



ISA Solar E-Mobility Webinar Series: Charging for Change

Webinar #2 | Vehicle Integrated PV Sector: Technical and Regulatory Aspects

Concept Note

The EV deployment can achieve its full GHG emission mitigation potential if the vehicles are charged through renewable energy sources. Due to the rapidly falling costs, solar energy can be a viable option to provide clean energy for EV charging requirements. The global solar and EV markets are growing at a fast pace due to governments trying to achieve climate goals. However, the solar-powered EV sector is still at the initial stage of evolution owing to some technical and regulatory challenges.

The International Solar Alliance's program on 'Scaling Solar E-Mobility' aims at creating an enabling ecosystem that will contribute to higher uptake of solar energy in the E-mobility sector among ISA Member Countries. Under this program, ISA focuses broadly on two approaches – solar-powered vehicle and battery charging stations and Vehicle Integrated Photovoltaic (VIPV) technology. The vehicle charging through solar energy can be achieved via open access mode or on-site rooftop PV (RTPV) installation at the EV charging or battery swapping points. The various aspects related to this area were addressed in the first webinar of this series held in April 2022.

The Photovoltaic panels can also be integrated directly with the vehicle body, an option known as Vehicle Integrated Photovoltaic (VIPV) technology. In this webinar, we will hold discussions on the benefits and current technical and regulatory landscape pertaining to PV integrated electric vehicles.

Vehicle Integrated PV: Opportunities

There are many advantages of integrating PV panels with an electric vehicle. The VIPV approach can help in extending the range of EVs which also adds to the end-user convenience by lowering the charging frequency via the grid. This can even provide complete charging needs of the vehicle in certain use-case scenarios. The EV batteries have a significant CAPEX and OPEX cost share. VIPV can enhance the battery lifetime and reduce maintenance needs on account of lower charge-discharge cycles. Additionally, the PV integration can help in sparing some of the battery capacity to be used for powering other electronic components of the vehicle. PV integration reduces the load on the charging infrastructure and the electricity grid, thereby also decreasing the CO₂ emission of the vehicle, especially if the grid is low in the renewables mix. Besides self - consumption advantage, VIPV deployment can also support vehicle-to-grid (V2G) services as these vehicles can supply excess PV power to the grid when the EV batteries are fully charged.

However, there are some concerns pertaining to VIPV- for example, the efficient utilization of total generated solar energy requires high voltage batteries which are a safety concern. Other aspects to be taken into consideration are – the manufacture of safe, cheap, and reliable solar panels for vehicle integration; engineering design related issues owing to vehicle complexities like the curvature of the roof reducing the yield of solar panels; fluctuations in PV generation output due to multiple factors like bad weather, shadowing etc. The impact of PV integration on the vehicle cost needs to be weighed against the payback period of the panels and the driving range purely supported by solar panels per year.

The webinar will include discussions on the technical and economic feasibility of PV integrated electric 2 w, 3 w, 4 w (light and regular), bus and truck segments along with a currently operational solar ferry case study.

Expected outcomes

- I. Learning techno-economic viability aspects of VIPV sector and industry perspective through select case studies and business models
- II. Review of technical, policy, and regulatory challenges encountered by the VIPV sector stakeholders
- III. Recommendations proposed by each category of the stakeholder community
- IV. Building consensus on the Way Forward steps

Target audience

Automotive OEMs, EVSE industry, EV fleet operators, Solar PV panel manufacturers, Electric utilities and regulators, Automotive testing and standards agencies, Government nodal agencies for transport, renewable energy, Urban local bodies and power sectors, ISA Member Countries' representatives.

Webinar set-up

Mode: Virtual (Video conferencing via Zoom)

Format: Inaugural session (20 min) followed by two sessions (33 min each, Q &A after each session); Closing session (4 min)

Duration: 90 min

Image Source:

<https://www.indiasolar.in/transportation-need/>

<https://www.pv-magazine.com/2021/04/09/vehicle-integrated-pv-for-light-commercial-vehicles/>



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