Supersmart Charging, without everlasting sleep

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EVS35
OSL2022

More information on www.flexpower020.nl

Gemeente Amsterdam
alliander
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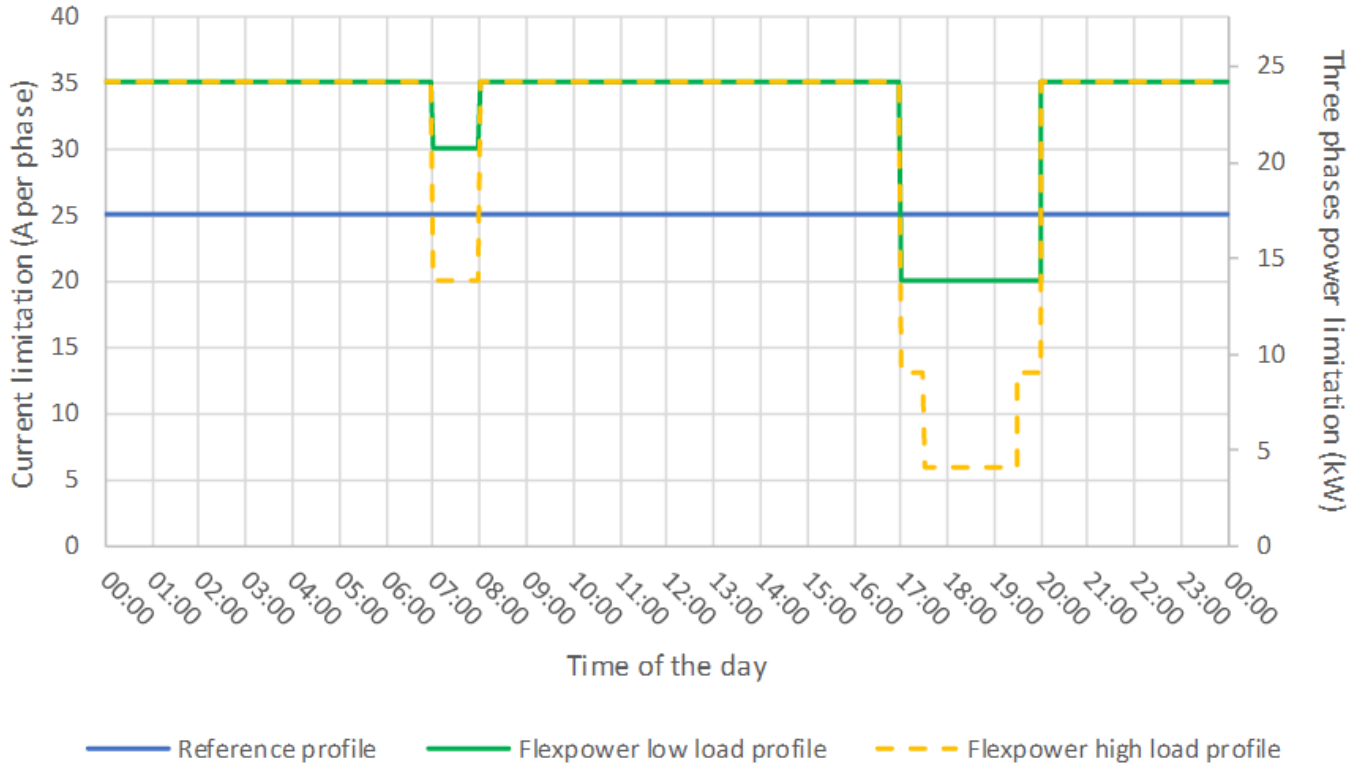
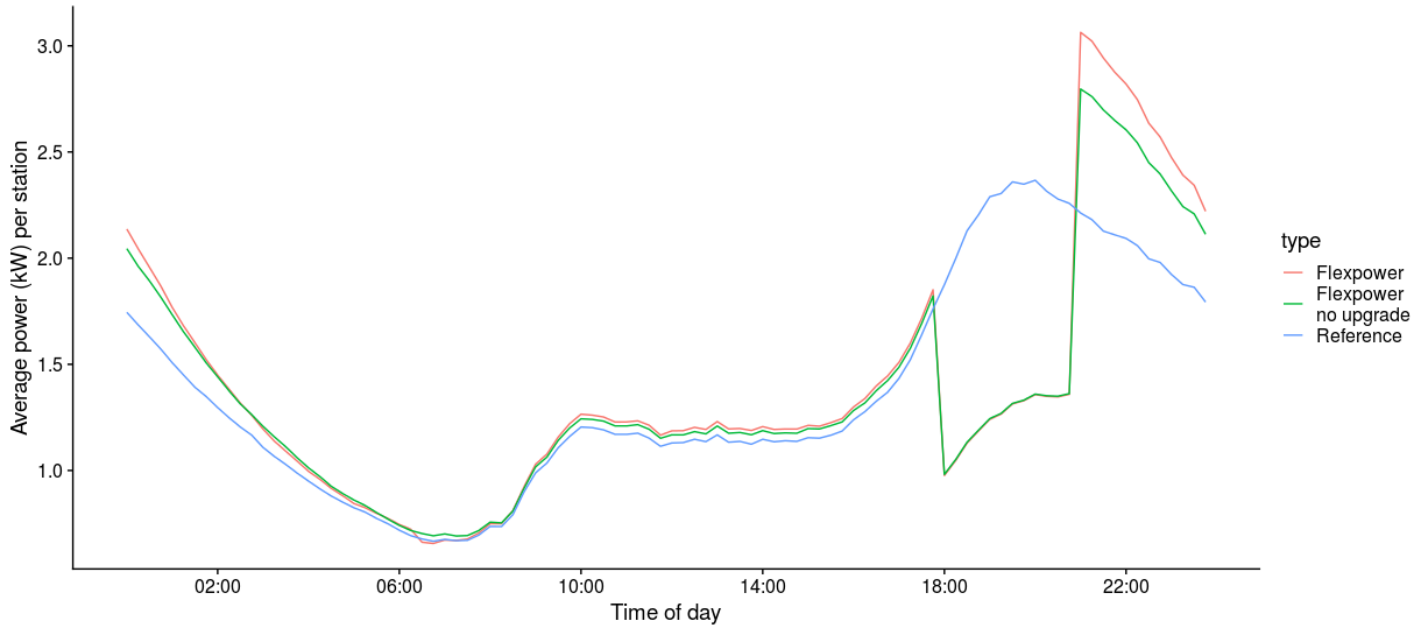
Hogeschool van Amsterdam
heijmans
Elaadnl

Flexpower: variable capacity

First attempt (2017-2021):
Hard coded limitation of available power during peak times.
More power off-peak.



First results

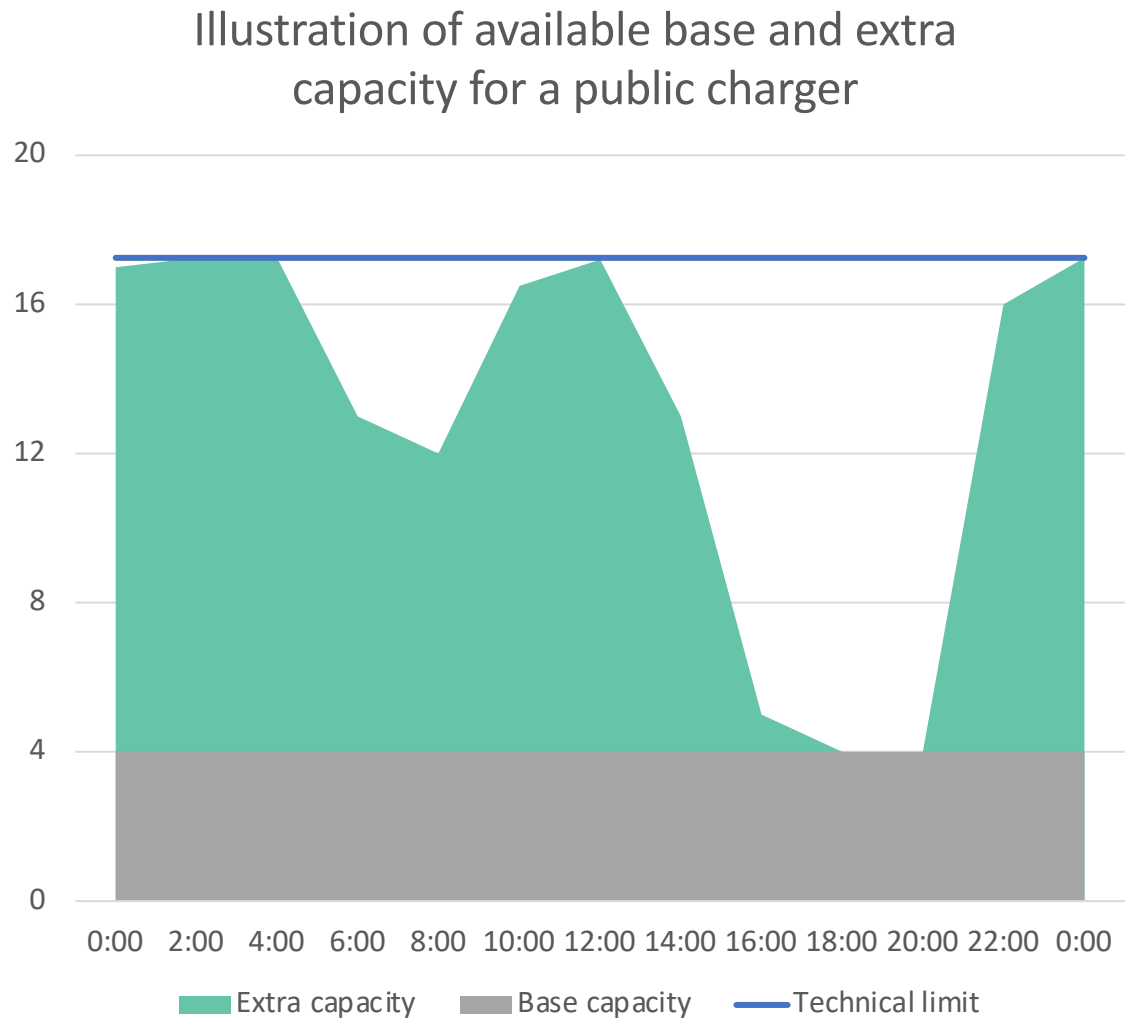


Peak succesfully reduced, but:

- No flexibility in steering:
  - Local grid situations
  - Occupancy
- Second peak in grid load after restricted period
- No added value of higher power off-peak

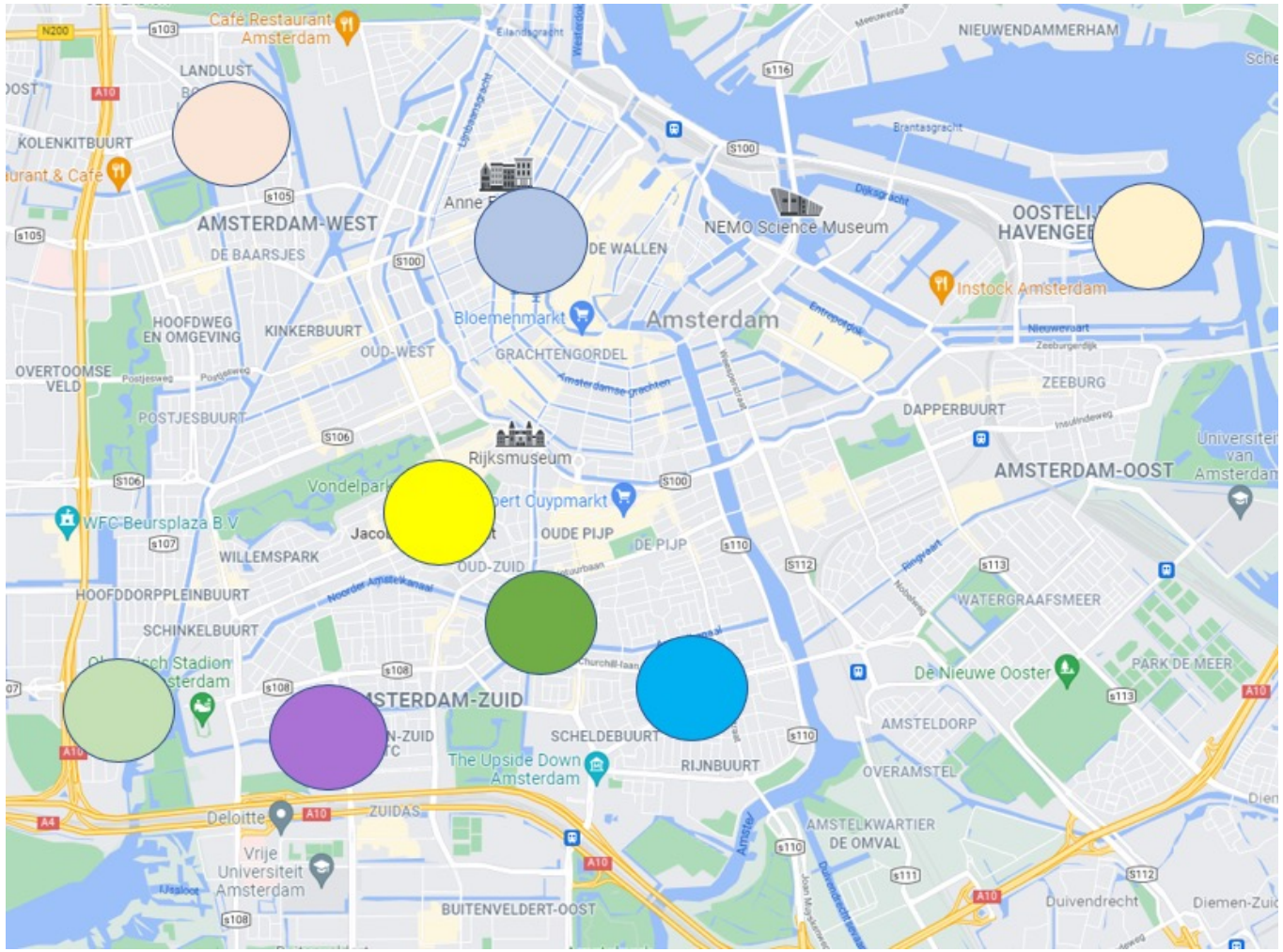
Flexpower 3 set-up

- A group of chargers gets a limited, but low, base capacity
- The base capacity is redistributed among active chargers only.
  - 100% predictable max power usage
  - Full power for a session when occupancy is low
- When available, the DSO allows extra capacity (non-firm)
  - Optimal usage of available grid capacity



Flexpower 3 - location

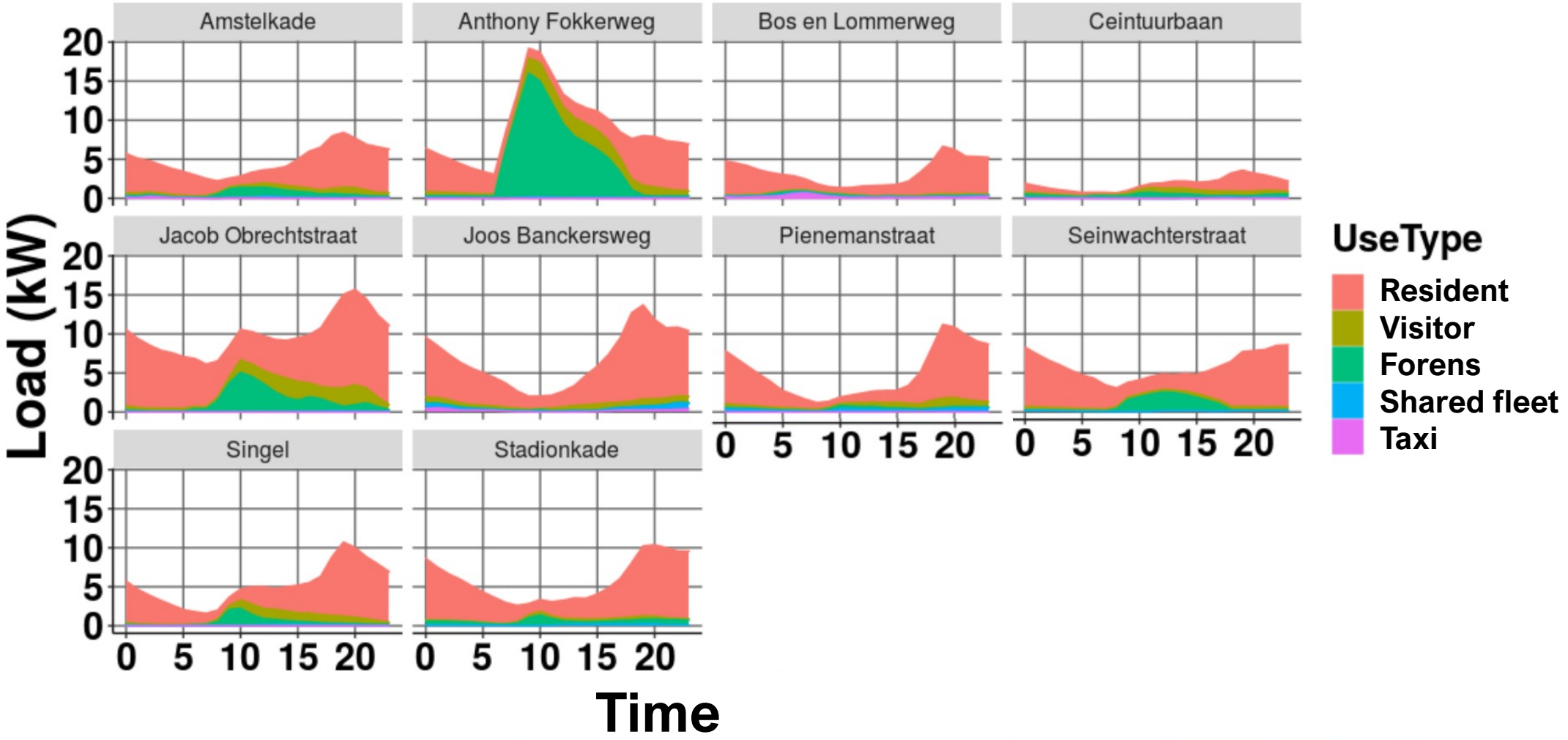
- 10 mid voltage areas in the centre of Amsterdam
  - Fully metered
- 63 chargers (126 sockets)
  - Information stickers
  - Occasional user surveys
  - Active monitoring at back-office



Diverse charging in sample group

Flexpower

Sum of loads per charger, 01-01-2019 to 28-02-2020, per Mid Voltage Station



Adding complexity

Three phases in the project

Phase 1: What is the lowest acceptable base capacity

- Develop clustering algorithm

Phase 2: How can we determine free capacity and add it to the charging sessions

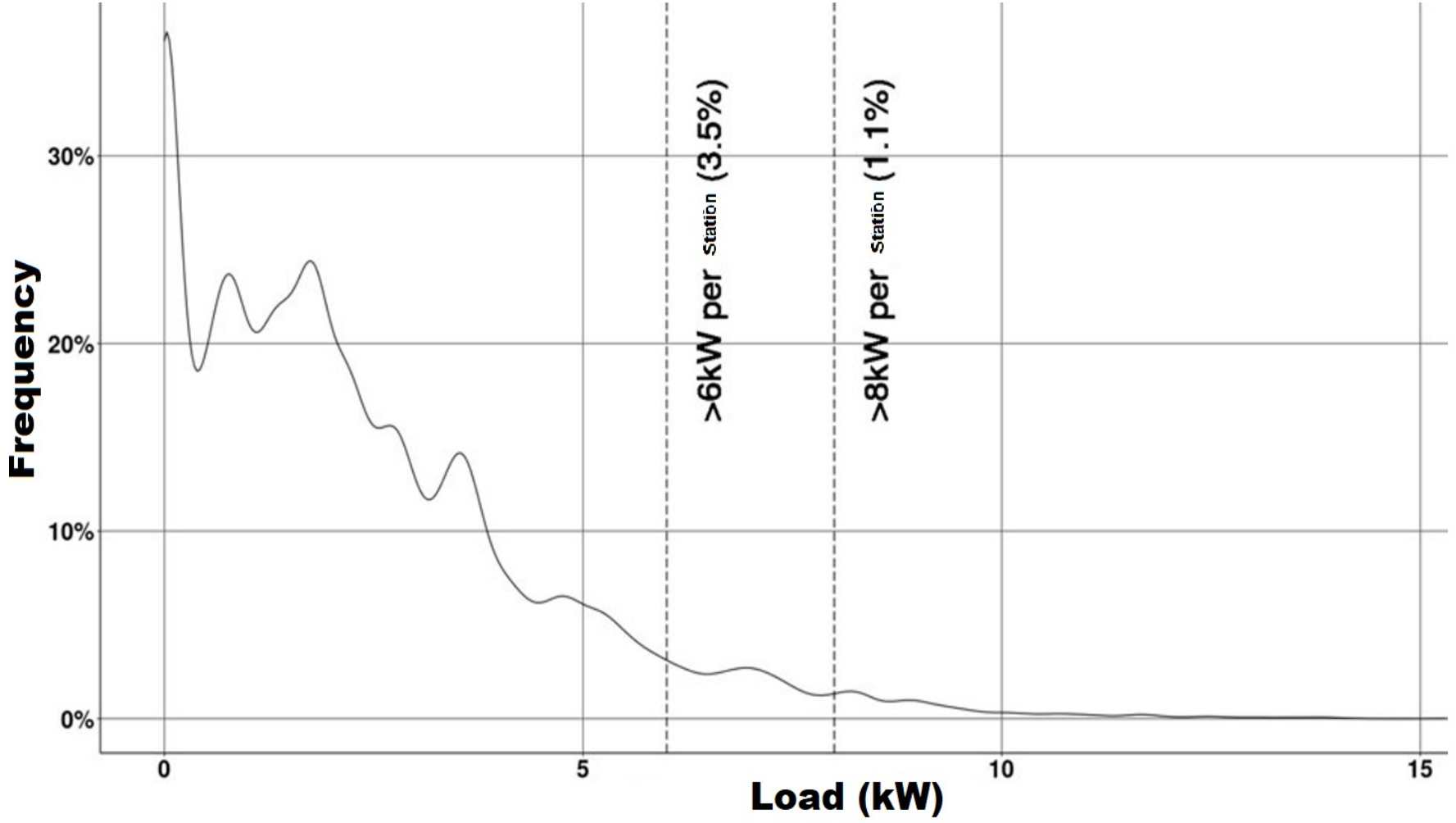
- What is the impact of this addition on charging and on base profiles?

Phase 3: Add smart scheduling based on predictions of session duration etc.

Results phase 1

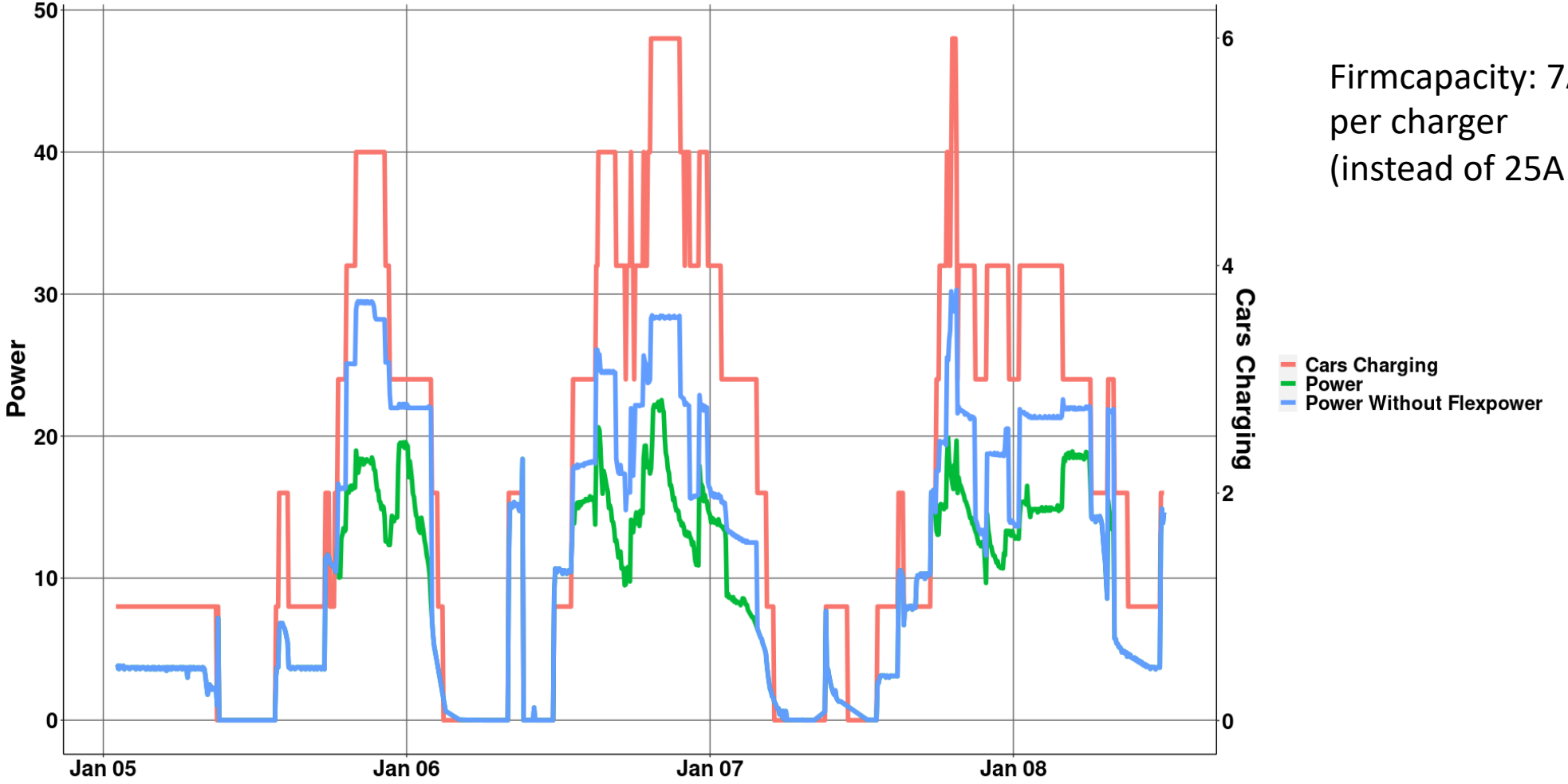
Base capacity

Assessment of possible range



Resultats

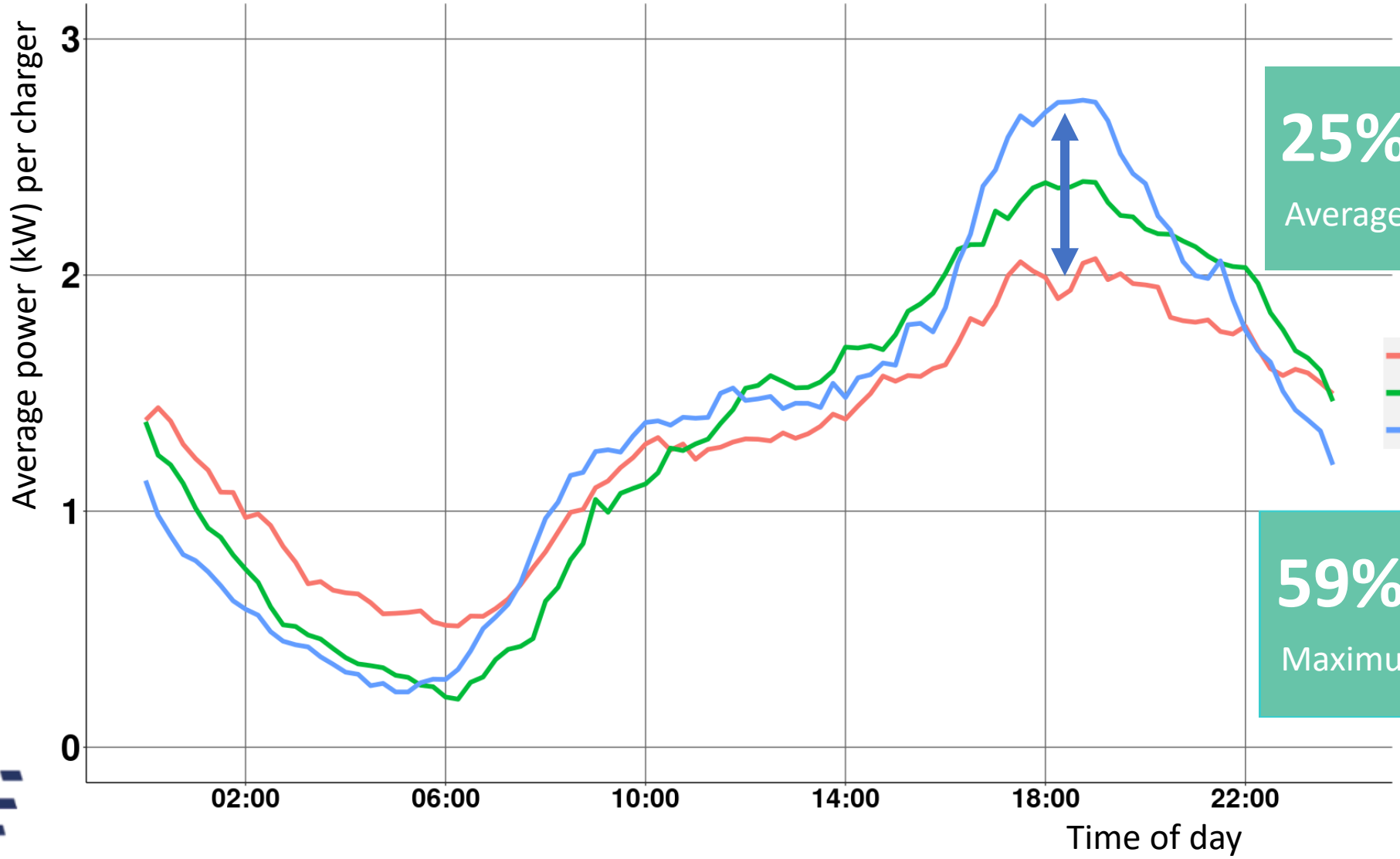
Clustering procedure is effective



Firmcapacity: 7A per phase, per charger
(instead of 25A per phase)

Results

Overview of peak damping at different settings



25%

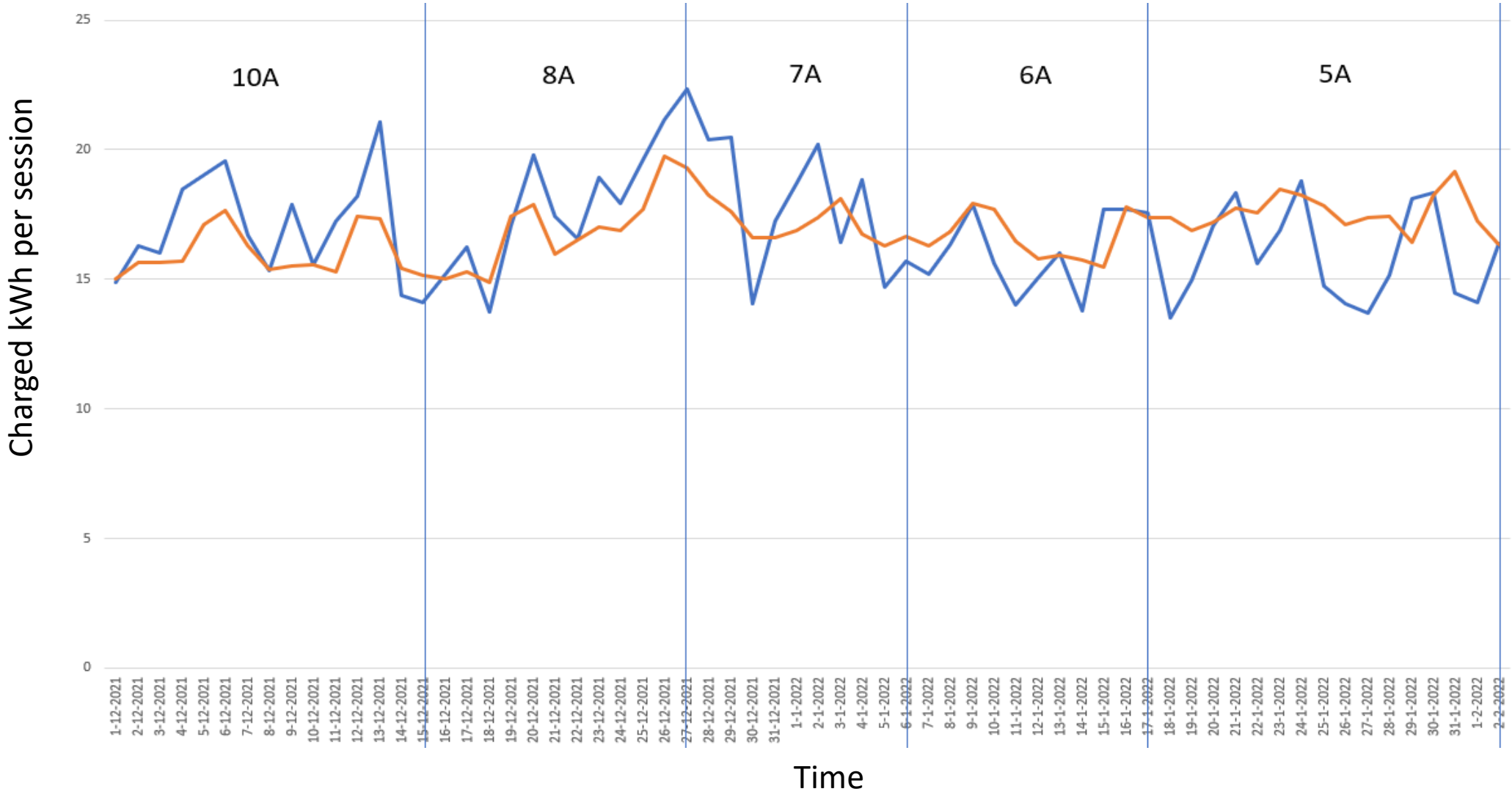
Average reduction of peak load

59%

Maximum reductionof peak load

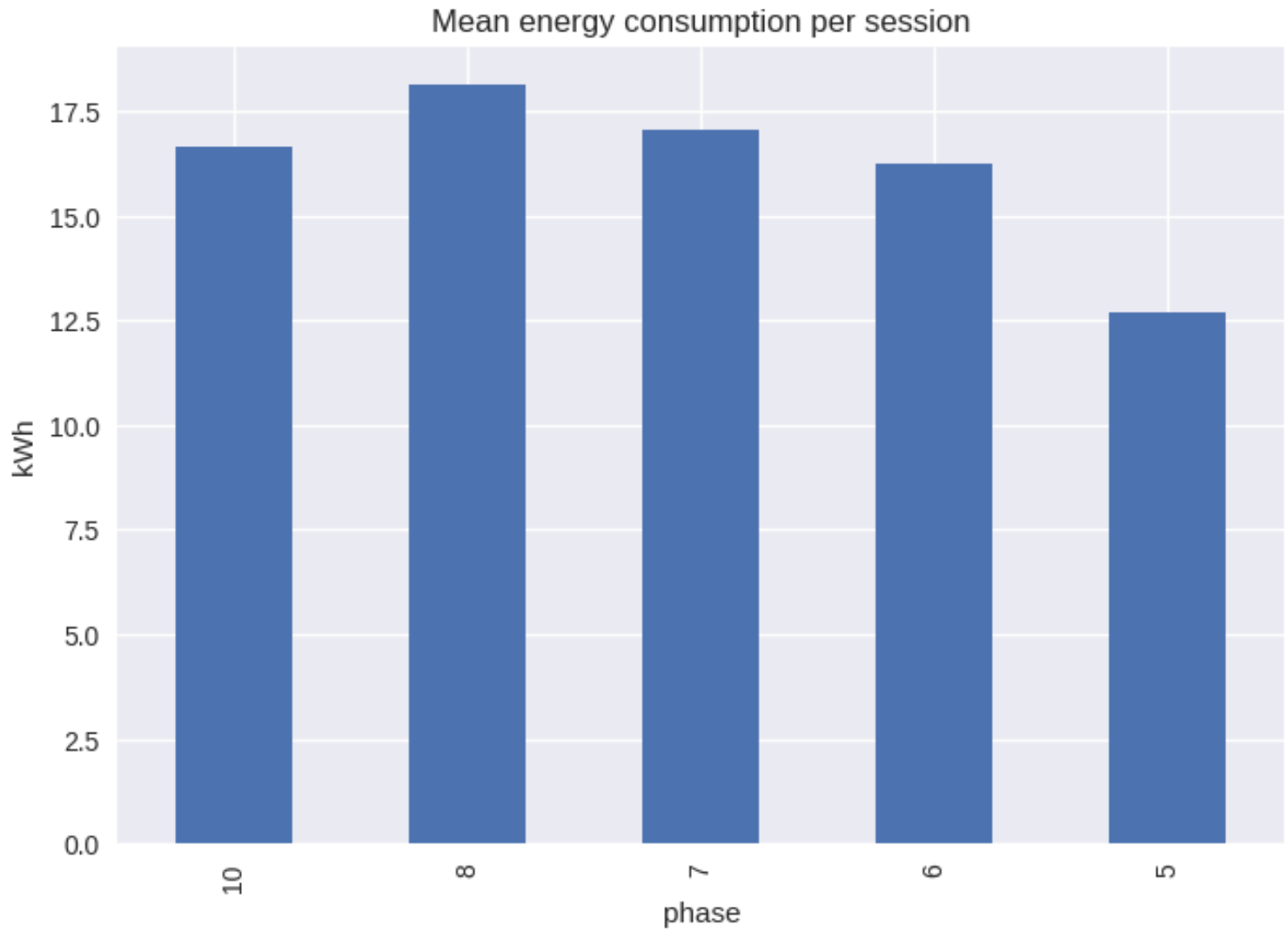
Results

Comparison of charged kWh for the different settings



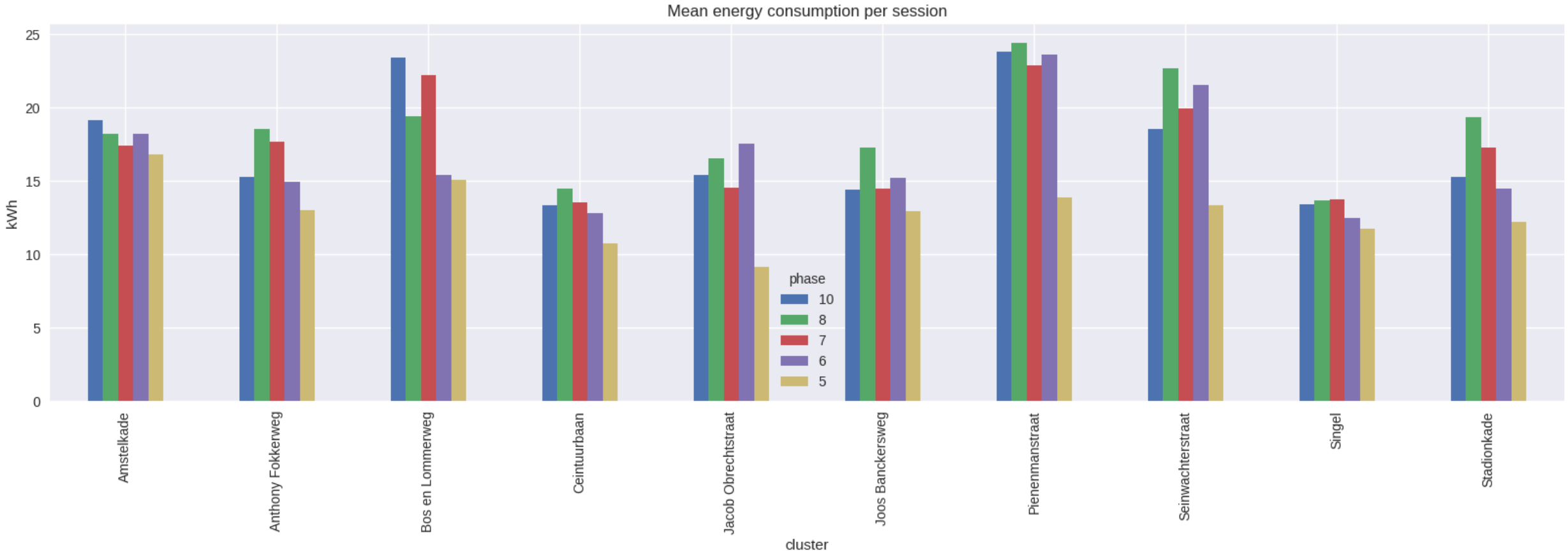
Results

Comparison of charged kWh for the different settings



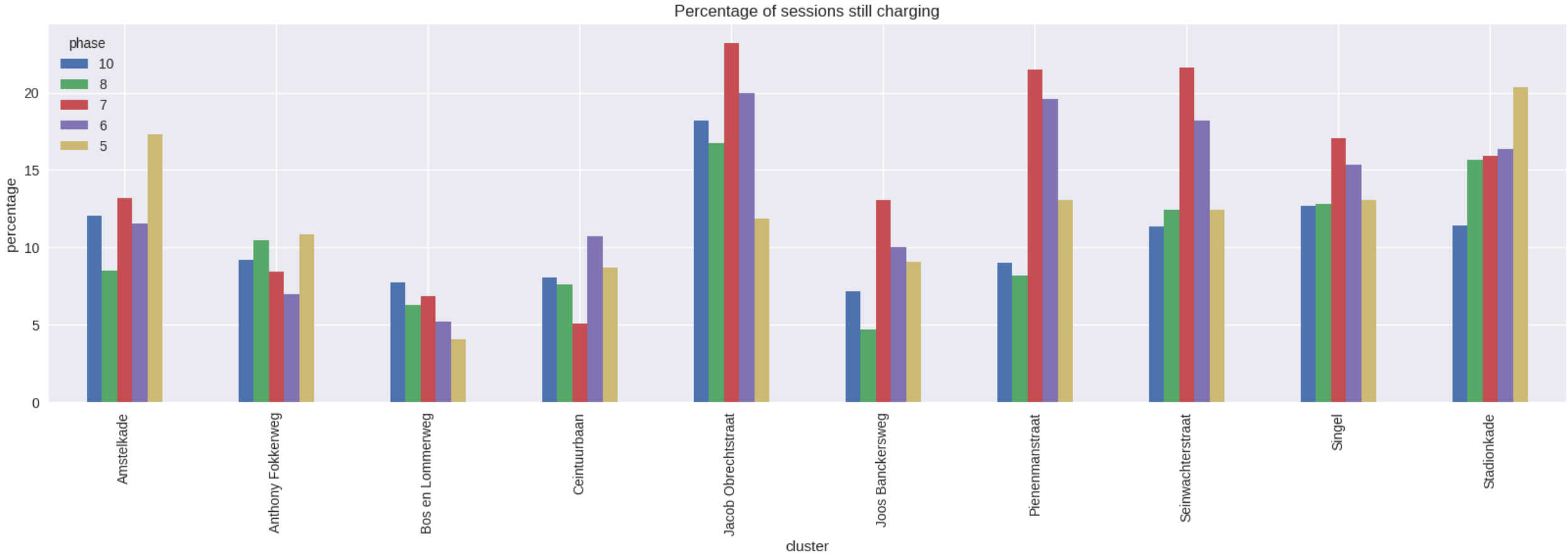
Results

Comparison of charged kWh for the different settings



Results

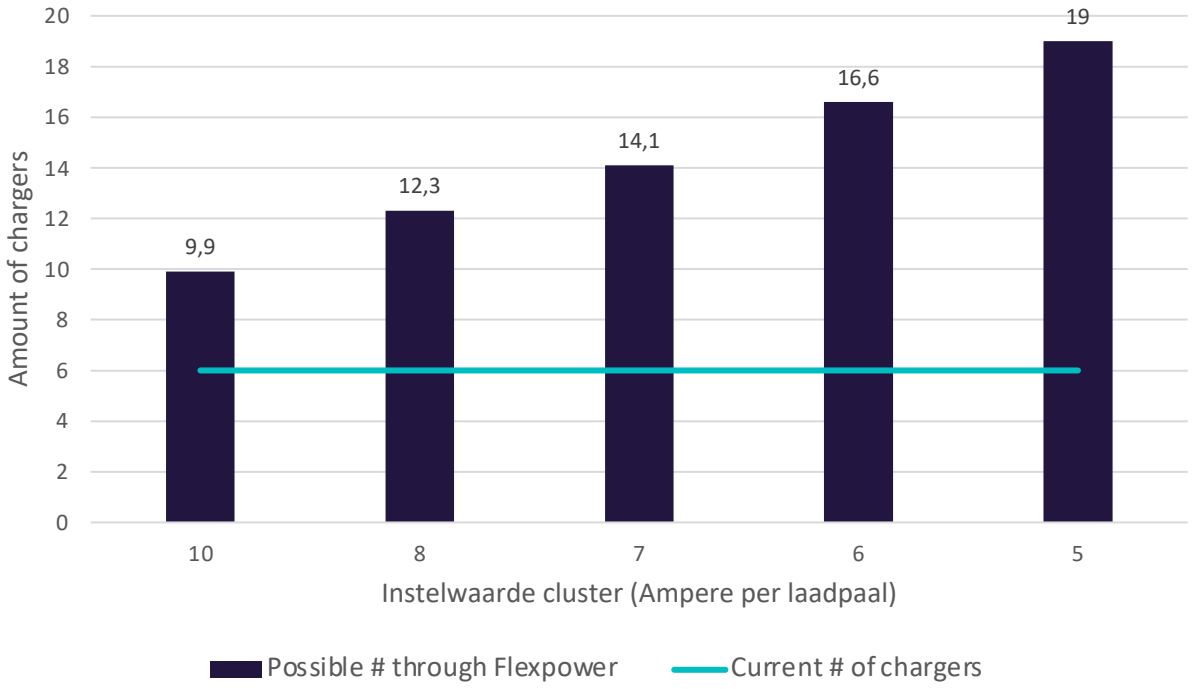
Comparison of sessions still charging at disconnect for the different settings



Impact on Energy Transition

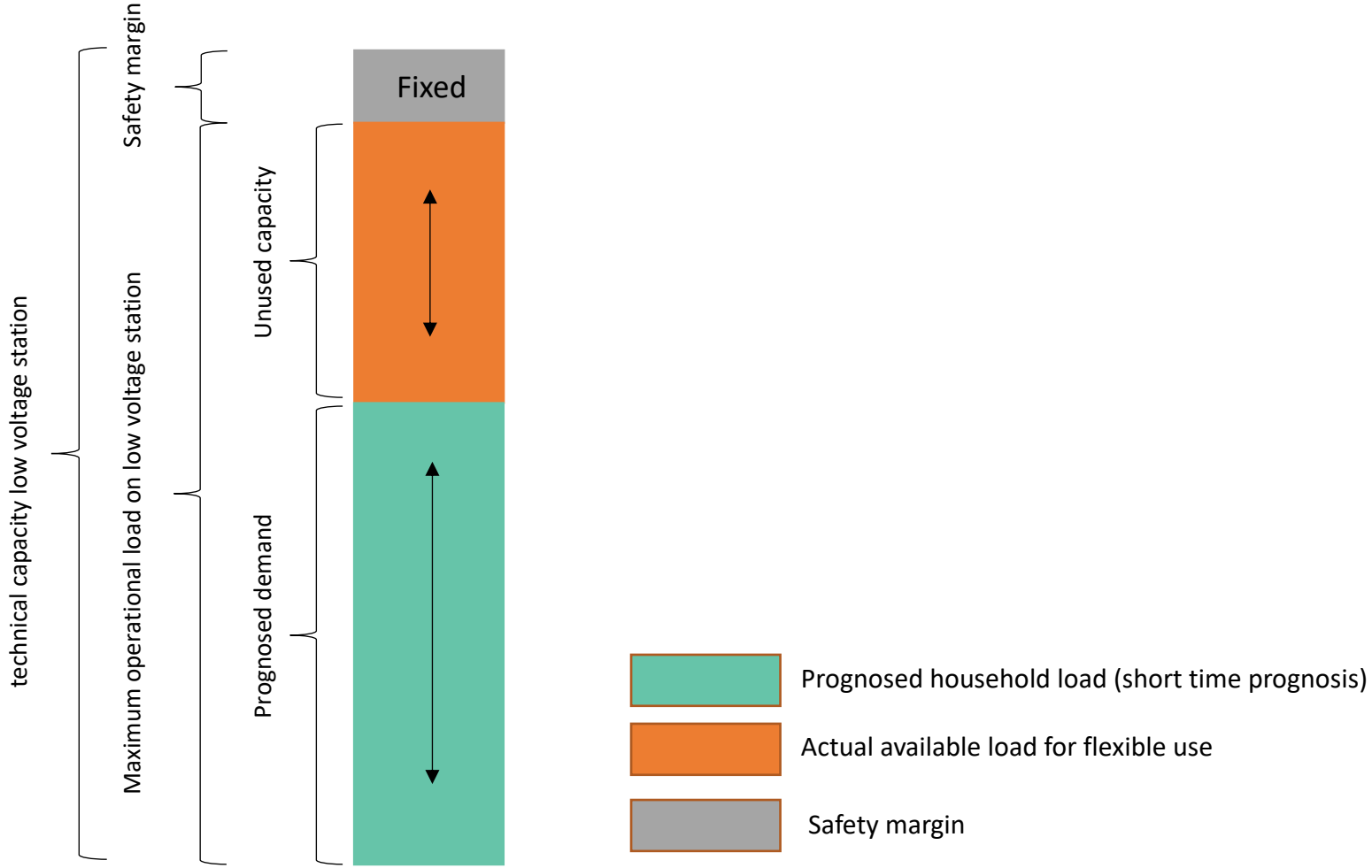
Clustering works!

- Clustering allows 3.2 times more chargers to be installed within the same power usage, without discomfort for drivers

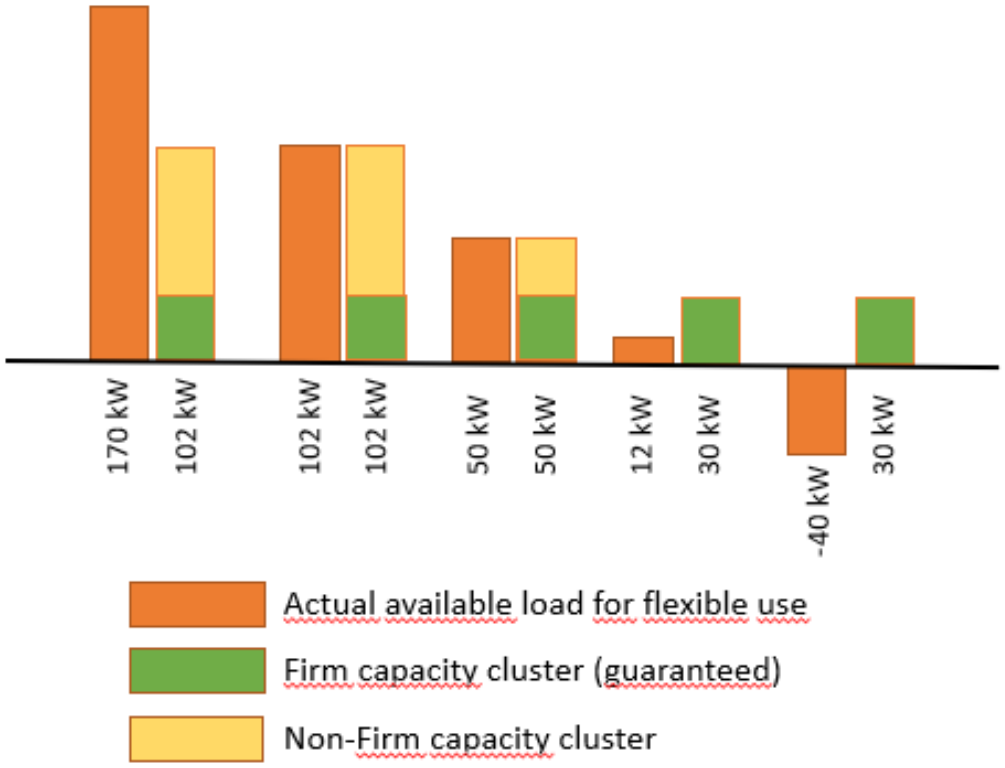


Results phase 2

Distributing unused capacity



Adding capacity to charging profiles



Questions

- What improvement on performance is obtained?
- Is a lower base capacity possible?
  - What would happen when the grid becomes congested 24/7?

5A: 3,2x more efficient grid usage

4A: 4,1x

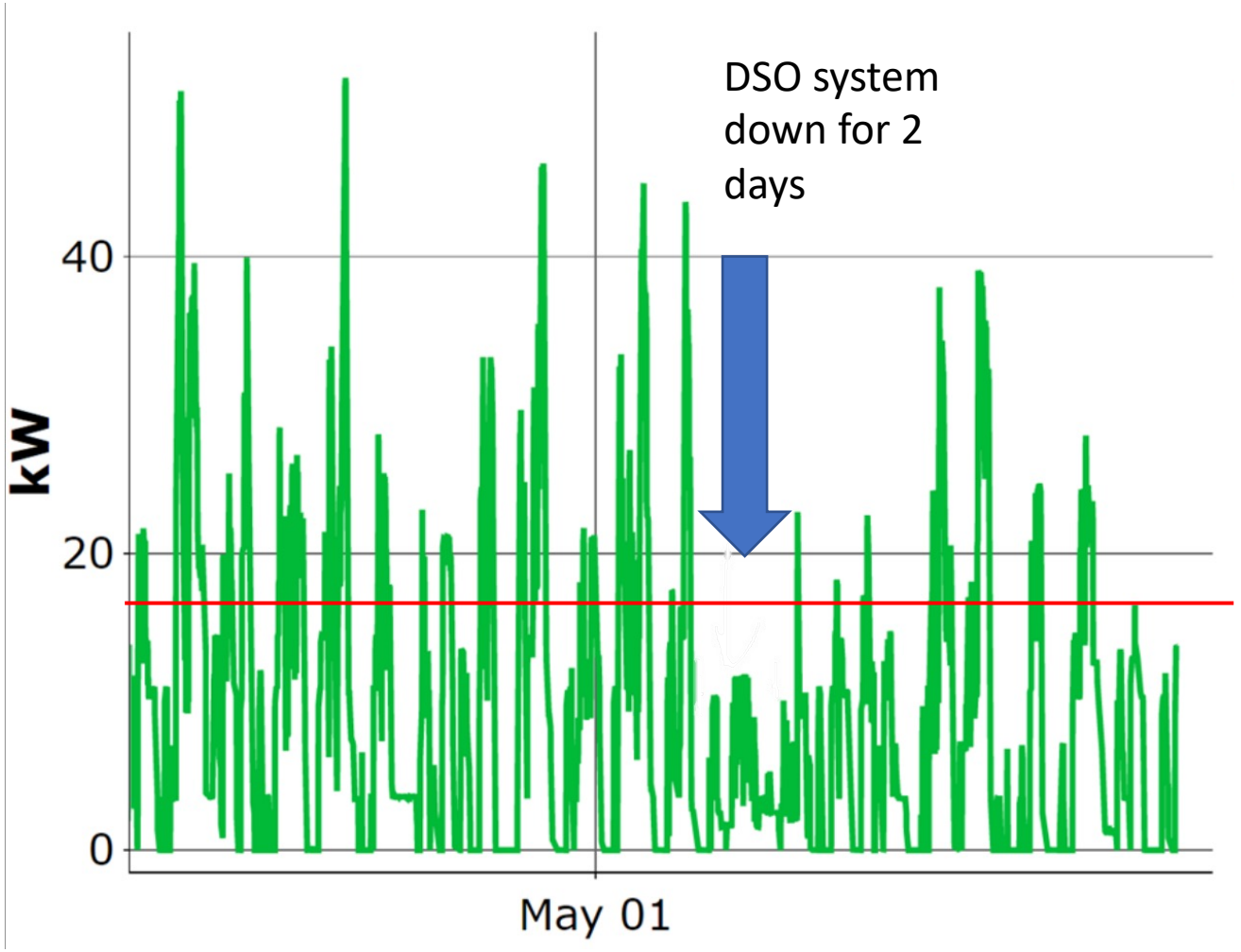
3A: 5,5x

Setting in project

Boundary chosen to result in 6 periods per week with base capacity only; longest period: 2h 50min

Effect of more complex profiles

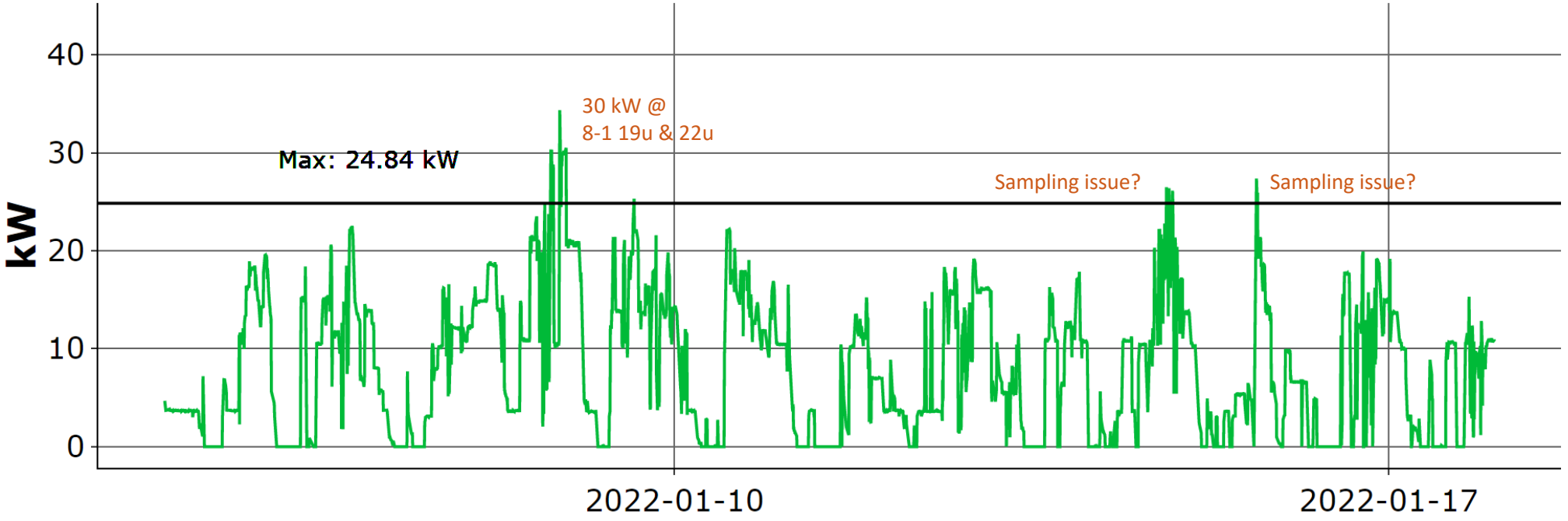
Safe adjustment: no harm done when communication fails



Boundary of cluster, base capacity: 17,5 kW

Incidents do happen

Some exceptions have been recorded



Laadpalen in project

Address	ChargePoint_ID
Lampenistenstraat 2	ALF-0003584
Seinwachterstraat 67	EVB-P1515013
Ertskade 155	EVB-P1539166
Panamakade 84	EVB-P1542190
J.F van Hengelstraat 1	EVB-P1552078
Ertskade 113	EVB-P1917049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