Hochschule für Technik und Wirtschaft Berlin

University of Applied Sciences

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Federal Ministry for Economic Affairs and Climate Action

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Solar charging - lessons learned from field observation

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38th International Electric Vehicle Symposium & Exhibition
15 to 18 june 2025 - Gothenburg, Sweden

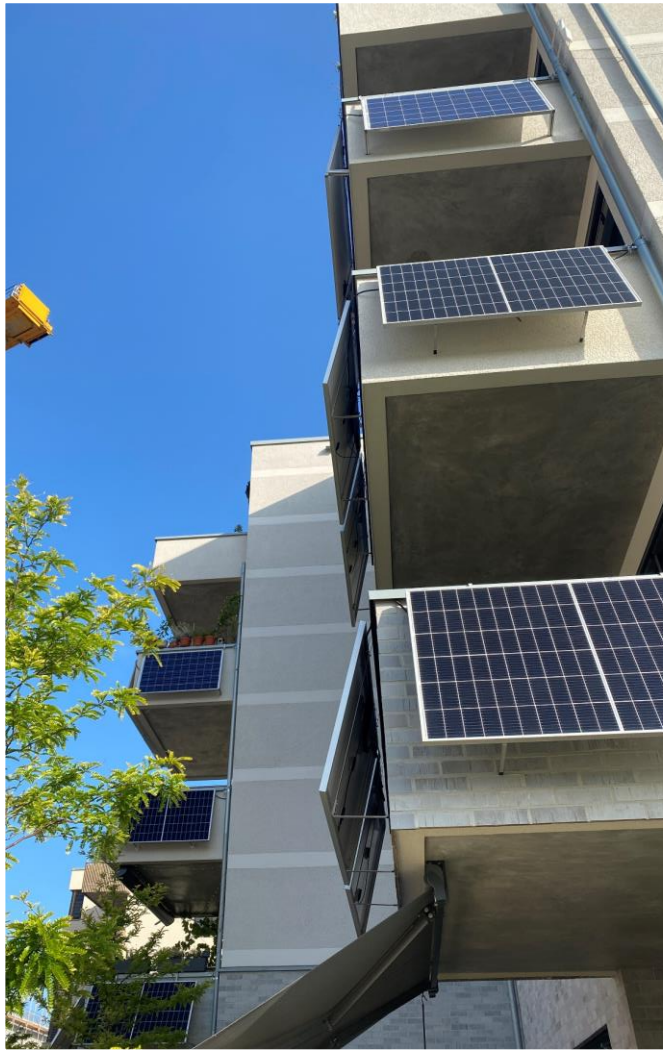
Solar charging is state of the art

> 78% of home chargers offer an solar optimized energymanagement*

- ☑ Improves economic efficiency
- ☑ Reduces feed-in power
- ☑ CO2 reduction from mobility**
- ✗ increases losses***
- ✗ sligthly higher up-front costs*

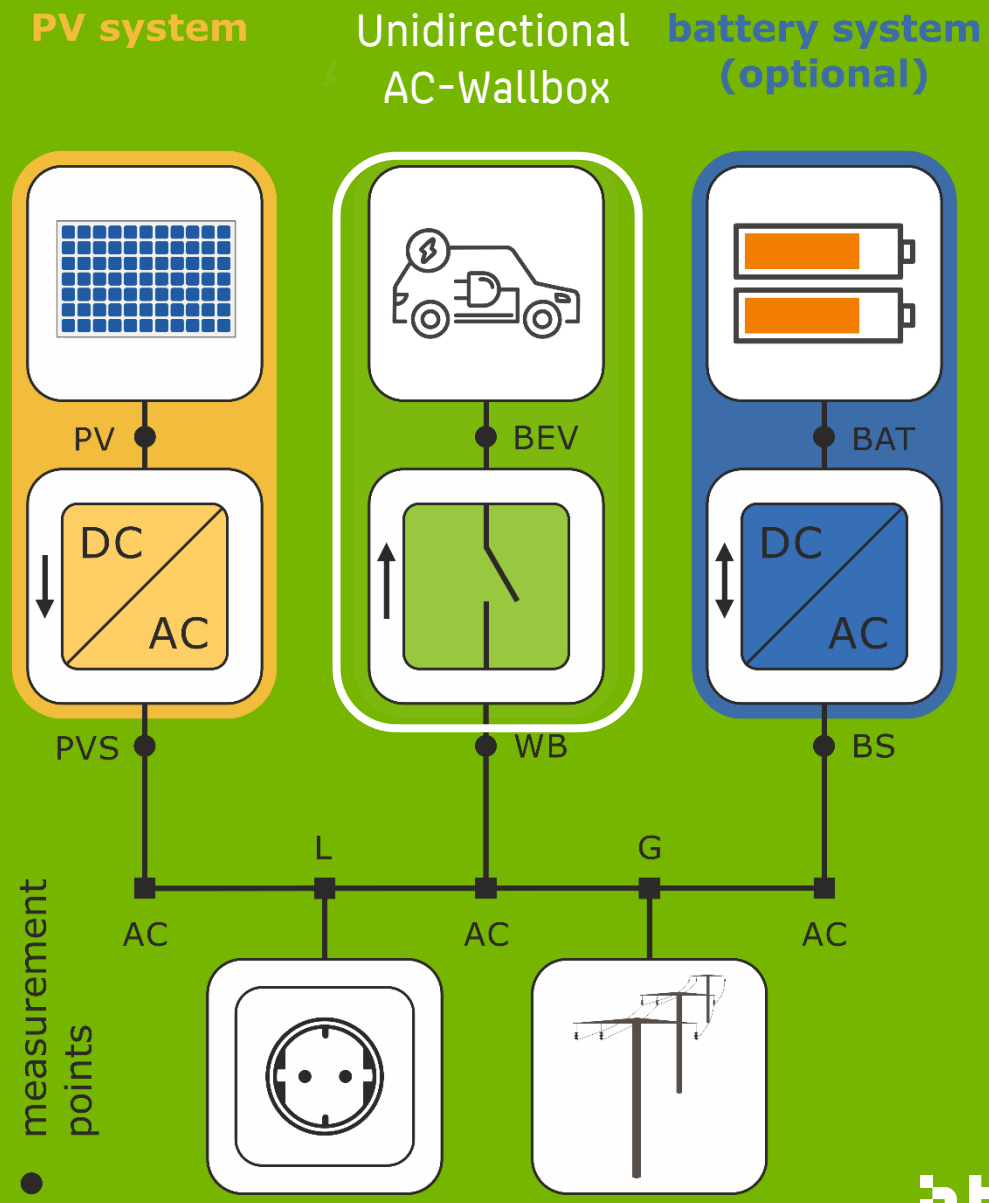
*pv magazine; ** 10.1016/j.tra.2015.05.00 ; ***https://doi.org/10.1016/j.seta.2023.103512; Picture: pixabay

Is solar charging = solar charging?



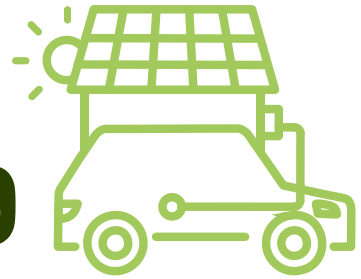
Monitoring data based analysis

- Provision of monitoring data by a solar integrator
- >3800 households for two years
- Temporal resolution of 5 minutes.
- Intense data revision was necessary
- Enhancement with secondary data

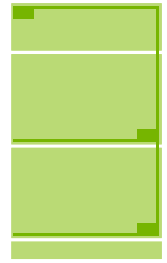


Data provided by Fronius International

Basic data statistics

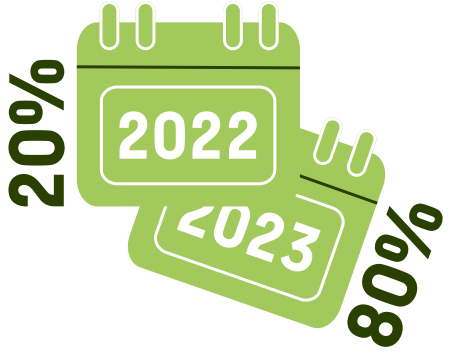


849
Data sets



48% with battery system

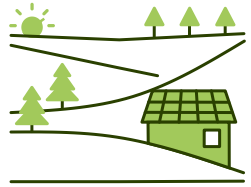
From the years



42 % with heat pump

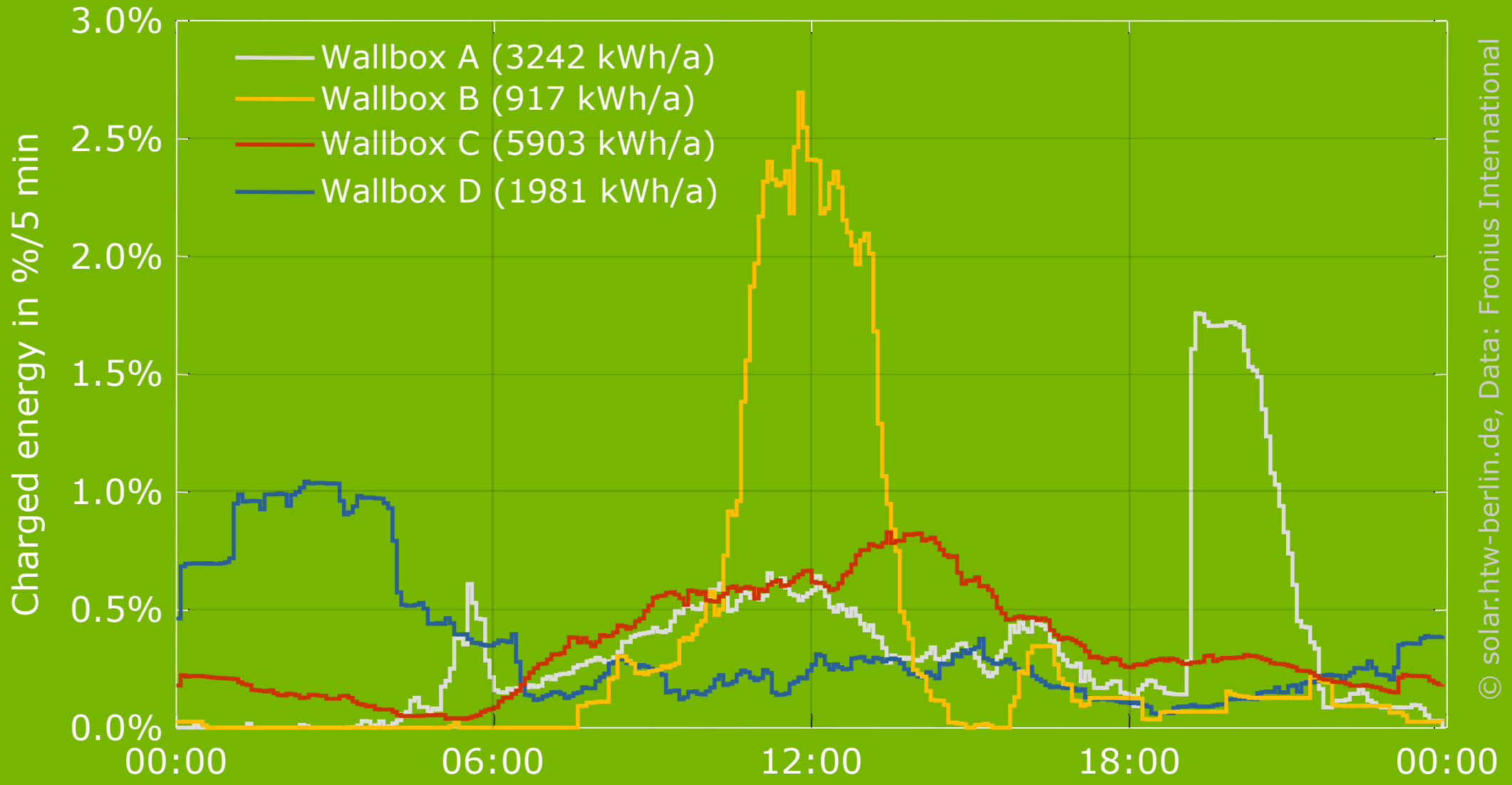
12% urban

61% rural



Data: Fronius

When does the sample charge their cars?



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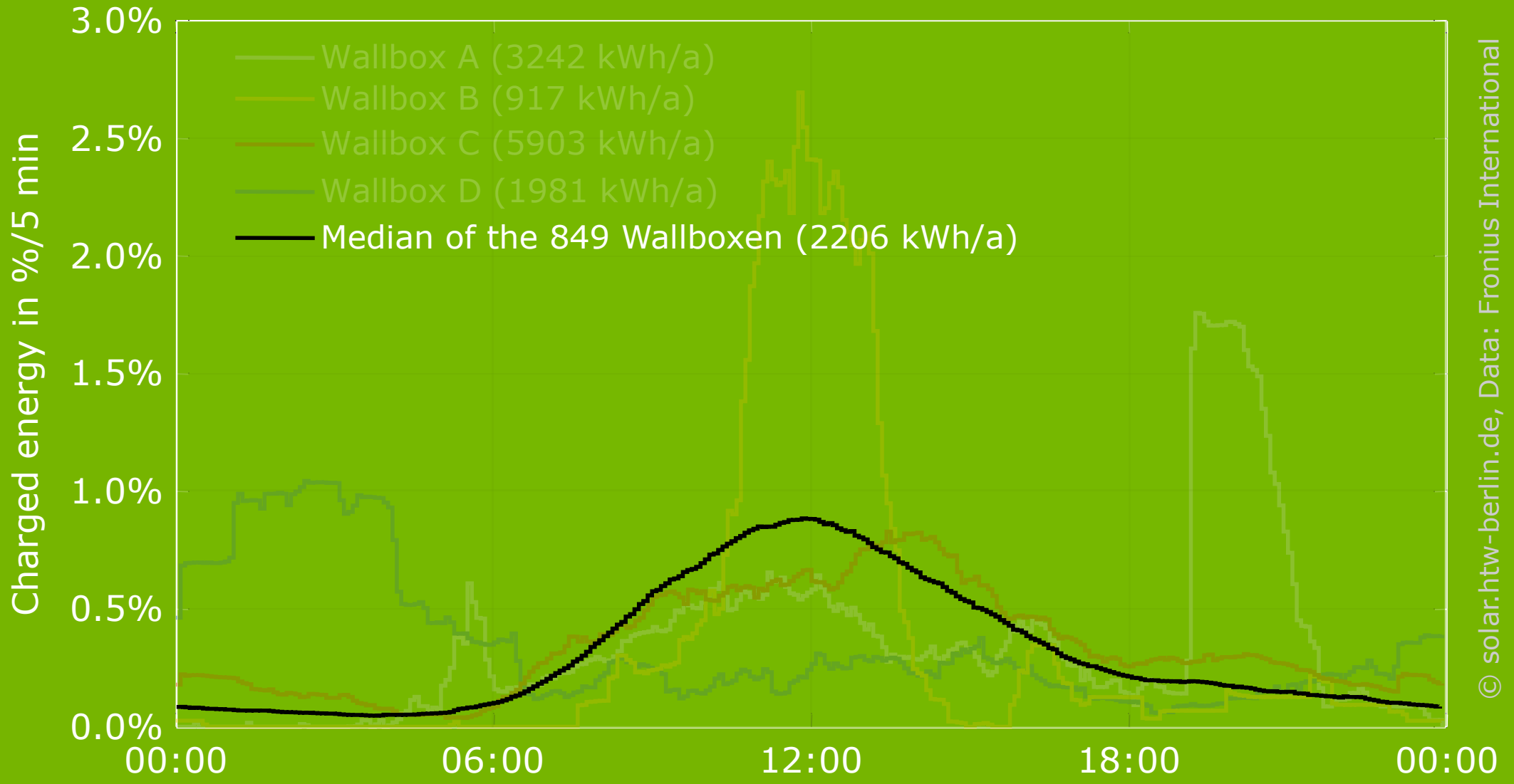
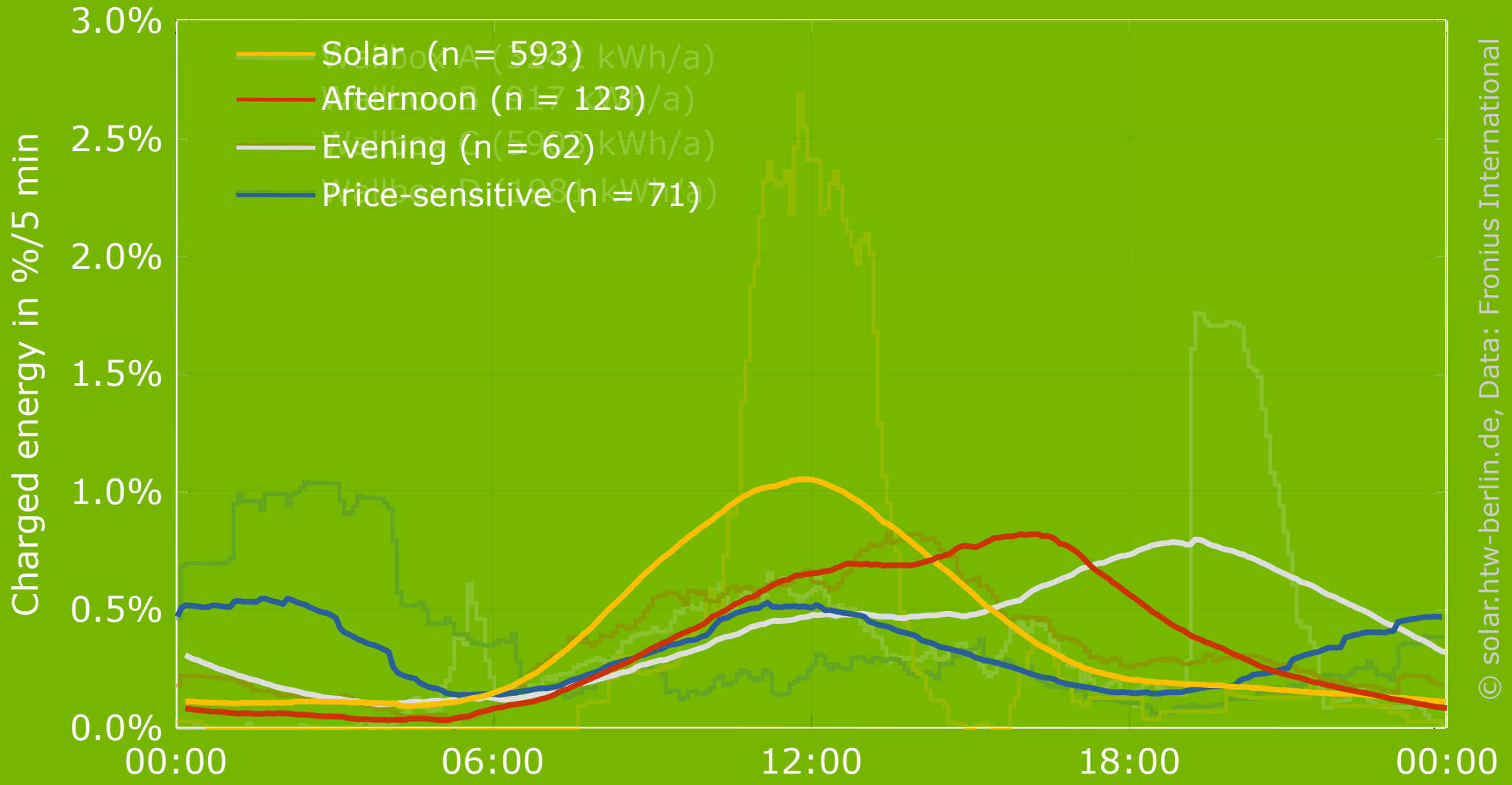
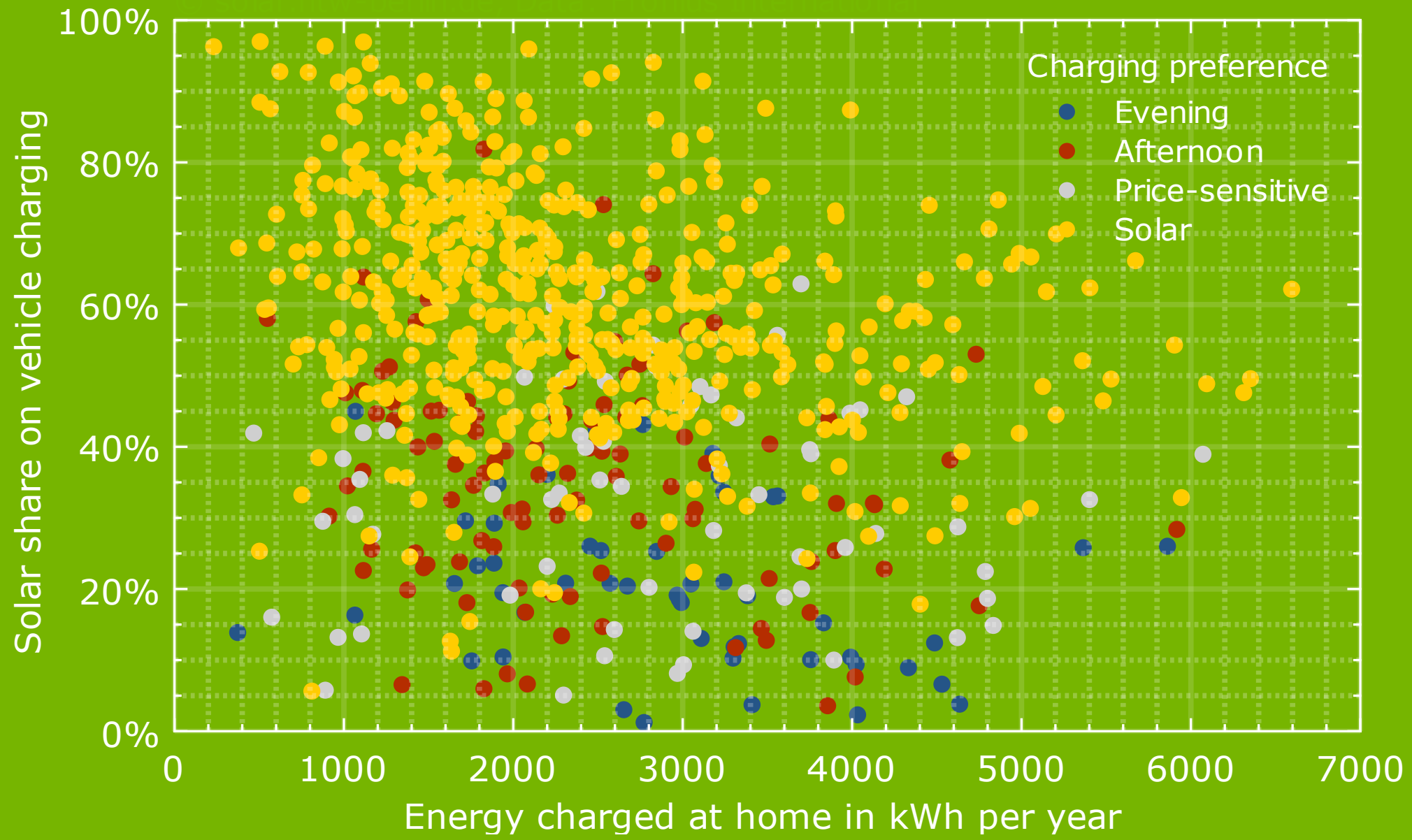


Clustering charging routines...

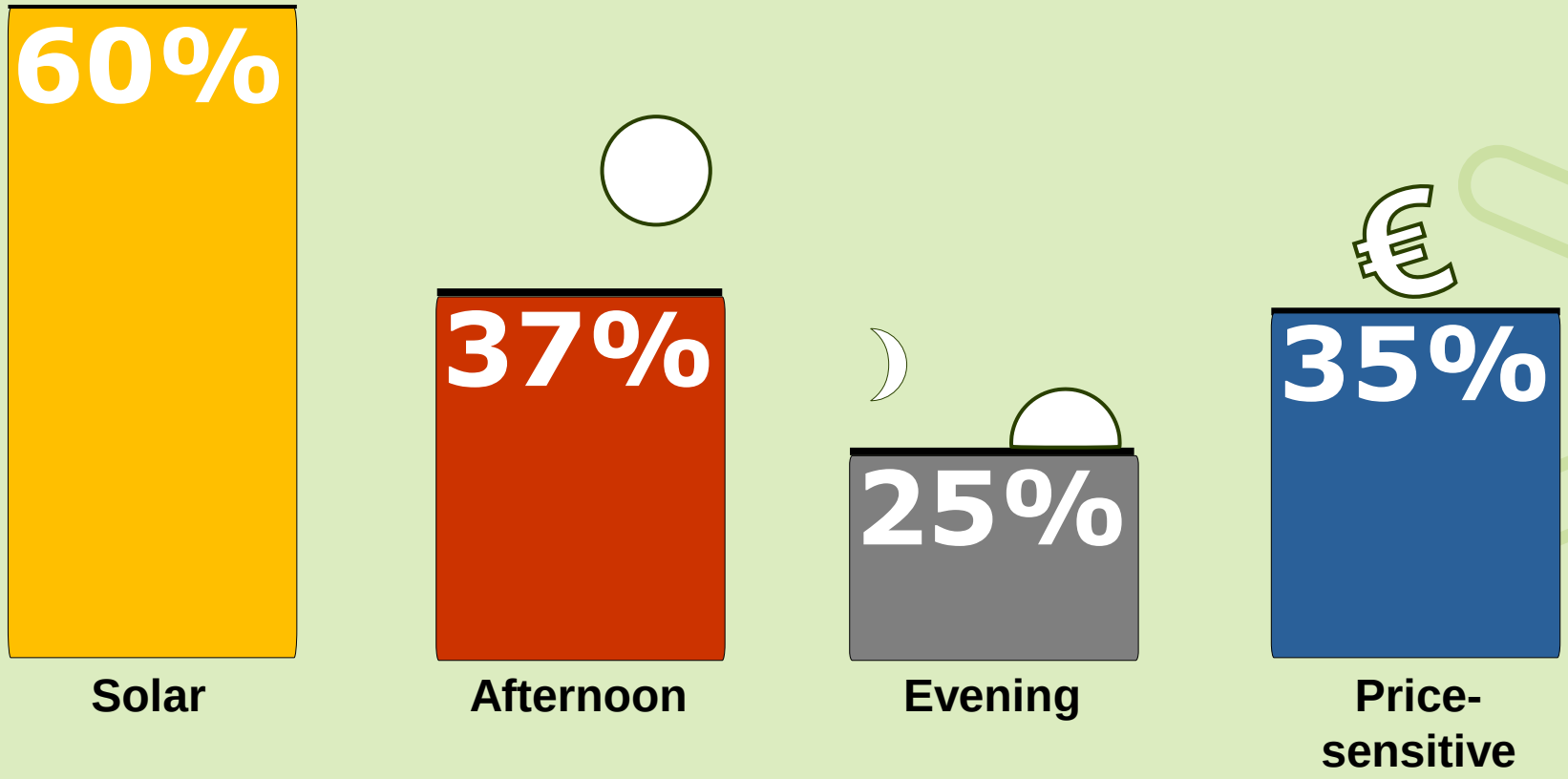


Plug-in and charging habits matter!



Median solar share for an annual mileage of 10 000 to 15 000 km

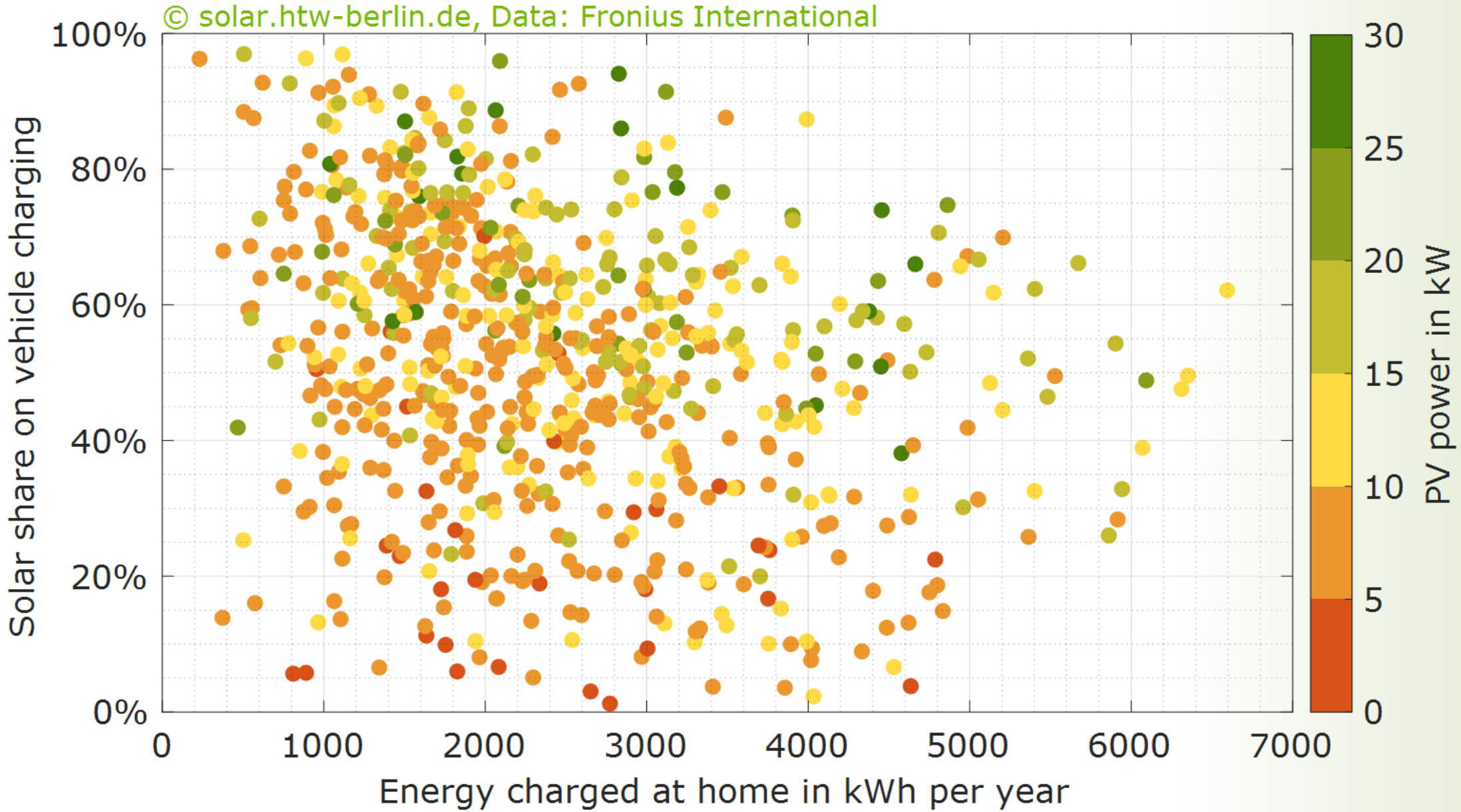
Charging Cluster



Median solar share on EV charging of 2000 kWh/a up to 3000 kWh/a. Assumed energy demand: 20 kWh per 100 km.

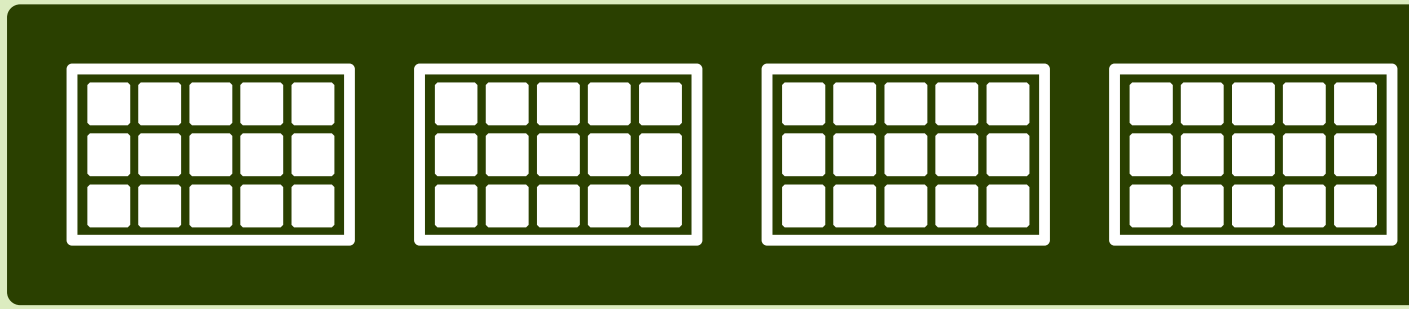
Data: Fronius International

Bigger is better. In tendency.



Median solar share for an annual mileage of 10 000 to 15 000 km

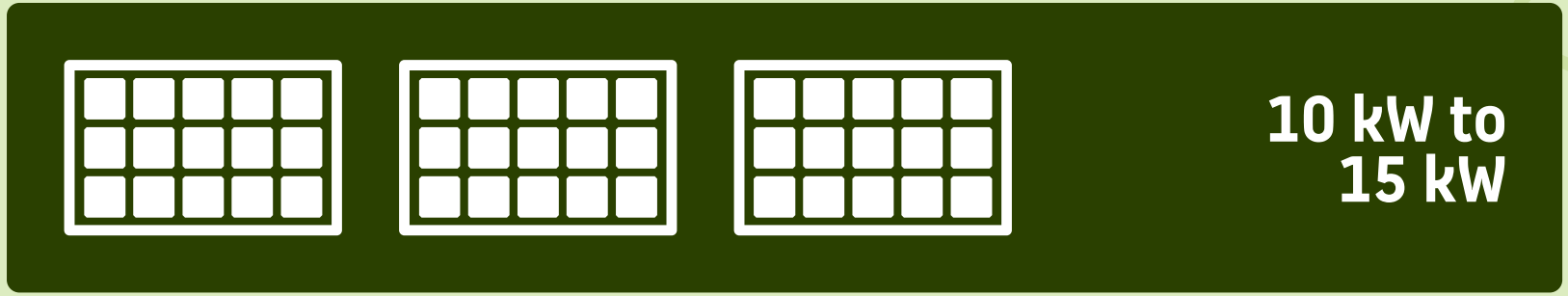
htw



15 kW to 20 kW

62%

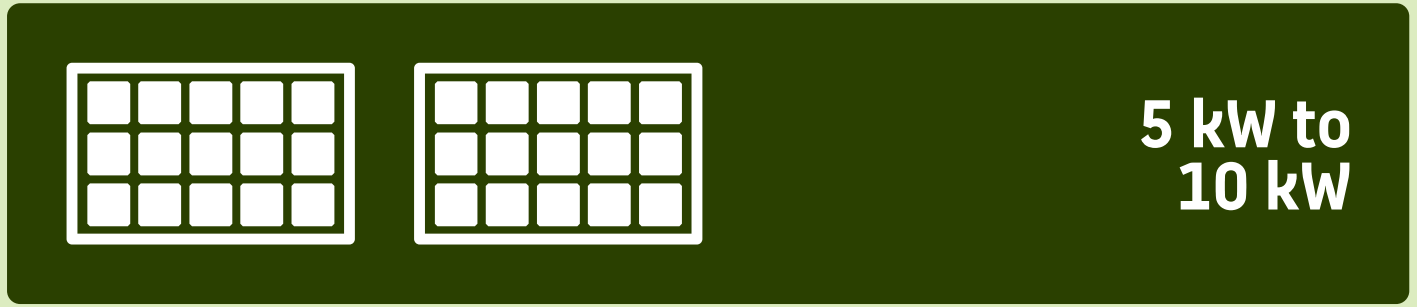
n = 40



10 kW to 15 kW

53%

n = 58



5 kW to 10 kW

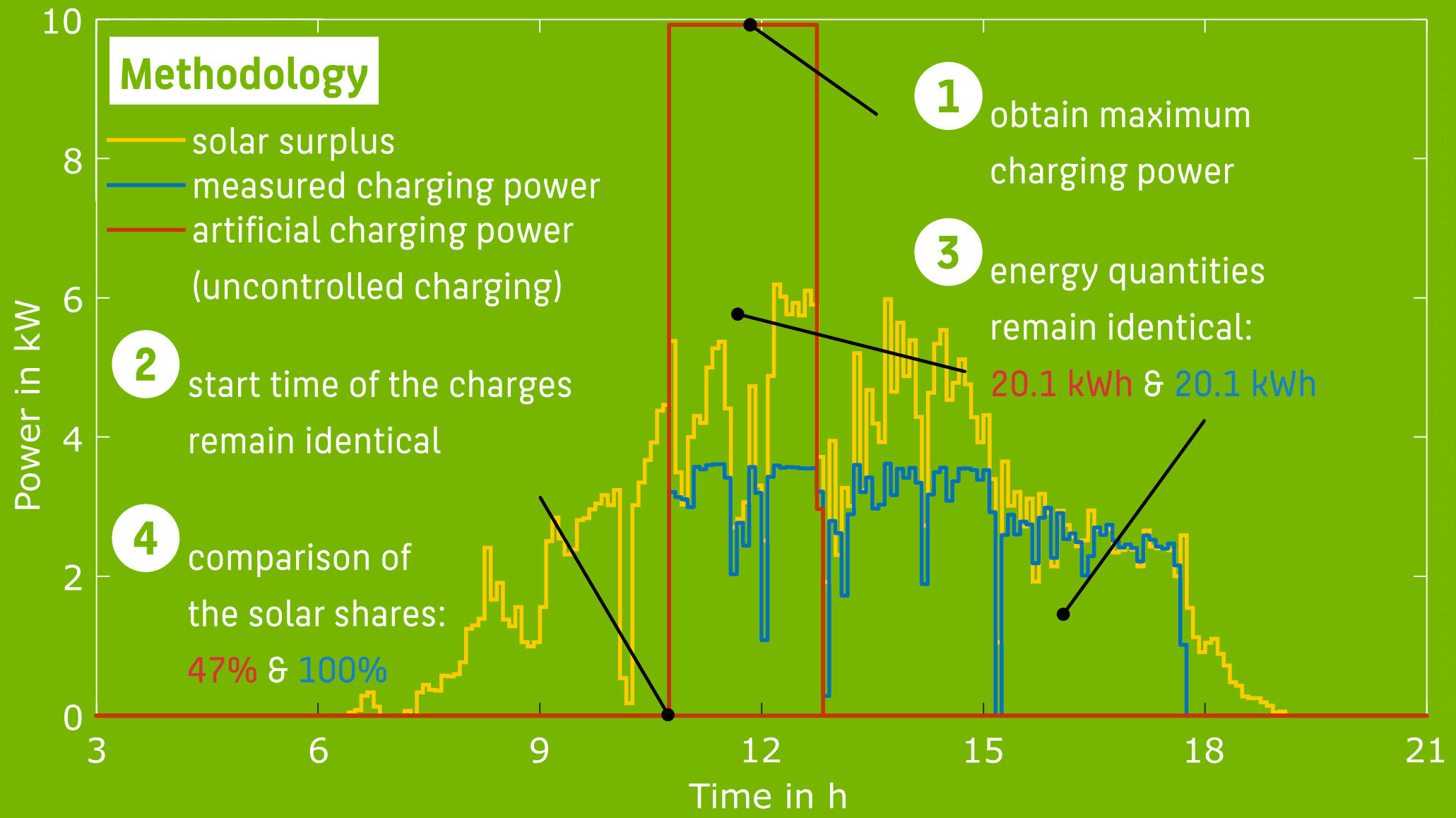
46%

n = 112

Median solar share on EV charging of 2000 kWh/a up to 3000 kWh/a. Assumed energy demand: 20 kWh per 100 km.

Data: Fronius International

Who takes advantage from dynamic solar charging?



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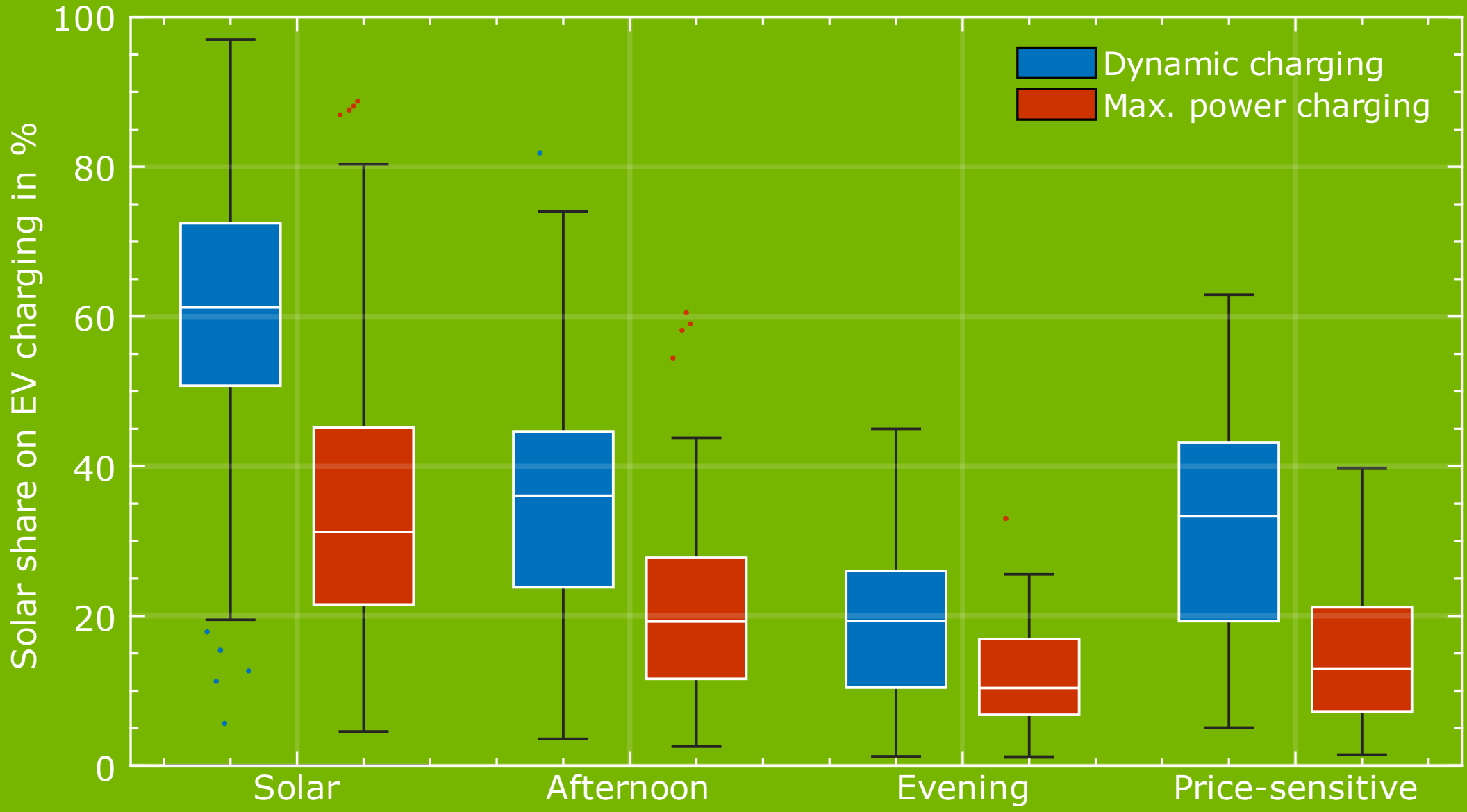
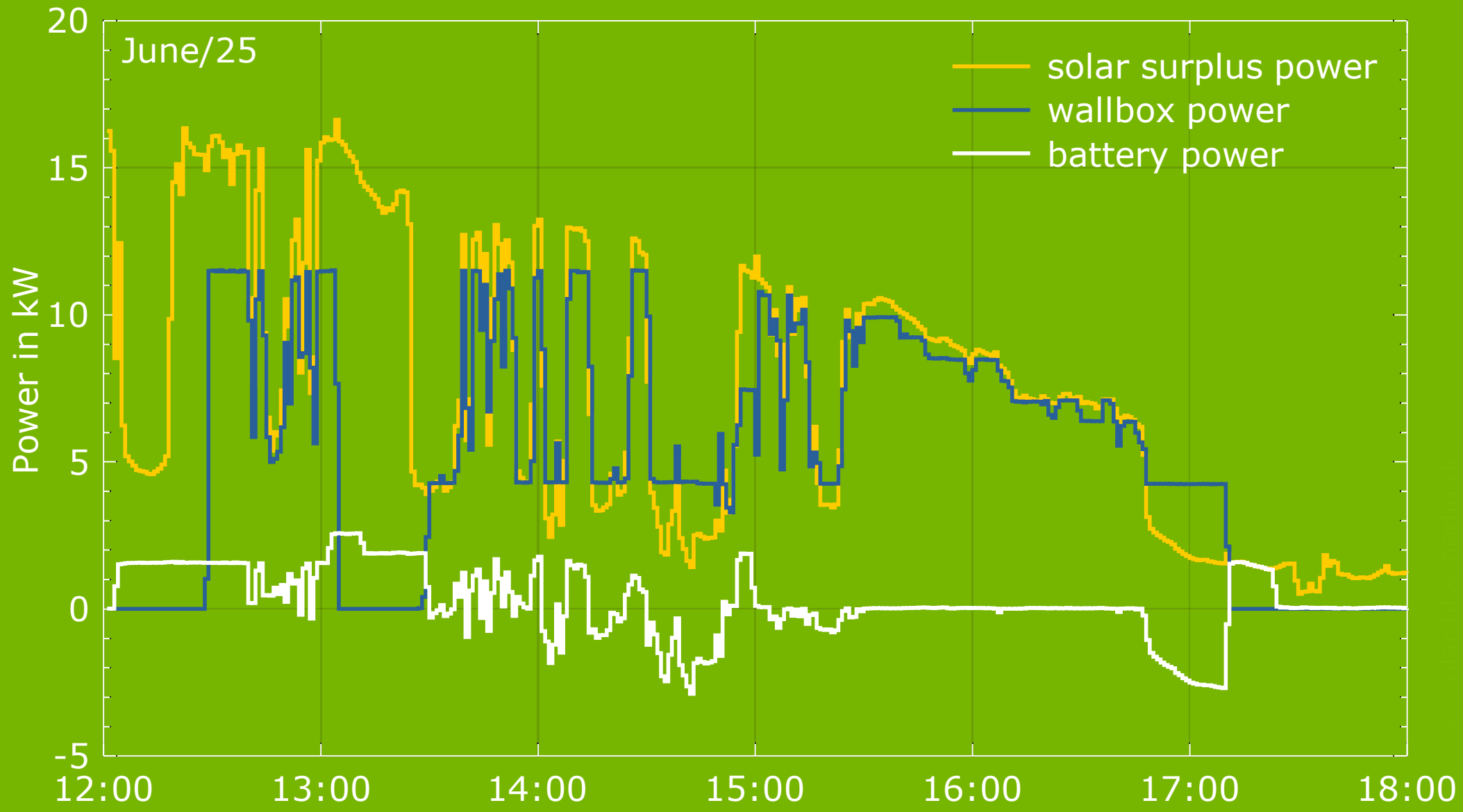
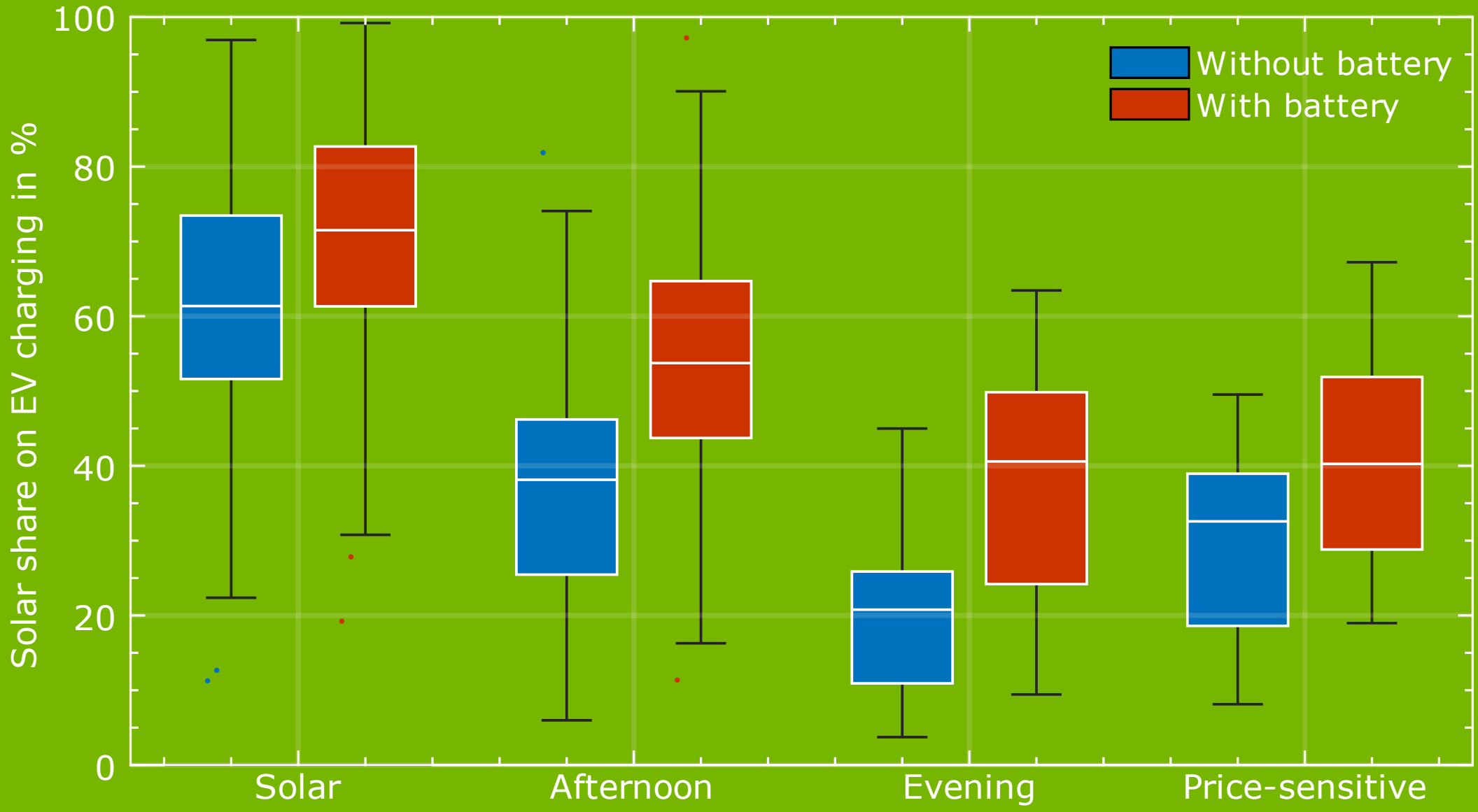


Does a stationary battery support solar charging?



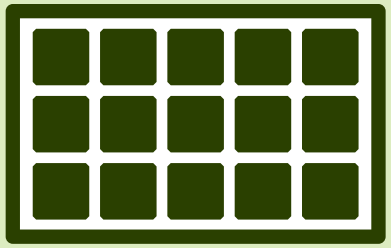
… and to what amount?



Lessons learned...

Statistical description of operational data of home chargers

9.9 kW

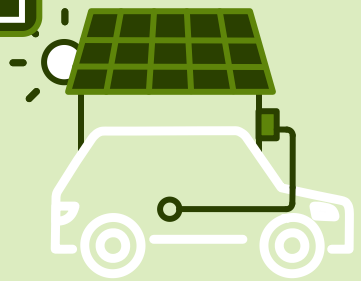


Median values

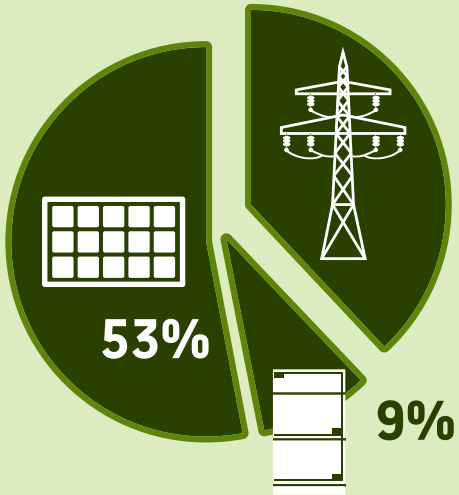
number of days per week with charging: 3.9

2 2 2 8 kWh/a

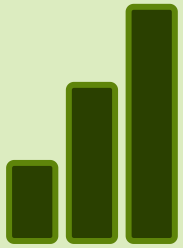
charged at home



93% in stand-by mode



solar share on electric vehicle charging



25% increase if charging follows solar surplus dynamicly

Data: Fronius

htw

Median values of 730 households with a solar system power of up to 30 kW and a home charged energy of the electric vehicle of up to 7000 kWh/a.

EVS 38

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Solar Storage Systems

More insights: solar.htw-berlin.de/studien/solares-laden-von-elektrofahrzeugen/

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