

Exploring the potential of Solar Vehicles

The rapid uptake of electric vehicles around the world is already evolving with innovations in Solar Vehicles, providing even greater benefits to users and higher reduction of CO2 emissions.

Pioneer manufacturers such as Toyota, Nissan, Lightyear, and Sono Motors are using 'vehicle integrated photovoltaics' (VIPV) with curved, flexible and lightweight solar modules built-in to the materials of the vehicle.

By generating their own solar energy, solar vehicles have less or no dependency on grid electricity, resulting in lower CO2 emissions. The reduced need for external charging also provides drivers with more convenience and autonomy.

In Australia, the UNSW 'SunSwift' solar race-car team has been exploring this technology with much success for decades.

Currently, options for low-carbon charging of electric vehicles include charging from the existing grid network with PV or other sustainable electricity sources, or charging from a dedicated charge point with local PV electricity generation.

VIPV provides the user with greater autonomy and convenience as the vehicle is charged directly and independently with on-board PV. Additionally, in most circumstances around the world (and particularly in Australia), solar vehicles provide cost savings and a reduction of CO2 emissions during driving. The exception is locations with very clean grid energy, where the CO2 emissions from panel manufacturing might lead to slightly higher lifetime emissions.

The emerging potential for VIPV is explored in a new report by the IEA PV Power System Programme 'State-of-the-Art and Expected Benefits of PV-Powered Vehicles 2021'. Australia is represented in this program by the Australian Photovoltaics Institute (APVI). The APVI's contributing author is Associate Professor Ned Ekins-Daukes, who teaches at the UNSW School of Photovoltaics and Renewable Energy Engineering.

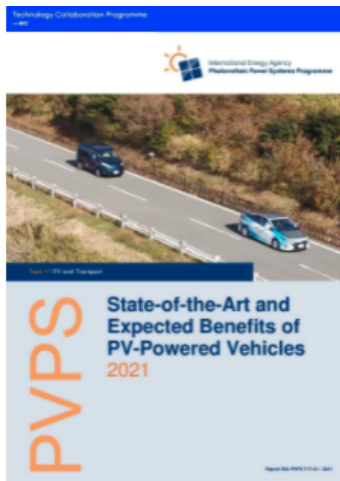
Commenting on the application of solar vehicles in Australia where road travel requirements can be lengthy, Ekins-Daukes said, "the point is not to achieve fully self-sufficient operation over long-distances - for that, fast-charge stations will still be necessary - but the daily errands around town can substantially be covered by direct solar charging of the vehicles."

The report also notes the opportunities for VIPV light commercial vehicles and long distance trucks, as Ekins-Daukes explains “Even when fitted to existing diesel trucks a 5% reduction in fuel consumption has been achieved with solar power offsetting some of the electrical loads.” For heavier commercial vehicles such as truck trailers, delivery vehicles and buses, on-board PV can also make significant contributions to auxiliary systems such as air-conditioning, heating and refrigeration.

As the market introduces more commercially available solar vehicles, there will also be a flow-on effect to the EV market as a whole, with more uptake of electric transport and other PV applications in the transport sector.

Other existing PV-onboard transport applications already commercially viable in Australia include the [Byron Solar Train](#) and the [Daintree River ‘Solar Whisper’](#) tour boat.

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[Full Report:](#)

State-of-the-Art and Expected Benefits of PV-Powered Vehicles 2021

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About the IEA PV Power Systems Programme:

A/Prof. Ned Ekins-Daukes of UNSW and Julia MacDonald of IT Power Renewables are Australia's experts for Task 17 of the IEA Photovoltaic Power Systems Programme. Task 17 focuses on possible contributions of photovoltaic technologies to transport, as well as the expected market potential of photovoltaic applications in transport.

About the APVI

The Australian PV Institute is a not-for-profit, member-based organisation which focuses on data analysis, independent and balanced information, and collaborative research. Our objective is to *support the increased development and use of PV via research, analysis and information.*

The APVI promotes solar through its live solar mapping platform [<http://pv-map.apvi.org.au>], the national solar research conference and Australia's participation in two International Energy Agency (IEA) programs – PVPS (Photovoltaic Power Systems) for solar photovoltaics and SHC (Solar Heating and Cooling), concerned with new solar thermal products and services.

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