

Bachelor/Master Thesis Vacancy

Research related to design and analysis of a Solar Powered Carpark for Charging Electric Vehicles

Period: Around 9 months beginning as soon as possible (early 2019, though dates negotiable)

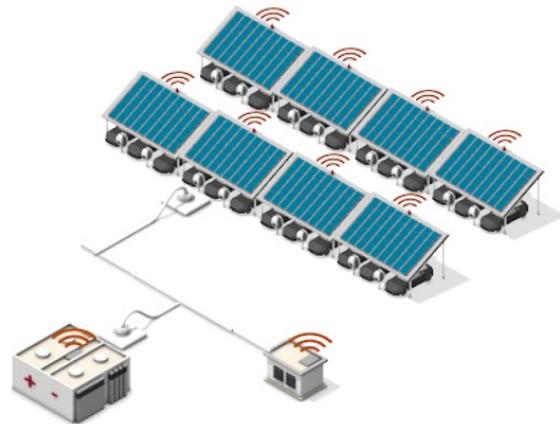
Research group and supervision: You will work mainly with project researcher, Rishabh Ghotge, and other members of the Future Energy Systems group, Process and Energy, 3mE department, TU Delft under Prof. Ad van Wijk. (Contact email: r.ghotge@tudelft.nl)

PowerParking project details:

The PowerParking project aims to design and implement a solar powered parking lot for the charging of electric vehicles at Lelystad Airport and Lelystad Airport Business Park and analyse it in operation. As part of the project, a prototype solar powered electric vehicle charging station will initially be installed at the Green Village, TU Delft for the testing of the system in a working environment.

Background:

For established airports like Schiphol, electric grid infrastructure is often used at maximum capacity of the connection for the terminal building (which is extremely energy dense). However, with increase in the use of electric vehicles among passengers, visitors and staff, and corresponding demand for charging infrastructure, electrical loads in the parking areas are increasing rapidly. This means that connection infrastructure needs to be upgraded or mitigation strategies need to be adopted to cater to the increasing loads.



Though the areas covered by modules needed to reliably and independently charge vehicles (cars) at normal speeds through solar energy are generally prohibitively large, off-grid solar carports may be an option for long-term parking spaces, where speed of charging is typically not an issue.

For EVs staying for long periods (days to weeks), it is not feasible to keep them plugged in since they block other vehicles from access to the charge point. Options for charging them include valet charging service, rapid charging at the exit or a long charging session for the person picking up the vehicle after returning from a flight, each of which has its issues. Off-grid solar charging at slow speeds offers the potential for a viable product for locations such as Schiphol, where electric vehicles will be parked for long periods of time. The potential benefits include huge reductions of cost (as much as 50%) by charging vehicles without a grid connection and large emissions reductions for mobility by shifting

from grid electricity to solar power. Further, it may result in a definite product if the feasibility study is positive.

However, the number of EVs (and non-EVs) and the durations they spend in these parking spaces, the changes in parking patterns over summer and winter (generally critical for off-grid systems), the initial states of charges of the EV batteries when they enter, etc. are relatively unknown. Your thesis work will contribute towards investigating this unknown and estimating the feasibility of off-grid solar charging stations for long term parking spaces for EVs.

Research Assignment:

You will contribute toward the research work done in the area mentioned above and will work together with researchers and students at TU Delft and the Green Village as well as with the other partners in PowerParking. You will use a combination of computer modelling and experimental measurements and your findings will lead to a better understanding of the system and its operation. You will be expected to step out of the University to independently find/ measure data to support your work. You can also investigate business or design cases based on the results of your feasibility study depending on where your interests lie.

Profile:

- Background in Sustainable Energy Technologies, Electrical Engineering, Power Engineering or similar.
- Enthusiastic and aware about subjects like the use of solar energy in the built environment, energy storage, electric vehicles and charging infrastructure, vehicle-to-grid concepts, impacts of electric vehicles on the electric grid, etc.
- Ability to work independently, communicate well and learn quickly on the job.
- Working knowledge of Dutch will be an asset but is not a requirement for this project.