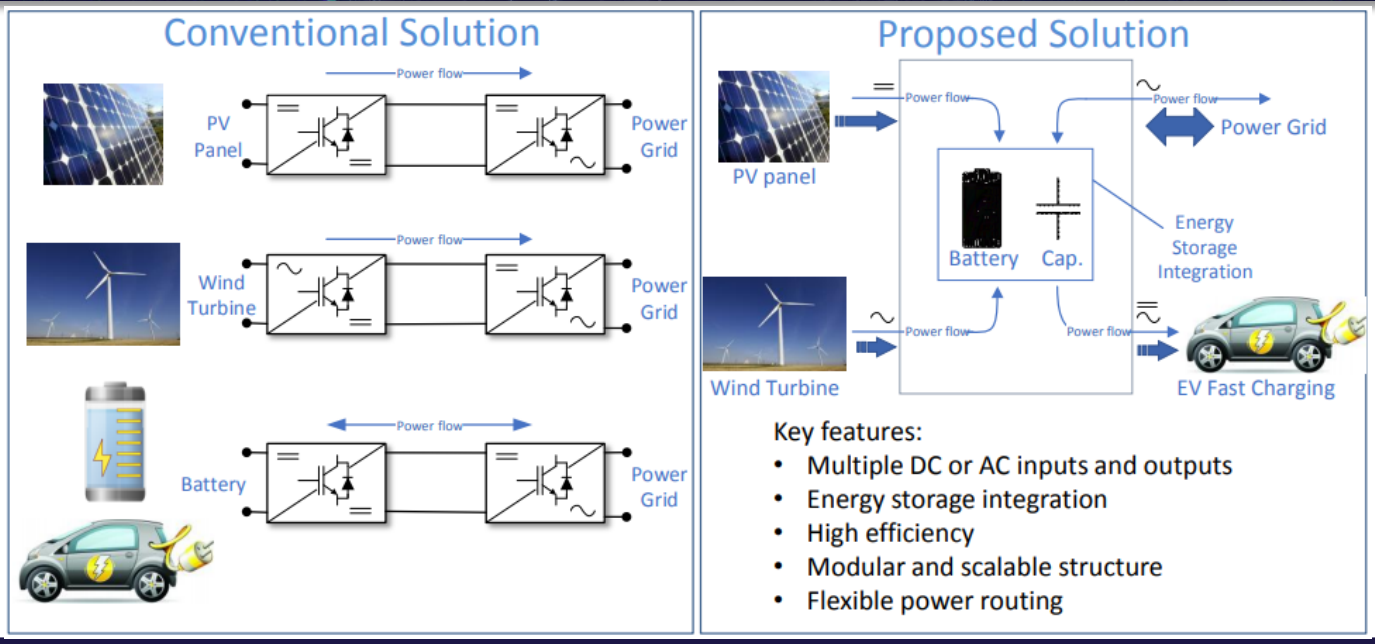
Flexible and Efficient Switched String Converter



VALUE PROPOSITION

The proposed converter is suitable for bi-directional high efficiency DC-AC, DC-DC, AC-DC, and AC-AC conversion with the same hardware configuration; the conversion type can be software programmed. It is capable of handling multiple input and output terminals, both AC and DC. The number of terminals can be freely extended by adding additional modules. The power transfer can be arbitrarily distributed online among output terminals and it is possible to have all power routed to a selected output for e.g. fast charging of electric vehicles.
The energy transfer is based on capacitors or similar energy storage elements, therefore bulky inductors are not needed. The multilevel output voltage ensures minimum grid side filtering requirements. The structure of the proposed converter enables direct integration of energy storage e.g. batteries without the need of a charger; other low-voltage generators such as fuel cells can be integrated in similar manner.

BUSINESS OPPORTUNITY

The invention can replace or improve traditional solutions in several different applications such renewables (including storage integration), automotive power distribution system, DC-, AC- and hybrid microgrids, etc. and in applications with mixed input and output types that require full control over power distribution with decoupling.
This results in a huge potential market for the proposed converter. For example, PV inverters are a USD 6 billion market, while storage inverters are expected to reach USD 600 million by 2021.
Manufacturing the proposed converter does not require specialized skill or equipment, it can be implemented in existing standard electrical production facilities. The modular structure supports reduction of manufacturing costs.

TECHNOLOGY SUMMARY

The invention is an efficient, scalable and reconfigurable converter topology to handle multiple sources (DC or AC) and to provide multiple outputs (DC or multi-level AC). The proposed topology enables simple integration of various energy storage elements (batteries, super-capacitors, etc.) in the converter without a charger, therefore reducing costs.
The modular structure allows design for nominal power with high granularity as well as extension of existing converter both in terms of power and number of input-output terminals.

CURRENT STATE OF DEVELOPMENT

Detailed circuit-level simulations based on commercial power electronic components have shown: (i) the correct operation and high efficiency of the proposed converter; (ii) controllable energy transfer between input and output; (iii) charging and discharging of energy storage elements integrated in the circuit.

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SEEKING

- Funding/Investors
- Licensee/IPR sale
- Partner/Research collaboration

PATENT: Pending