Energy and Clean Technology

Opportunity

To convert solar energy to electric energy, photovoltaic solar systems require a DC boost converter to increase the low voltage output of the panel to that of the grid, as well as an inverter to transform DC voltage into AC voltage. Battery storage may also be incorporated typically through a standalone loop including a battery inverter. Increased competition in the residential solar market is forcing manufacturers to provide new functionalities and/or lower production costs.

Technology

This technology is a novel converter-inverter topology which integrates the battery directly into the DC converter, eliminating the need for an additional loop and a battery inverter.

A unique feature is the bi-directional power flow, which permits charging of the battery from both the solar panels and the grid simultaneously.

The simplified topology reduces the number of components and therefore manufacturing costs and physical size. In addition, the control system necessary for switching between different operational modes can also be greatly simplified.

The battery is employed in the circuit on the low voltage side, reducing voltage stress and prolonging product life for the owner, as well as simplifying installation and testing.

Potential Commercial Applications

The tech is suited to the residential market of "hybrid" or "multimode" inverters where low cost, high functionality, simplicity, and compactness are desirable traits.
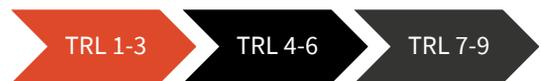
Development Status

Modelling has been validated with a low-powered proof-of-concept. Fabrication of a 1 kW prototype with circuits integrated on one printed circuit board is underway for testing.

Intellectual Property Status

The technology is the subject of PCT application No. AU2021/050260.

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TRL 1-3 ➤ TRL 4-6 ➤ TRL 7-9