University of Central Florida

PV Power Generation Using Plug-in Hybrid Vehicles as Energy Storage

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Description: The objective of this project is to develop and demonstrate an alternative PV power generation architecture that uses plug-in hybrid vehicle as the energy storage and transfer element with a total system cost target of $3.50/W. The tasks include developing efficient, reliable, and inexpensive maximum power tracking DC/DC battery chargers and 3-phase converters. A 10kW demonstration solar carport charging station was built on UCF campus. A plug-in hybrid vehicle with a 25kWh battery bank (battery-only driving range of 50-100 miles) and onboard bidirectional AC charging system will be demonstrated

Budget: $380,816
Universities: UCF
External Collaborators: City of Tavares, FL

Executive Summary

Photovoltaic modules have become a viable renewable energy source for energy systems in communications, commercial, and residential applications. Plug-in electric or hybrid vehicles appear in the market as an emerging technology to reduce carbon emissions and improve energy efficiency. PV modules and electric vehicles interact with the power grid as energy source and energy sink elements, respectively. However, little was reported on energy conversion systems featuring a three-way energy flow among the power grid, PV modules, and electric vehicles. The research described in this report examined the concept and devised a system to test and demonstrate the concept.

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This Project has been completed. Full report found here.