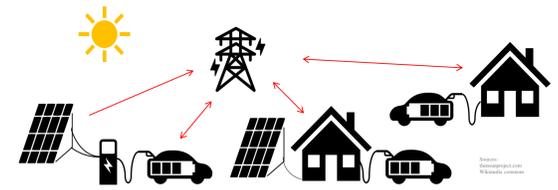


Motivation

- Supply a rising electricity demand for electric vehicle charging with photovoltaic electricity,
- Absorb the production peaks of solar panels by charging the electric vehicles batteries,
- Discharge the electric vehicles batteries into the electric grid or a home during demand peaks.

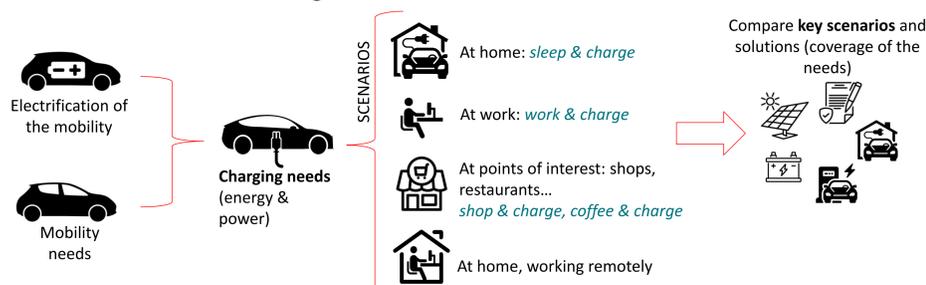


Objectives

The objective is to develop a new methodology based on mobility analysis to quantify the potential for coupling electric vehicles and solar electricity generation. The methodology is implemented in the open-source platform Citiwatts.eu.

Methods

First, to quantify the electrification of the mobility and the mobility needs, to evaluate the charging needs. Then, scenarios are developed to distribute the charging needs between different locations. Finally, the results are compared to solutions in term of coverage of the needs.

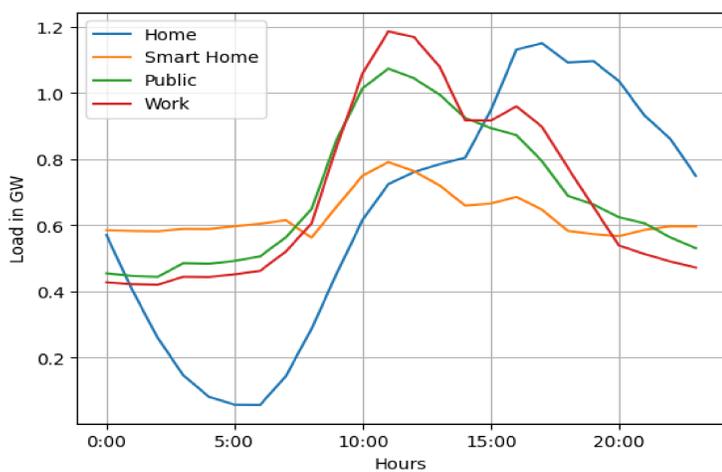


Case study in Switzerland

	Home	Smart Home	Public	Work
At home	65%	65%	35%	35%
At work	6%	6%	6%	21%
Working remotely	24%	24%	24%	24%
At points of interest	5%	5%	35%	20%
Smart charging	No	Yes	Yes	Yes

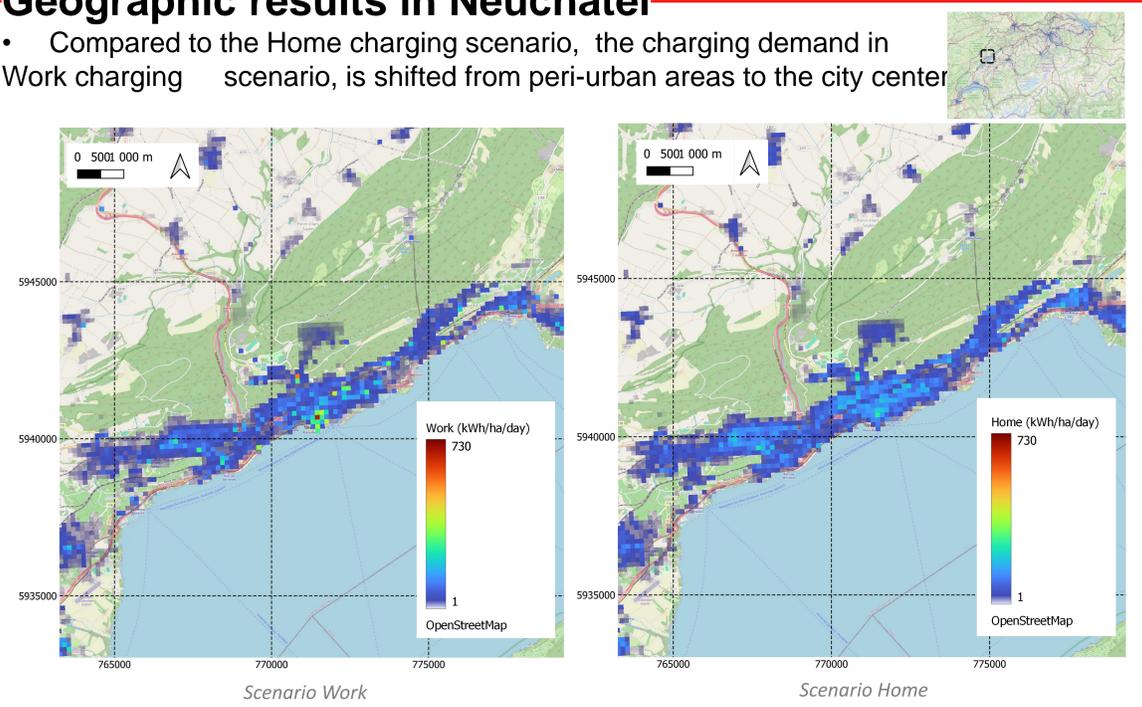
Load curves in Switzerland

- The total demand is about 15 GWh per day.
- The charging behavior affects the load curves.
- Scenario 'Smart charging at home' reduces the peak by almost 30%, and shift it in time compared to immediate home charging.



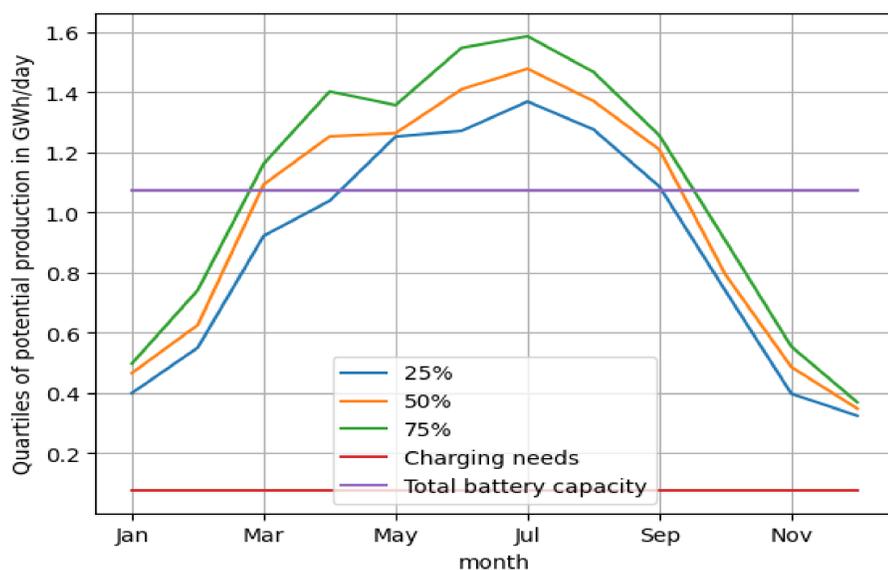
Geographic results in Neuchâtel

- Compared to the Home charging scenario, the charging demand in Work charging scenario, is shifted from peri-urban areas to the city center



Flexibility in Neuchâtel

- Photovoltaic electricity can supply the additional demand for charging.
- 1.1 GWh/day can available in the batteries and can be used for flexibility in Neuchatel in 2050, it is enough to store all the photovoltaic electricity consumption form September to March.



Photovoltaic scenario

- 30% of roofs covered by solar panels,
- 20% of efficiency of the solar modules,
- 80% of performance ratio.

Conclusion

- Significant effect of the charging behaviour on load curves.
- Most of the battery capacity remains available for flexibility

Uncertainties & future work

- Use of open-source layers (less accurate),
- Rough modelling of leisure and shopping mobility,
- Type of POI not taken into account,
- Slightly low average distance compared to statistics,
- Stochastic aspects of the photovoltaic production and the mobility still need to be modelled.

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