point to power the charging stations. This is a solution that can be particularly effective for companies with a large area, especially on the roof of premises where many panels can be installed. Some also choose to build EV parking areas that can accommodate solar panels, such as at carport level. Thus, there may be enough power to power charging stations. Example: SAP in France.

The introduction of solar panels makes it possible to increase the range of vehicles and at the same time do without recharging traction batteries from a traditional electrical network.

The use of solar panels is a far-reaching trend in the energy sector, but, unfortunately, many conditions do not allow transport to immediately switch to the use of such systems.

Firstly, good battery performance is ensured only in clear and sunny weather. Secondly, this is the financial side of using solar panels, despite the fact that the energy is generated for free, the solar panels themselves are not cheap.

Untreated solar panels can cause hazardous environmental consequences due to the harmful substances they contain, such as cadmium, lead and fluorine compounds, which can dissolve and pollute the environment [2].

The question is, are solar cars a dream or a reality? Modern technology is far from allowing a vehicle to run solely on solar energy. The main problem is the lack of space, since full self-consumption will require much more than one or two solar panels. However, some companies, such as Hyundai and Lightyear, are developing hybrid models that can add several miles to your driving range. In any case, it is now difficult to expect the development of 100% solar cars in the near future. Let's see what happens in a few decades.

## References

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2. Солнечная энергетика в возобновляемой энергетике [Electronic resource] – Mode of access: <https://www.renwex.ru/ru/ii/solnechnaya-ehnergetika/>. - Date of access: 12.03.2024.