

## Electromobility

The electromobility program presents the recent trends in photovoltaic-powered charging stations (PVCS) for passenger cars including system architectures, preliminary requirements and feasibility conditions to increase benefits of photovoltaic energy, social acceptance, and proposes steps for realizing PVCS.



*PV-powered electric vehicles charging station based on microgrid (30 Wp)*

PVCS can successfully operate for slow charging as well as for fast charging and with / without less reliance on the power grid, also providing additional services via vehicle-to-grid (V2G) and vehicle-to-home (V2H). To be able to host slow charging and fast charging terminals at a PVCS, the PVCS could be a system based on a microgrid, incorporating stationary storage that is charged exclusively from PV sources, with / without public grid connection, using intelligent power control, optimization system, user application interface, and communication system.

By using a techno-economic tool to identify the best feasibility conditions, the PV benefits are increased for local PVCS. The PV makes a significant contribution to the required charge of electric vehicles (EV). The results show that with the right combination of the stationary storage and PV array sizes, the use of PVCS can be a feasible EV charging solution from a technical, financial and environmental perspective in comparison with a grid-charged EV.

### Mentor



Manuela Sechilariu is Full Professor at Alliance Sorbonne University – School of Engineering Université de Technologie de Compiègne, France, Department Urban Engineering, and Director of the interdisciplinary research unit Avenues (EA 7284), which research area focuses on urban system modeling. Her broad research interests focus on the power and energy systems, smart grid, microgrids, electromobility, photovoltaic-powered systems, energy management, optimization, and intelligent control modeling. She has delivered several invited lectures and has published more than 100 refereed scientific and technical papers in international journals and conferences, with over 2400 citations. She has managed several international and national research projects and industrial research contracts, including IEA PVPS Task17. Since 2018 she is Deputy Director of French research CNRS group GDR SEEDS (Electric Power Systems in their Social Dimension). Since 2016 she is the founder of the French Working Group Microgrids (included into GDR SEEDS supported by CNRS France) and coordinates activities and several research teams working on microgrids. Her current research works are clarification on PV benefits in transportation, electromobility, and microgrids optimization applied to urban areas utilizing renewable energy actively.

### Student profile

Master in electrical engineering, or final undergraduate in electrical engineering

### Subjects

Contribution of renewable energies in electrical vehicles charging

Electric vehicle charging stations (system, infrastructure, sizing and implementation tools, etc.)

Environmental footprint of electromobility

Scenarios for electromobility for 2050