

Innovations in V2x: underground FlexGrid energy system

Menno Kardolus (M Sc)
CEO PRE power developers

heliox

Powering a Cleaner Tomorrow



PRE Power Developers - Quick facts



1. Founded 1984, 50 people - R&D
2. Development of Power Electronics
3. For EV charging since 2009
4. Our focus is on DC fast charging in the range of 6kW - 1MW
5. PRE has partnered with various charging OEM's in Europe, USA.
6. Part of Heliox-energy group

Heliox is the Dutch no 1
e-mobility solution
provider

Electrification projects for:

e-Busses

e-Trucks

e-Vehicles

Hardware

Chargers from Heliox

Software

Backend from Chargesight

Energy mgt

Smart (bidirectional)
charging by Recoy



e-Bus

The largest fast-charging network
in the world



Amsterdam Airport
Schiphol

250

e-Buses

31 MW

charging solution

e-Bus and e-Car

Helping Glasgow make
the e-transition, [video](#)



Caledonia Glasgow
depot

300

e-Buses
e-Cars

162 Chargers of 150kW



Zero emissions goal



Improved air quality in
the vicinity



Quick turnaround and
installation

180–360 kW Flex Charger



Built to last
for 15+ years



Easily upgradable for
growing fleets

Charging Estimator Time to power up to 100km

180 kW Flex PANTO UP/DOWN Charger



30 min



45 min

360 kW Flex Charger



15 min



20 min

CCS-1, CCS-2

Dual output 300 kW Rapid Chargers



Ease of use with a touchscreen and a simple tap payment terminal



Excellent serviceability – one person can easily upgrade the modules

Charging Estimator

Time to power up to 100km



55 min

CCS

CHAdemo

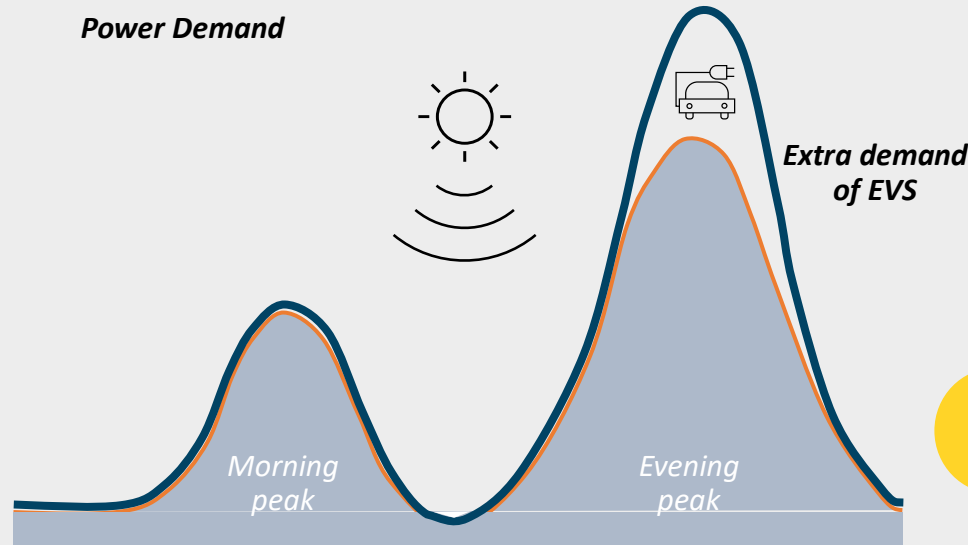


8 min

AC

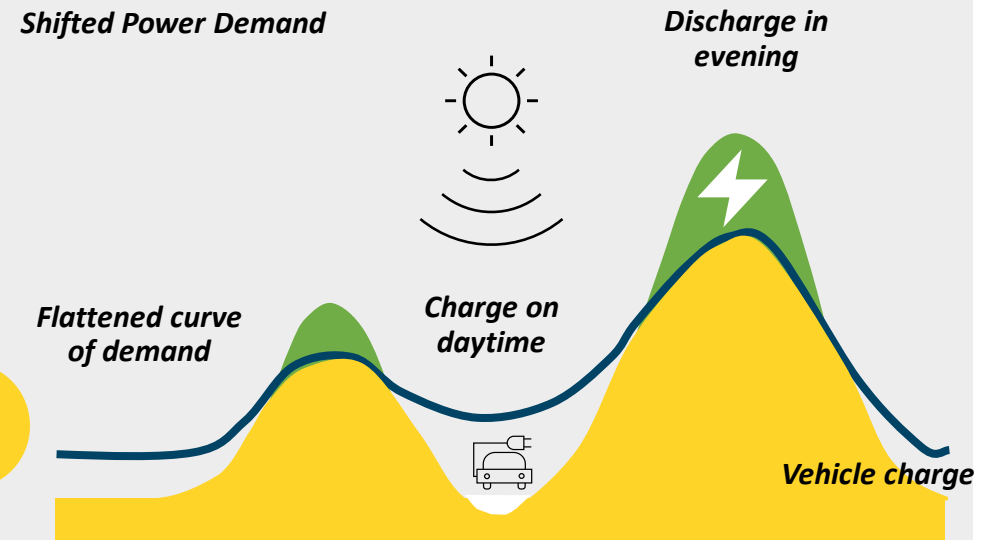
Bidirectional power flow between grid and the vehicle (V2G) helps smoothen daily demand curve/power generation

Typical daily-load curve



Situation without V2G

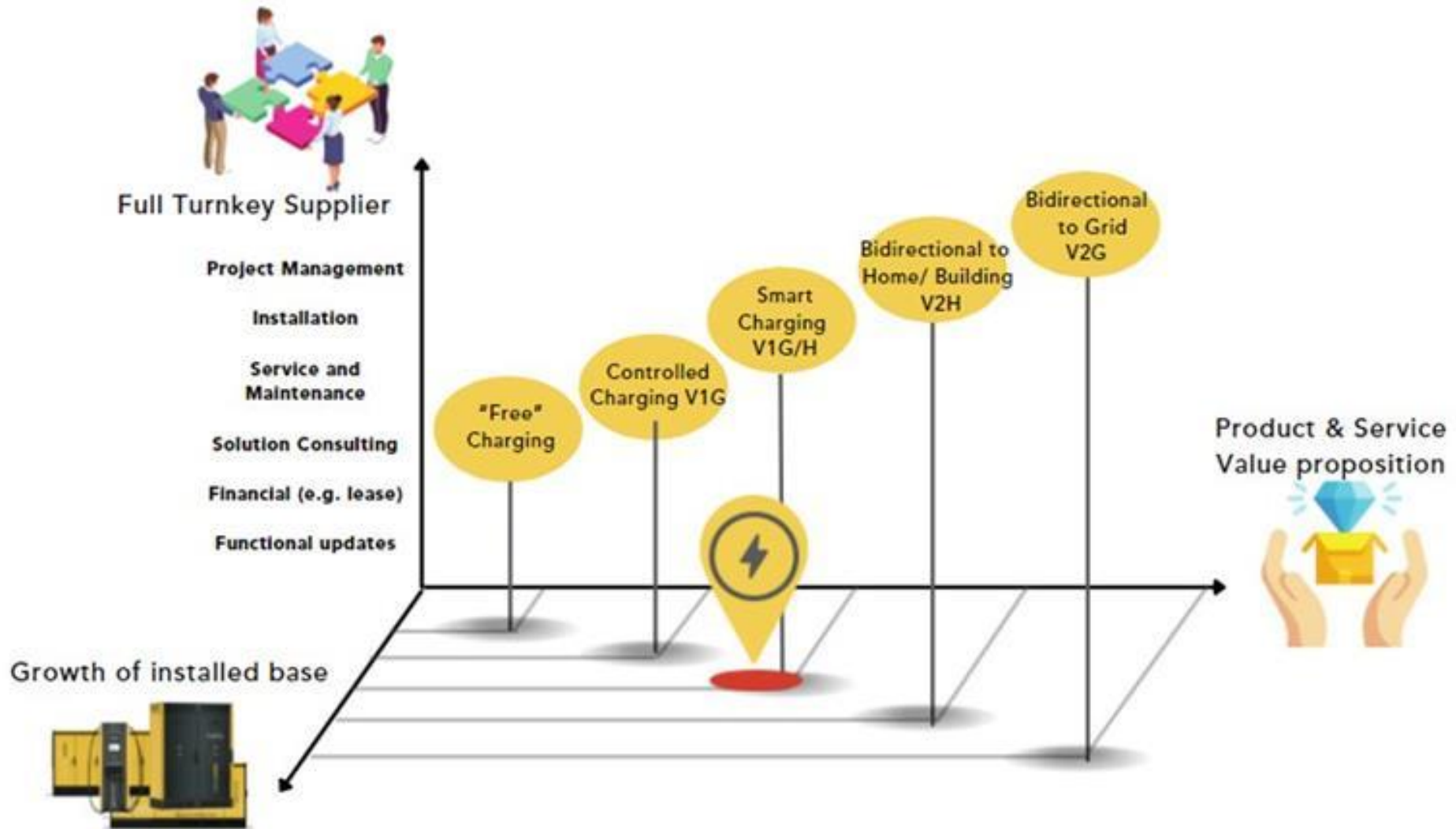
- Evening peak in electricity demand further increased by additional EV charging
- Misaligned with peak in solar generation during daytime



Situation with V2G

- EV charging shifted to match abundant solar generation during daytime
- Discharge during evening peak to lower peak demand and supply requirement
- Flatten overall demand curve

Roadmap and strategy Heliox-Energy group



Heliox references in V2G

Europe:

[Ovo/Indra](#)

V2G

[Eon/Virta](#)

V2G

[Shell Recharge](#)

V2G

[DeelDeZon](#)

V2G

[Aircon](#)

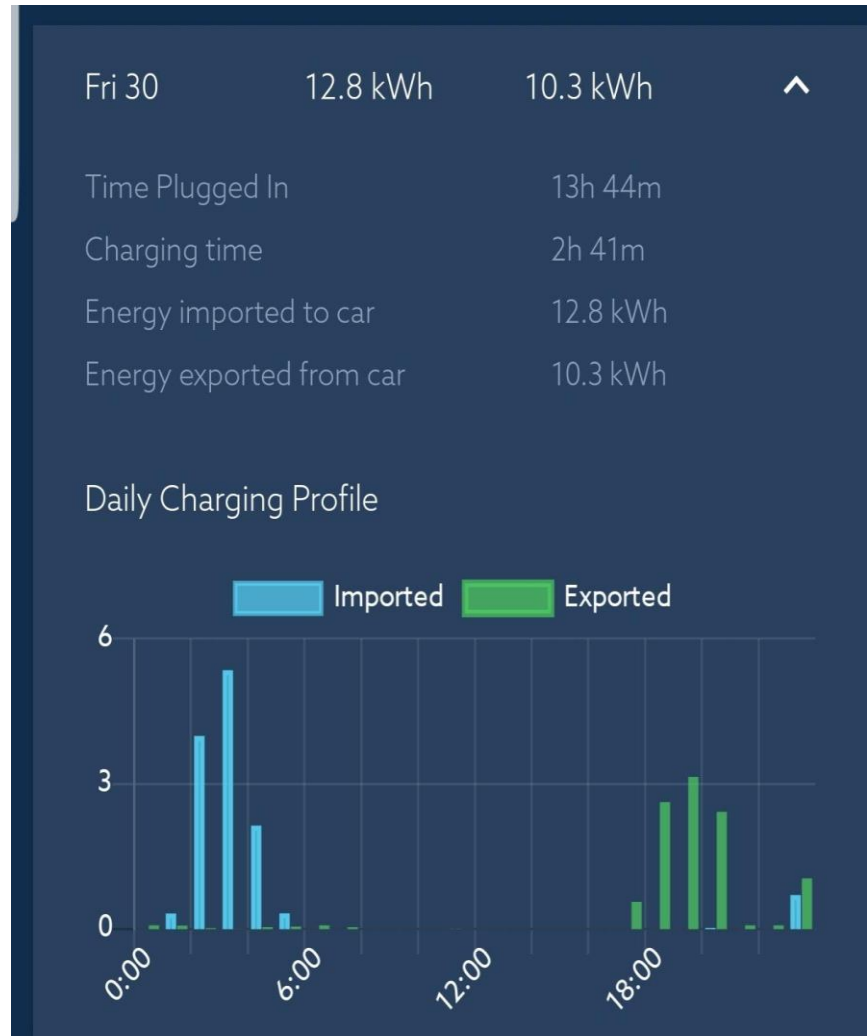
V2L

USA:

FermataEnergy

V2G

Innovate UK trial with Heliox Technology: monthly credits on bill



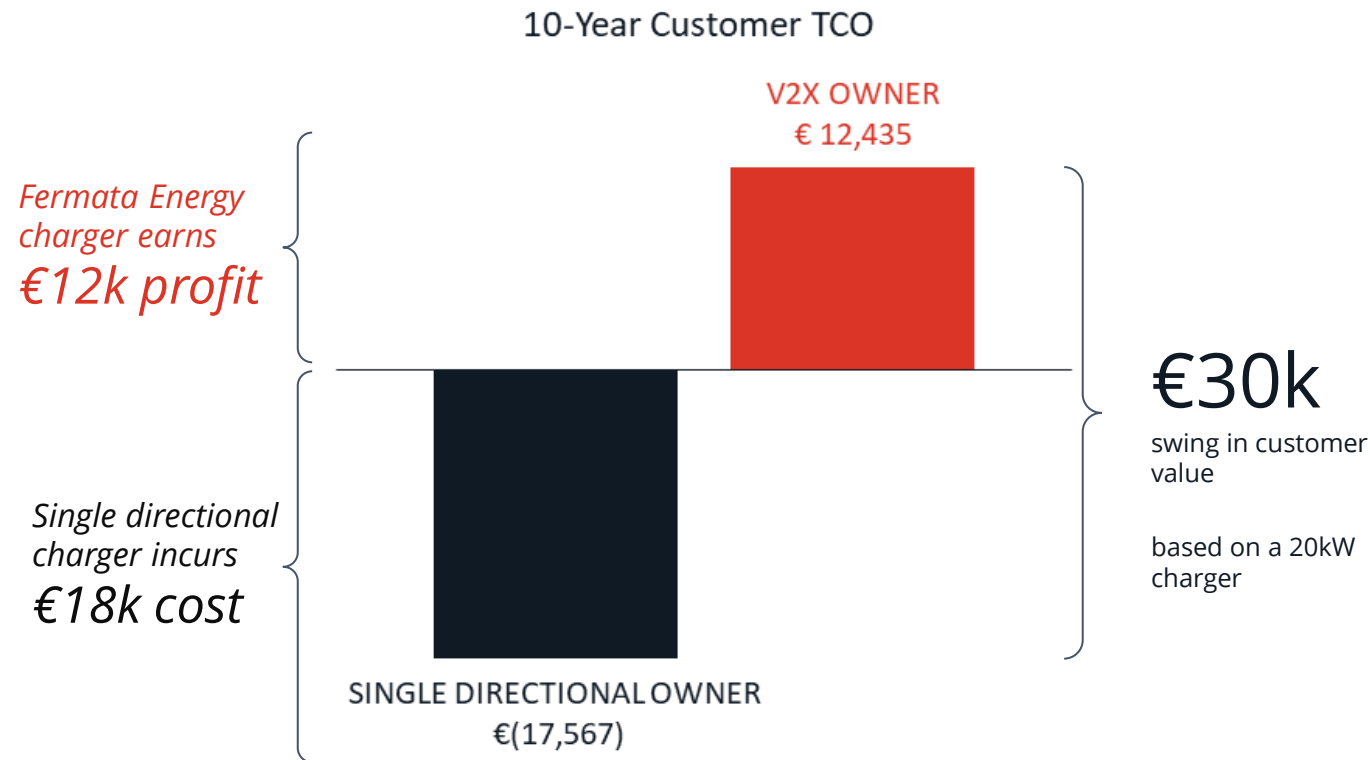
Electricity	
Consumption charge	£99.07
513 kWh at 13.72p from 1st – 23rd August	
28 kWh at 17.54p from 24th August	
167 kWh at 14.24p from 25th – 31st August	
Standing charge	£8.44
27.40p a day from 1st – 23rd August	
21.73p a day from 24th August	
27.40p a day from 25th – 31st August	
Gas	
Consumption charge	£5.28
131 kWh at 3.08p from 1st – 23rd August	
5 kWh at 3.91p from 24th August	
37 kWh at 2.81p from 25th – 31st August	
Standing charge	£8.47
27.40p a day from 1st – 23rd August	
24.86p a day from 24th August	
27.40p a day from 25th – 31st August	
Upgrades	
POLAR plus	£7.85 £0.00
Green Electricity	£5.00 £0.00
OVO Interest Reward	-£1.20
Vehicle-to-Grid Export Credit	-£57.55
VAT	£3.13
5% of £62.51	
Total charges for August 2019	£65.64



Fermata Energy | Vehicle-to-everything

Park it. Plug it. Profit.

Are you a Fleet Operator? Choose a charger that produces a positive ROI - with Fermata Energy bidirectional charging



Contact: info@fermataenergy.com

Confidential and proprietary



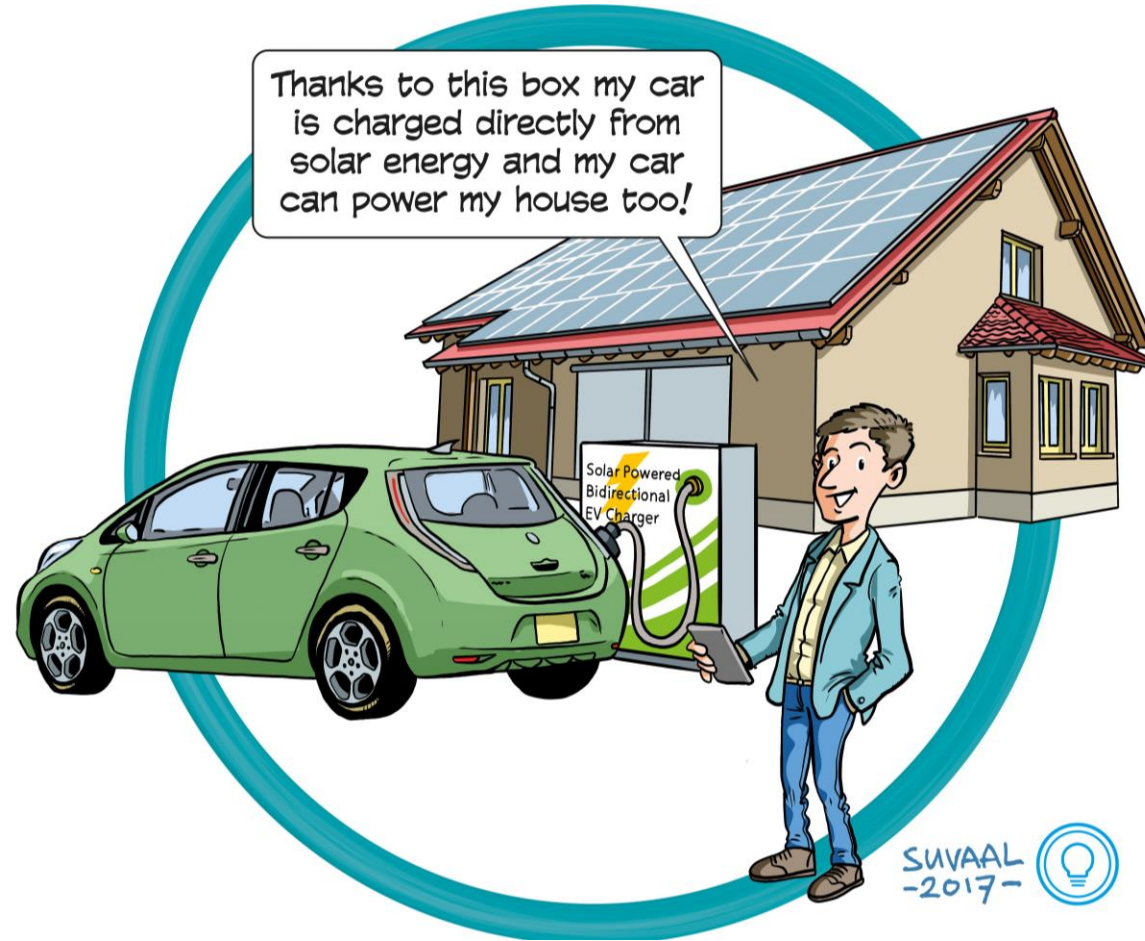
What is needed for V2G to happen.....

e-Fleets, with bidirectional capability	Garbage truck fleet
Bidirectional chargers	Heliox chargers
Backoffice	Chargesight
Aggregation software provider	Recoy
Energy market that allow any unit of flexibility to be offered to the Market	Government
Facilitate energy congestion management market	Government

RESULT:

private sector will Invest in Smart Software,
Government does NOT have to invest in infrastructure

Flexinet: innovative technology for houses/offices



heliox

Flexinet

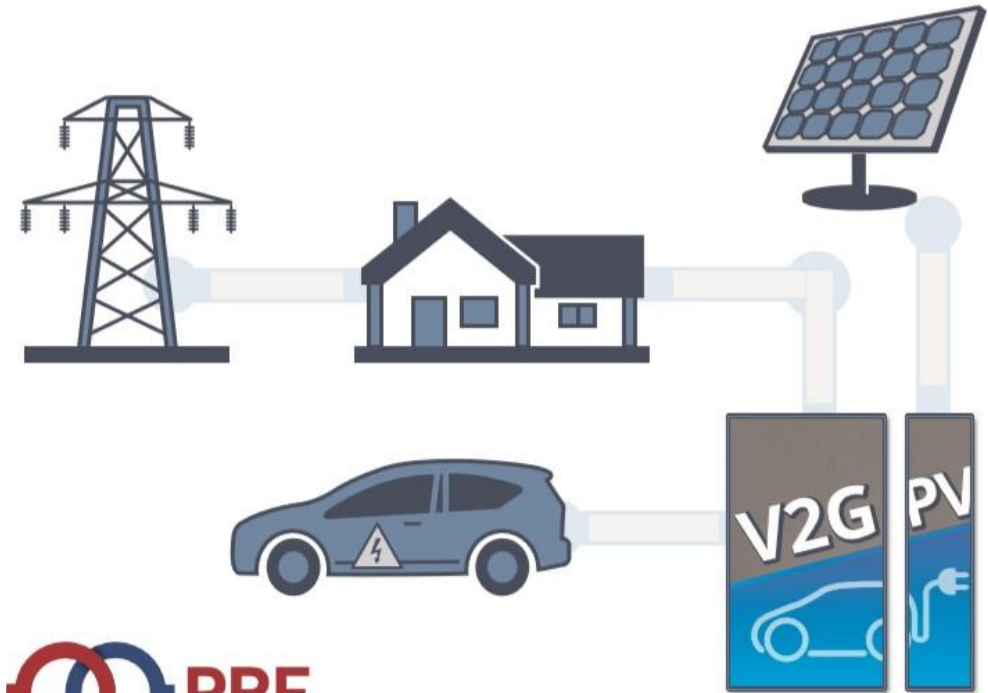
For dwellings with a private charging facility
For small offices

Enabling:

An integrated solution: PV + home battery + V2G

Compact and cost efficient

Higher energy conversion efficiency



heliox

 **PRE**
power developers

V2G + direct solar charging + home storage



Challenges

Use-case demand

- A scalable universal method to install the equipment
- Aesthetics
- Safety

Management

- Control of all assets in the system
- Integration with other assets (electrical- / heat storage)

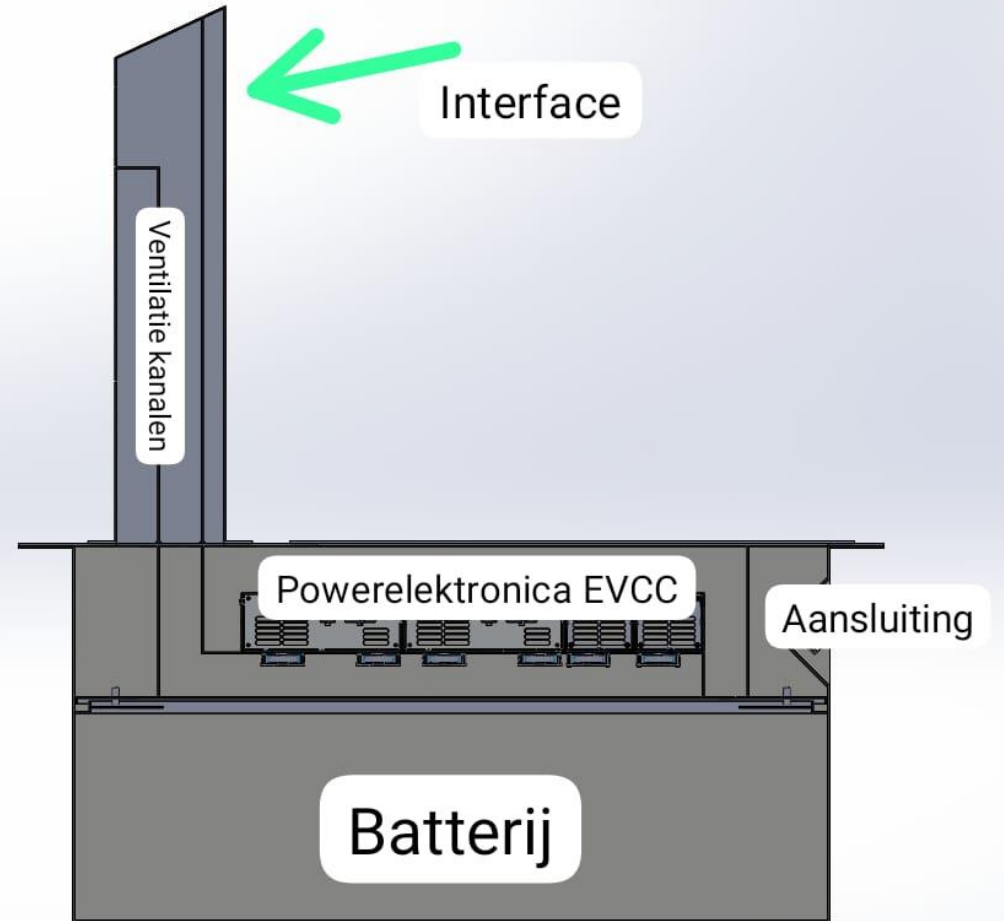
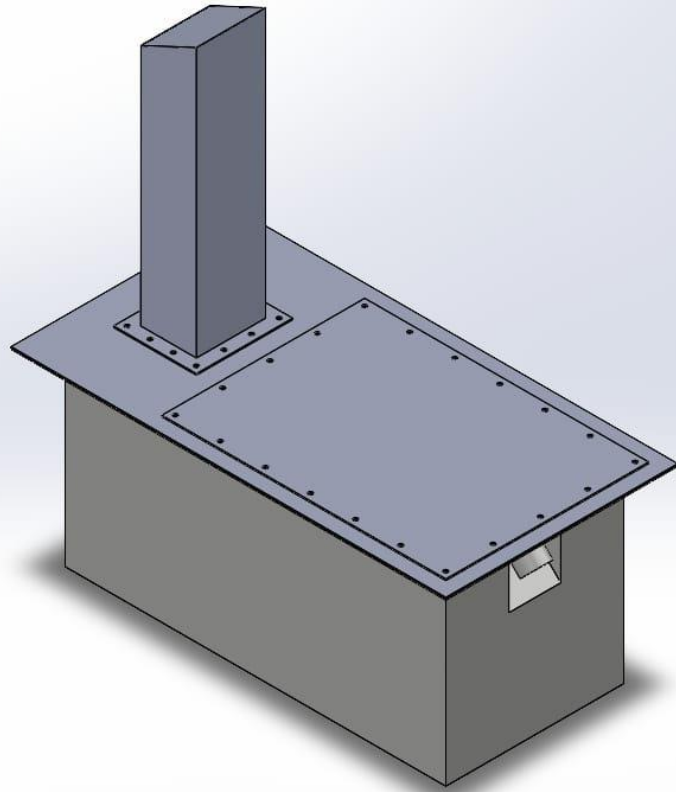
Underground system

1. Public space is very limited/expensive. Installing the integrated system underground could solve this issue.
2. Only the charge post with plug is above ground. The technology, (power) electronics and the battery are underground.
3. The regulations surrounding lithium-ion batteries are becoming increasingly stringent. An underground battery is a safe solution.
4. 'The most beautiful charger is an invisible charger.'



Inspiration

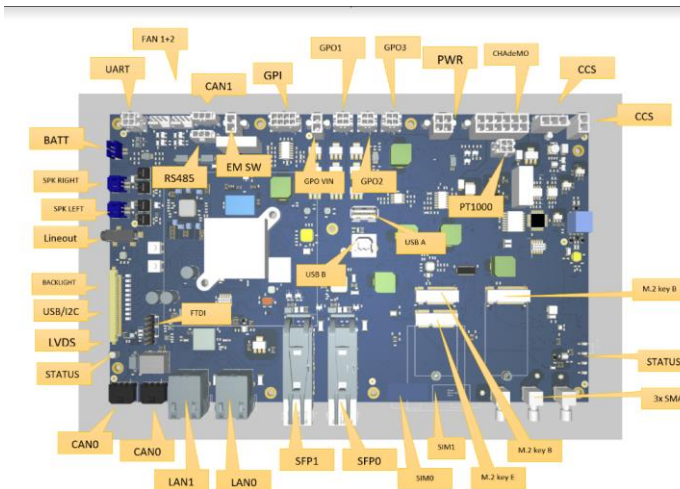
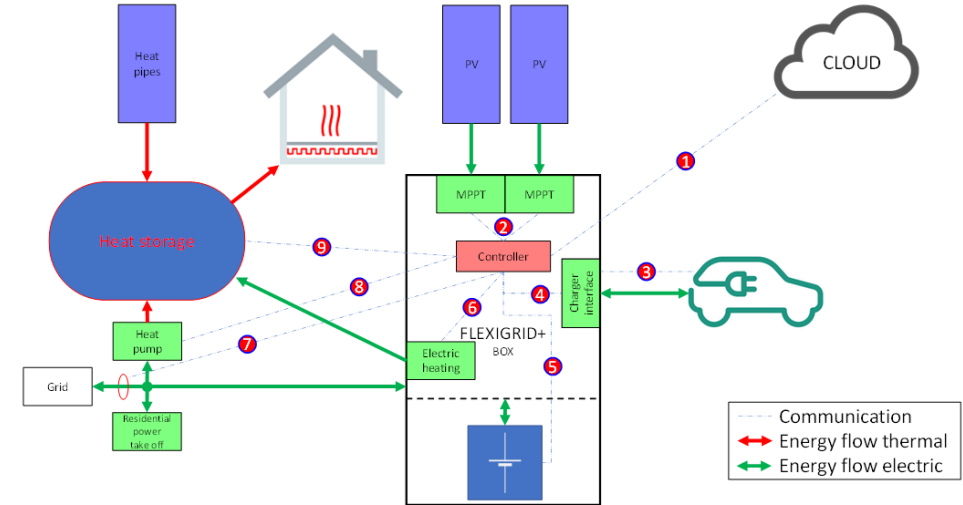
Underground system (basic design)



Energy management

To effectively operate the innovative system, in this project we develop:

- Smart algorithms for energy mgt (DUT)
- Integrated control with heat storage via a dedicated/universal protocol (S2 protocol)
- A physical embedded controller, connecting all the assets (PRE EMS)



A close-up photograph of a person's hand, wearing a beige sweater, plugging a grey Phoenix Contact charging cable into the charging port of a dark blue electric car. The car's charging port is open, revealing a digital display and various charging options. The car's body has a 'e-tron' badge. The background is slightly blurred, showing the car's side mirror and door.

Get in touch

Name: M. Kardolus

Position: CEO PRE Power Developers

Email: m.kardolus@pr-electronics.nl

Phone: +31 76 58 11 077