Seita Energy Flexibility

POSITIVE DESIGN

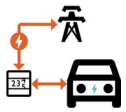
V2GLiberty: The open stack that could

How we enable EV owners to be ahead of the industry, with open source software.

V2G LIBERTY

LF ENERGY FlexMeasures

Nextcloud



Who we are

Seita **Energy Flexibility**

Smart backend for energy flexibility apps.

V2G LIBERTY

POSITIVE DESIGN

UX- & Service Design for a positive impact.

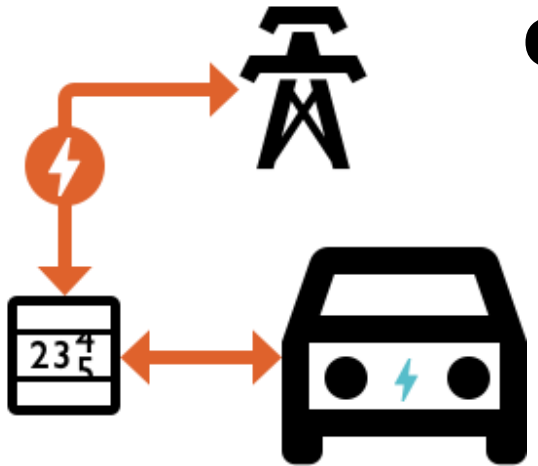
LFENERGY FlexMeasures

Vehicle-to-Grid: What and why?

EVs which can send power back to the grid.

- Support the grid
- Use your own solar energy
- Lower your energy bill

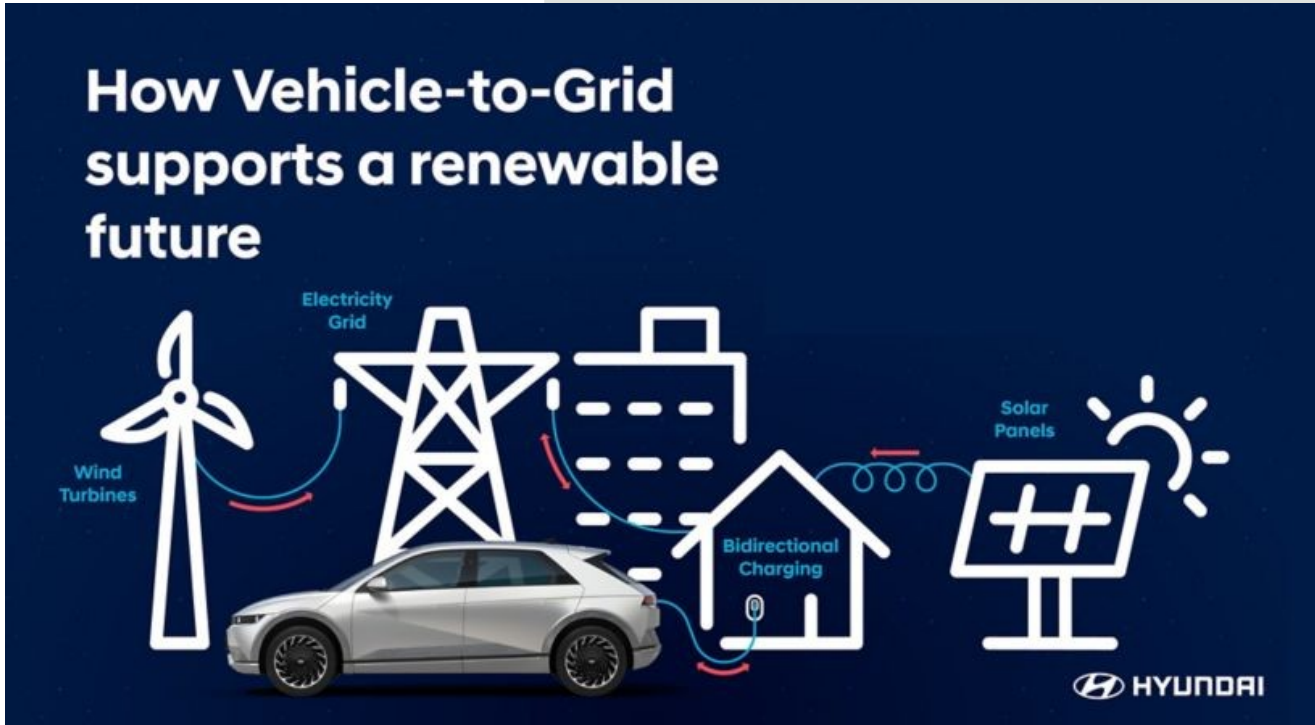
(buy low, sell high)



EPEX day-ahead price spreads within a day have grown 300% Between 2019 and 2021. (Source: Vattenfall Markt Expertise Desk)

www.thesun.co.uk

Where is it? Do we want it?



There are big plans, but industry is taking their time to build integrated (and possibly siloed solutions).

The V2G Liberty project

Kickoff: Fall 2021 in Utrecht
Now: 1 year of data, 5 new locations

Why?

- Didn’t want to wait for industry
- Showcase open source stack
- Challenge ourselves

What will I show today?

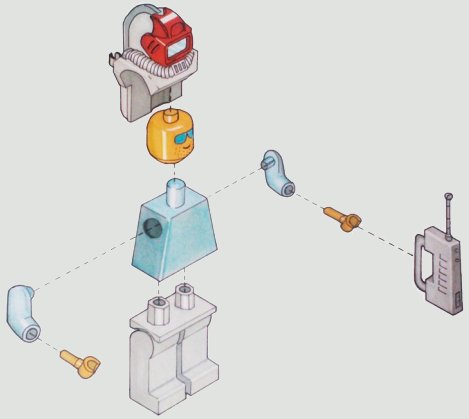
- Stack
- Design
- Some outlooks

What do we need?
(what is available?)

EV with CHAdeMO (Nissan Leaf)

V2G-capable charger (Wallbox Quasar — talks modbus, not yet OCPP)

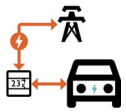
Local computer (Raspberry PI)



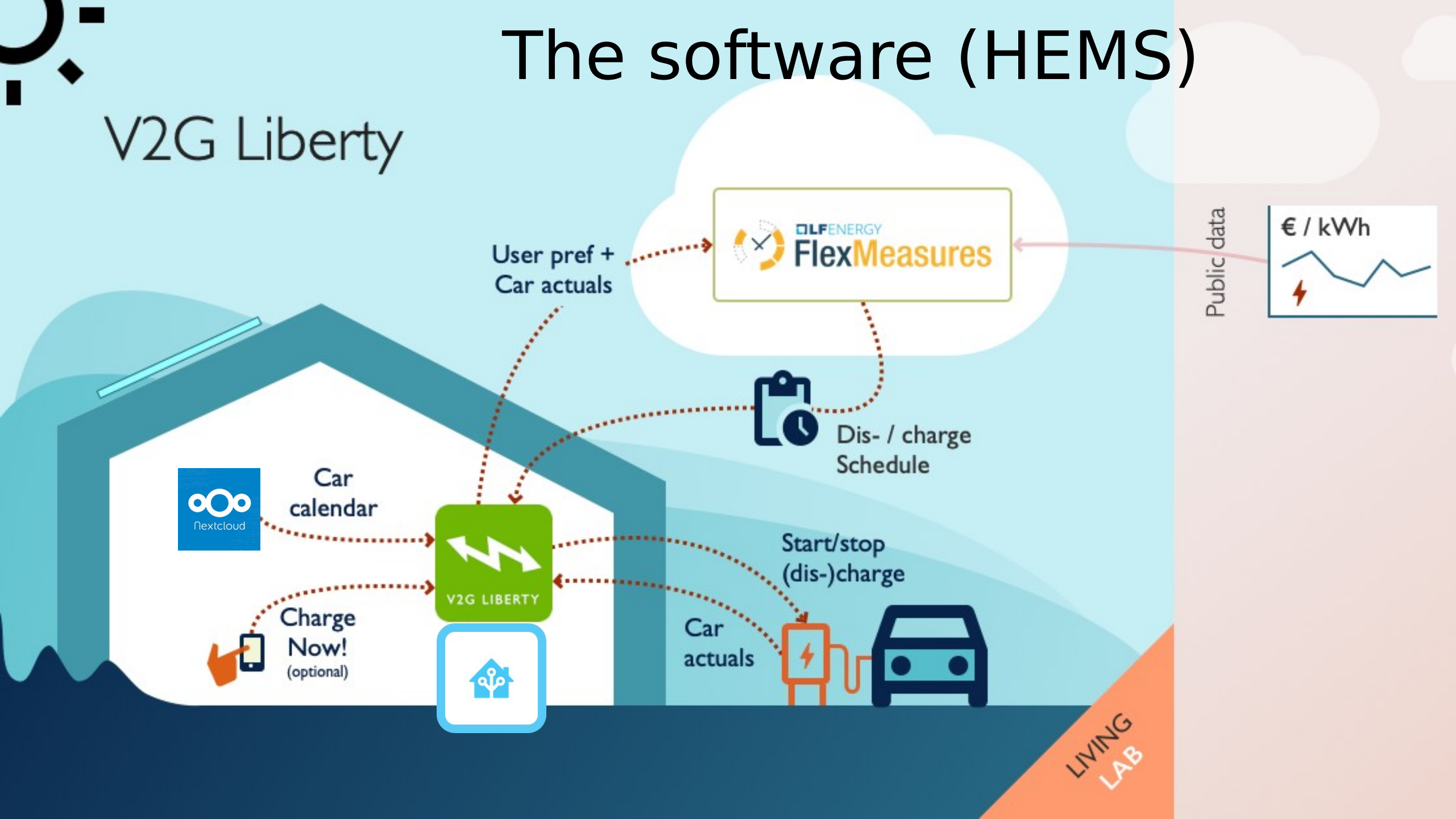
Ideally, an energy contract with dynamic tariffs

tibber anwb

... or even solar panels



The software (HEMS)



Home assistant

- Software for home automation
- Free & open-source
- Cheap hardware
- Local control → privacy
- Web-based user interface
  (+ apps for Android and iOS)

Among many others these companies provide add-ons for Home-assistant:

amazon alexa

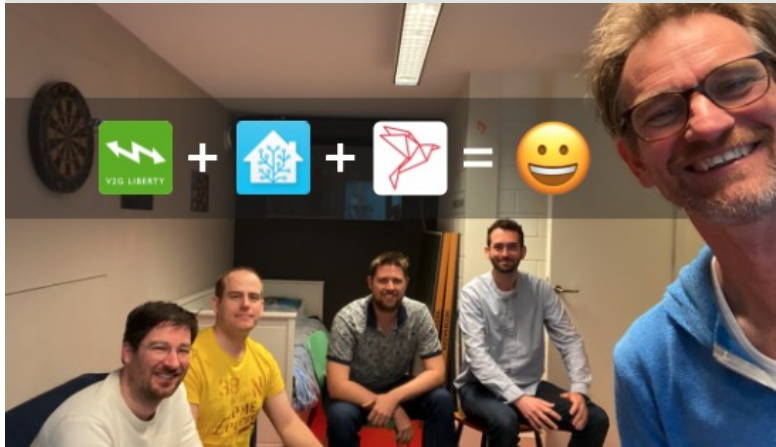
Google Assistant

Apple Homekit

hue

SONOS

IKEA

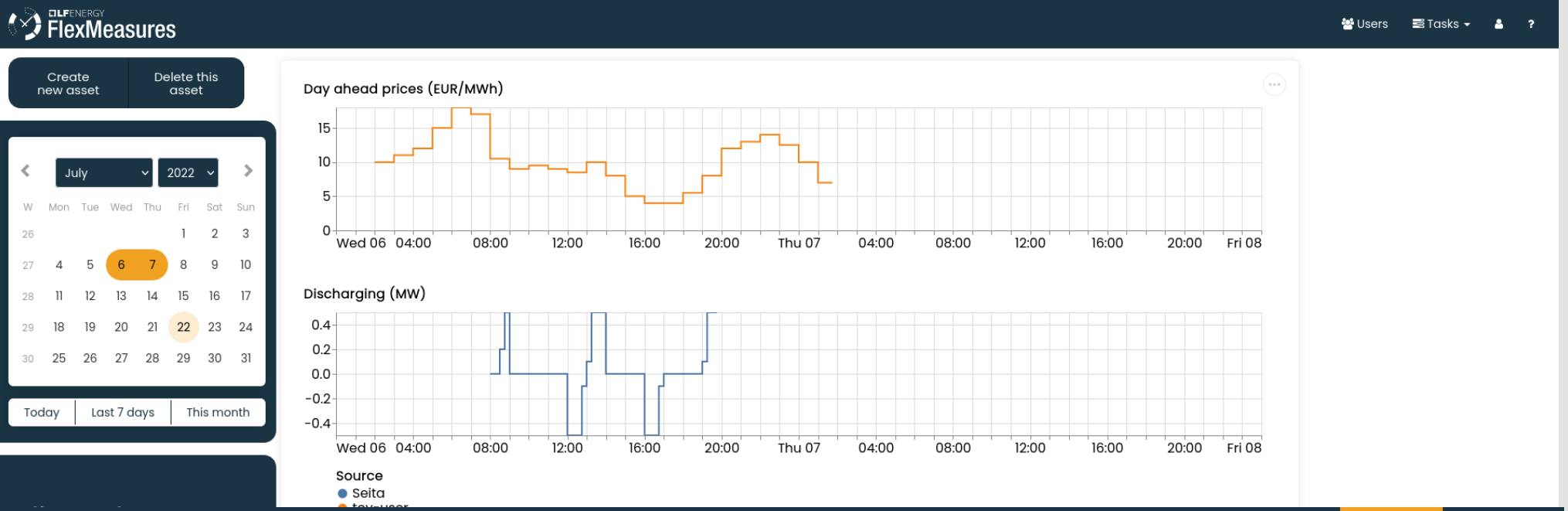


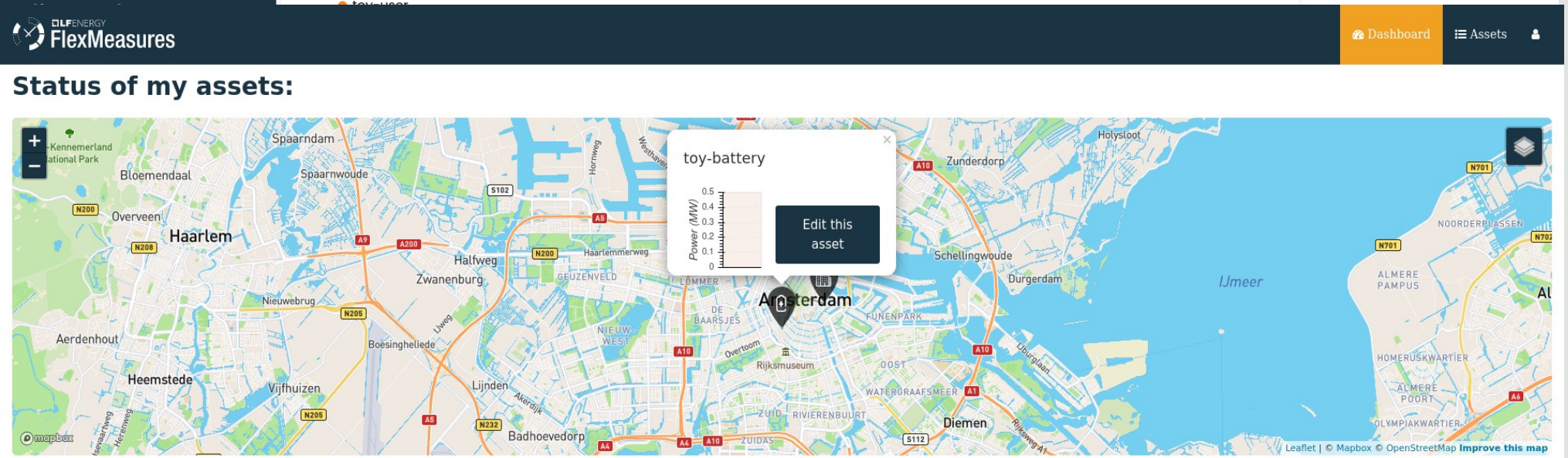
FlexMeasures

FM's goal is to answer this question: "What are the best times to run flexible assets, like batteries, heat pumps or industry processes?"

A platform for automating energy optimization throughout the day, to save CO_2 and costs.

- Python
- Developer-friendly (e.g. plugins, good docs, API, CLI, ...)
- E-mobility, industry, built environment



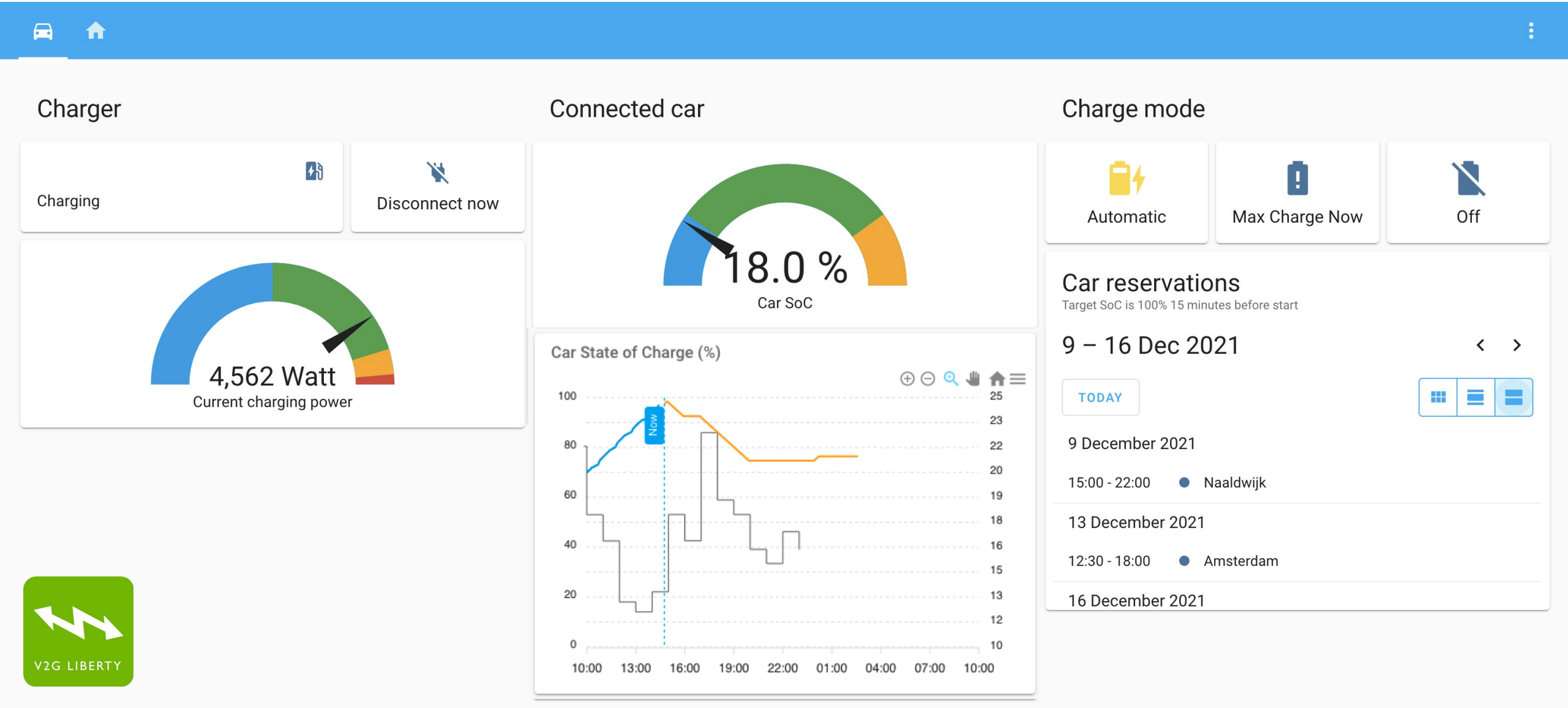


	Renewables	Solar	Batteries	Buildings	Temperatures	Wind_speeds	Radiations	Weather stations

This is the back-office in FlexMeasures.

Usually, our partners build their own UI, like we did in V2GLiberty.

V2G Liberty – HomeAssistant plugin



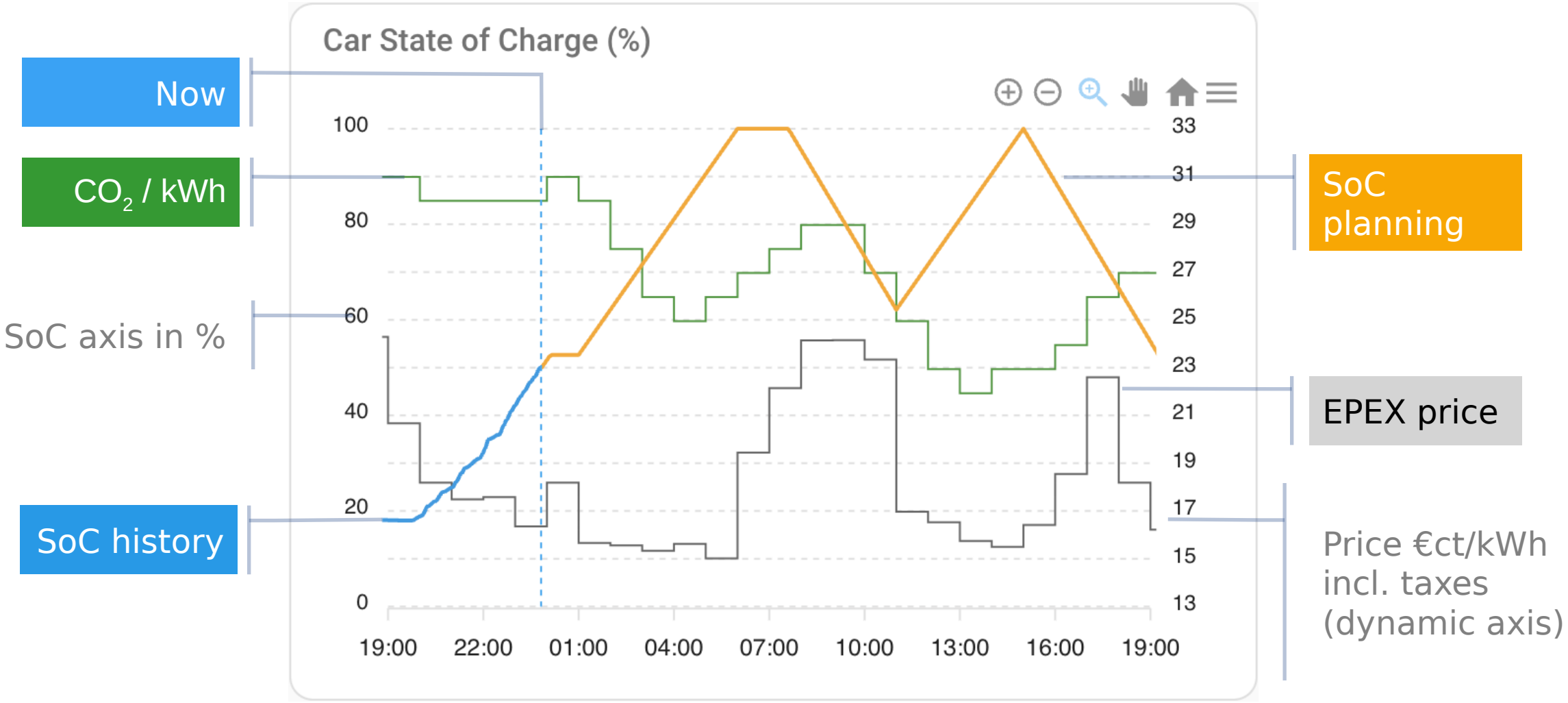
User experience (☺)

- Should not ask constant attention
  → Automation, user in control
- I’m always ready to ride
- I can trust the system
- It’s helping the climate
- It’s cost-saving
  → Optimize (dis) charging
  → Protect the battery

V2G research has shown that drivers accept low minimum SoC as long as they can easily overwrite the automated system.

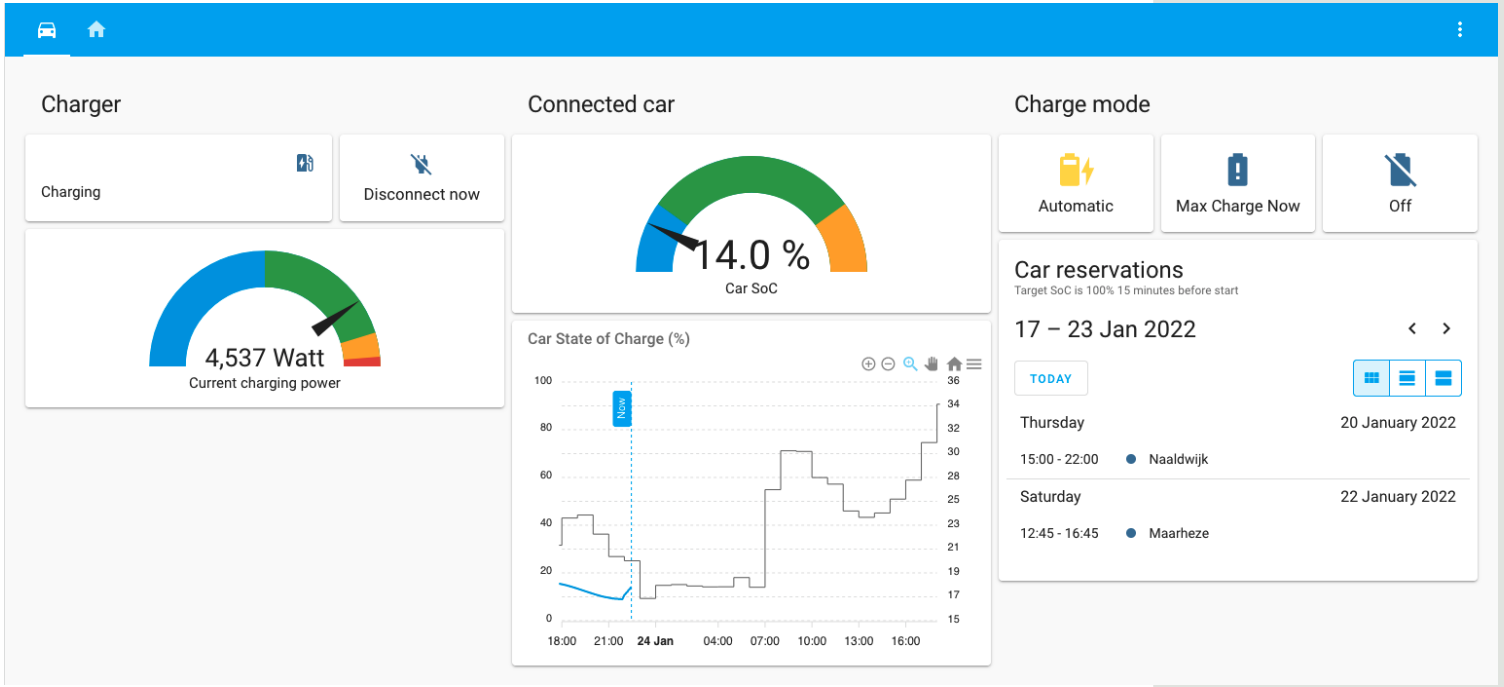
We Hicks, unsplash

V2G Liberty Dashboard

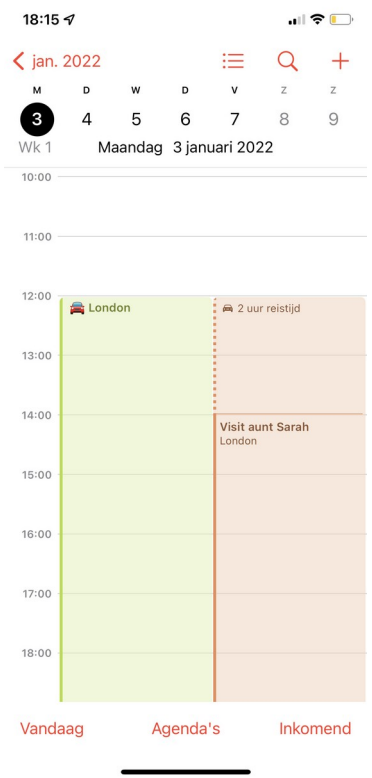


Auto returns with SoC < 20%

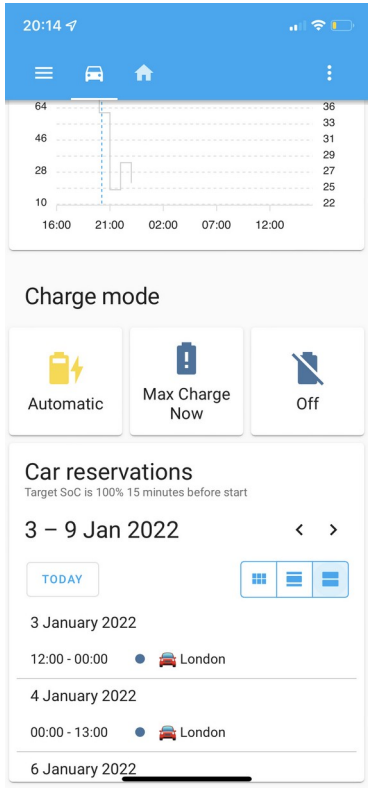
- Directly charge maximum speed
- Healthy SoC: 20 – 80%
- Minimum SoC of 20% ≈ 60 – 80km



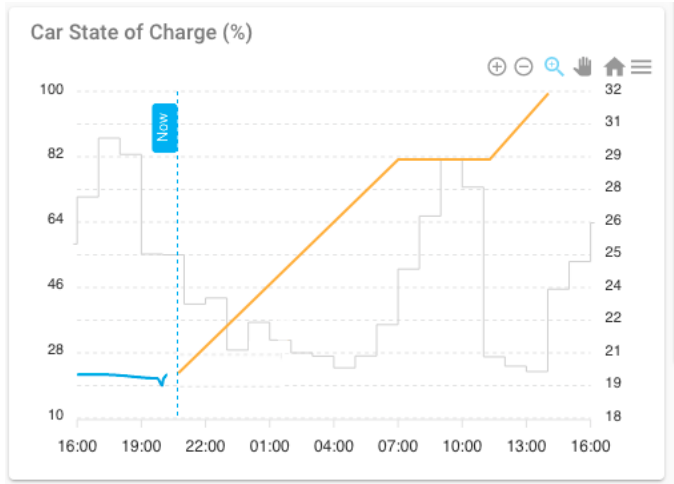
Car reservation → 100% SoC



Autom.



Autom.



Nextcloud

State

- Installation effort could be lower
  Needs technical skills
- If it works, it works
  (monitoring can be improved)
- Users are happy, now 5 installations
- Earnings up to > € 10 per day
- EV energy costs € 0,06 per km

  With 20.000 km/year

For 95% of EV drivers the EV is their main car, 40% do not own an IEC (anymore).

Despite many options for car sharing, it seldom is a reason not to (also) own a car.

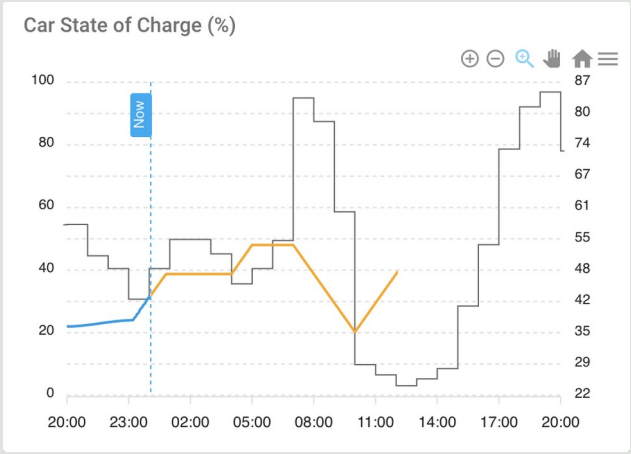
Business case

20000 km driven in 10 months (used for work and vacation), ~ €0,06/km

	Energy	Costs
charge	8.921 kWh	€ 2.640,45
discharge	5.607 kWh	€ -2.448,80
netto	3.314 kWh	€ 191,65

Compare this to no smart operation at fixed costs (€ 640) or dynamic tariff (€ 1440). Recall that spreads are increasing.

Note: Investment for V2G Charger = x 4 normal charger.

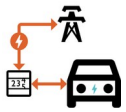


V2G Liberty roadmap

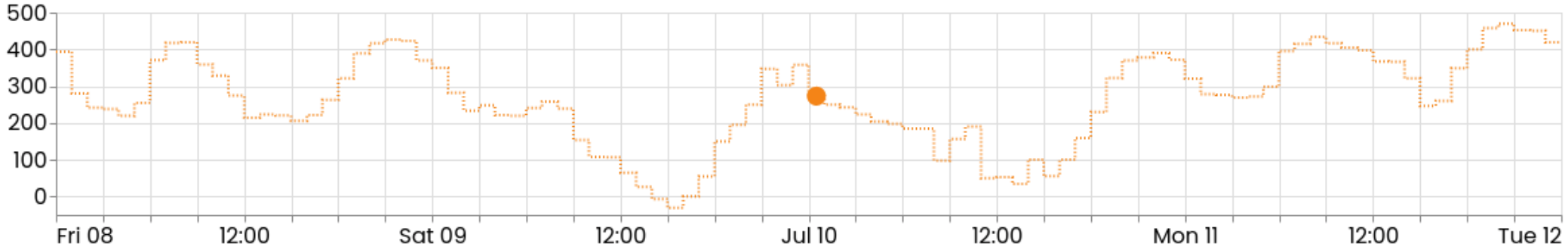
- Easier installation
- Update process automatable (via HA)
- UI upgrades, KPIs
- Learn from users
- Support other chargers, cars, standards (CCS 2? OCPP?)

FlexMeasures roadmap

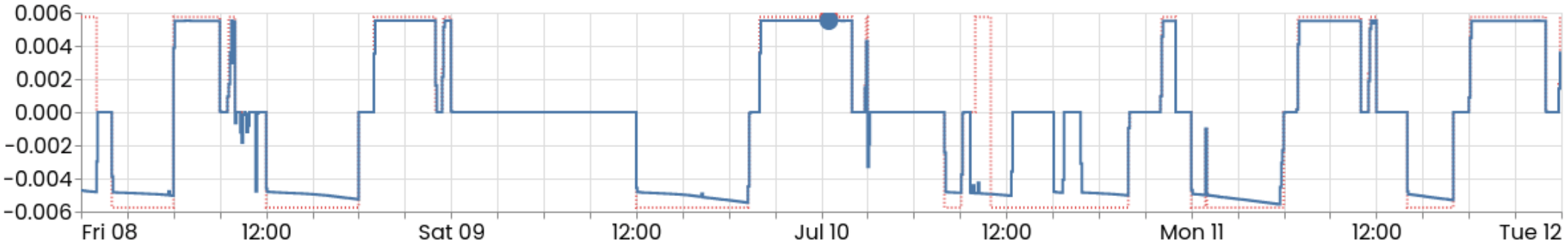
- Optimize heat & e-mobility together
- “Super-accounts” who manage sub-accounts
- Optimizing towards network congestion support



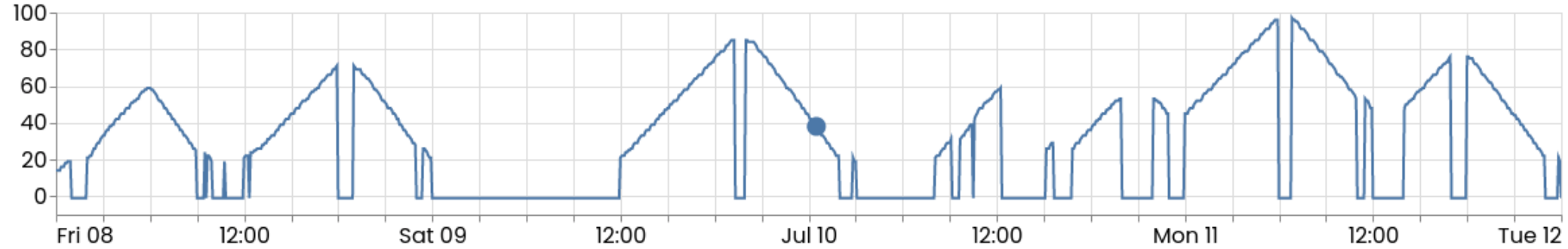
Day-ahead prices (EUR/MWh)



Nissan Leaf Battery (MW)



Nissan Leaf battery state of charge (%)



Questions?