



greenflux

Driving the
Renewable Revolution

Electric Vehicles as the Key Enabler
to a Renewable Future

June 7, 2023

Introduction



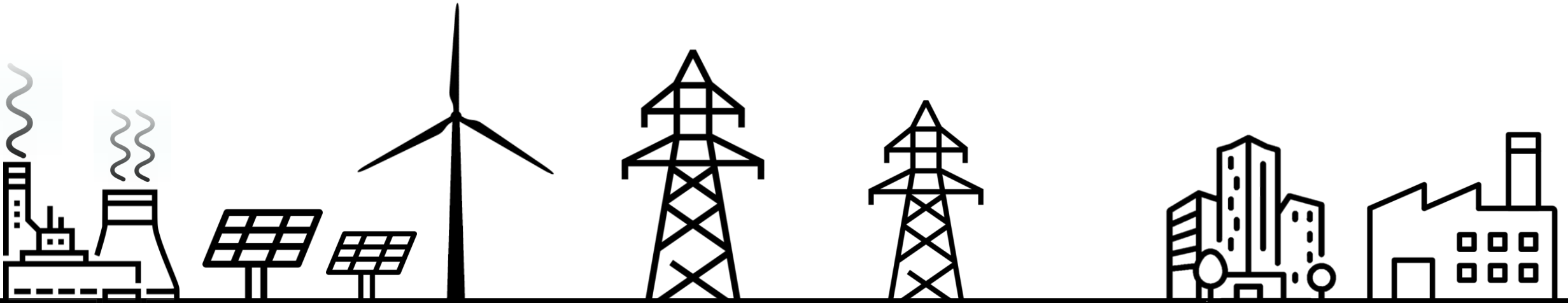
White label platform

In essence, smart charging means

Increasing or decreasing
the maximum charge rate
of an EV.



Power Grid

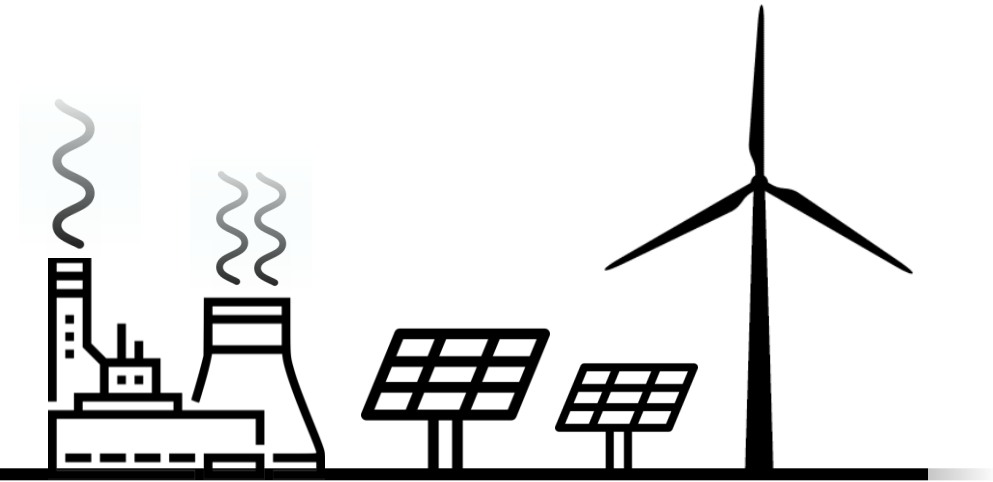


Generation

Transmission & Distribution

Consumption

Power Grid



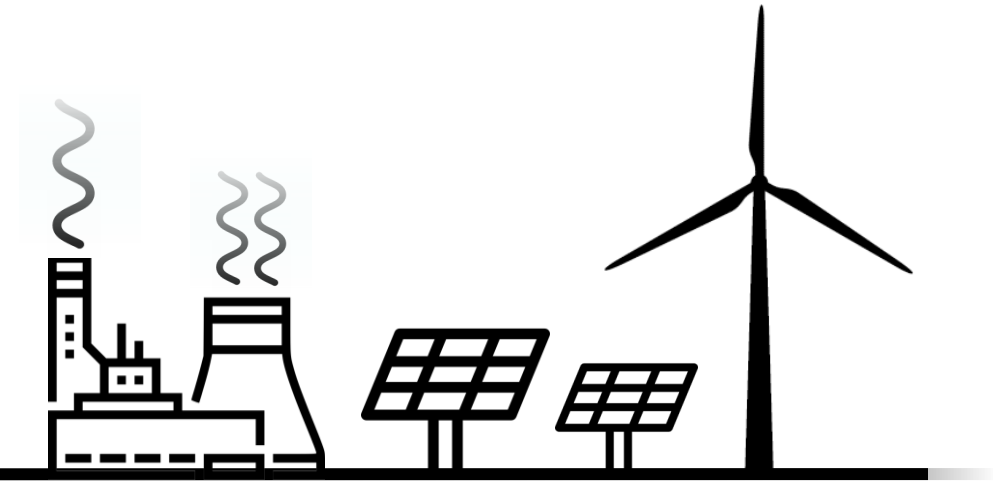
Generation

Must be equal



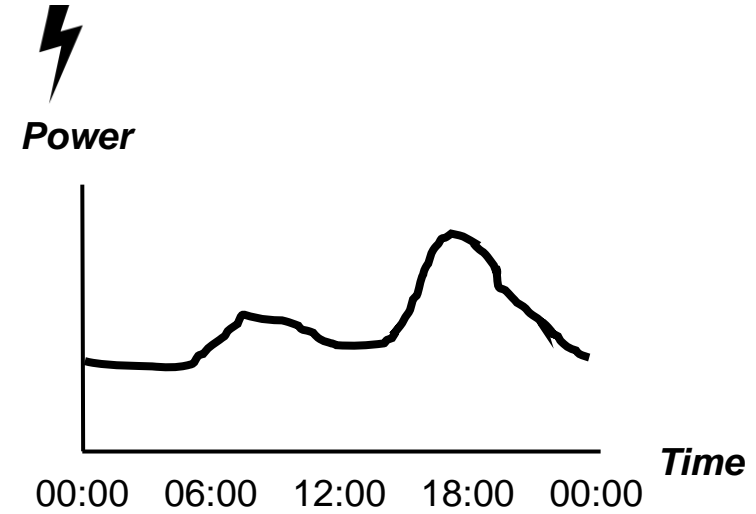
Consumption

Power Grid

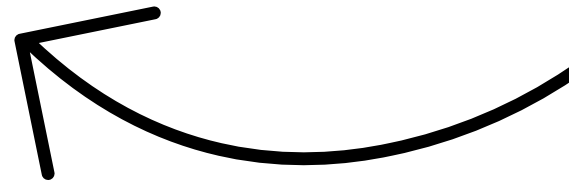


Generation

Must be equal



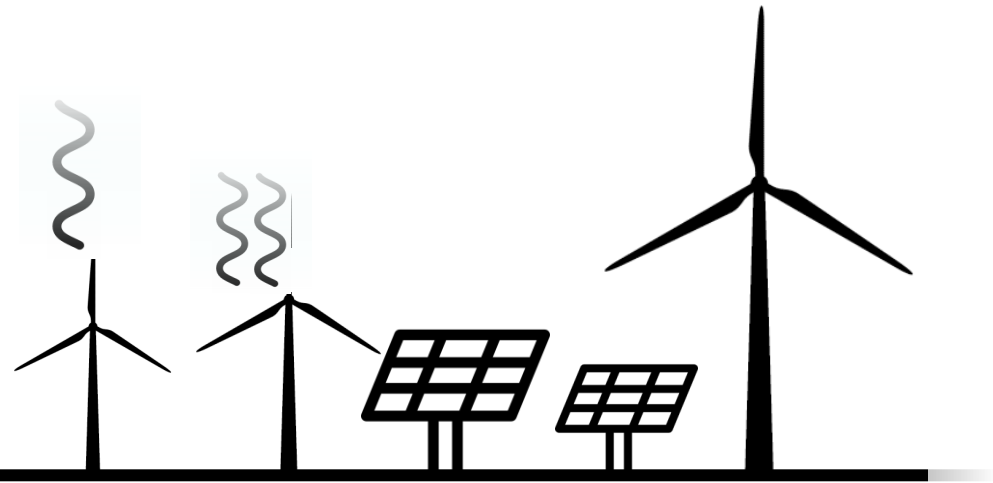
Consumption



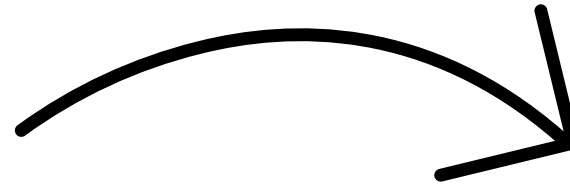
Up to now:
Generation is **directed by consumption**

Power Grid

Demand side response:
Consumption is **directed by generation**



Generation

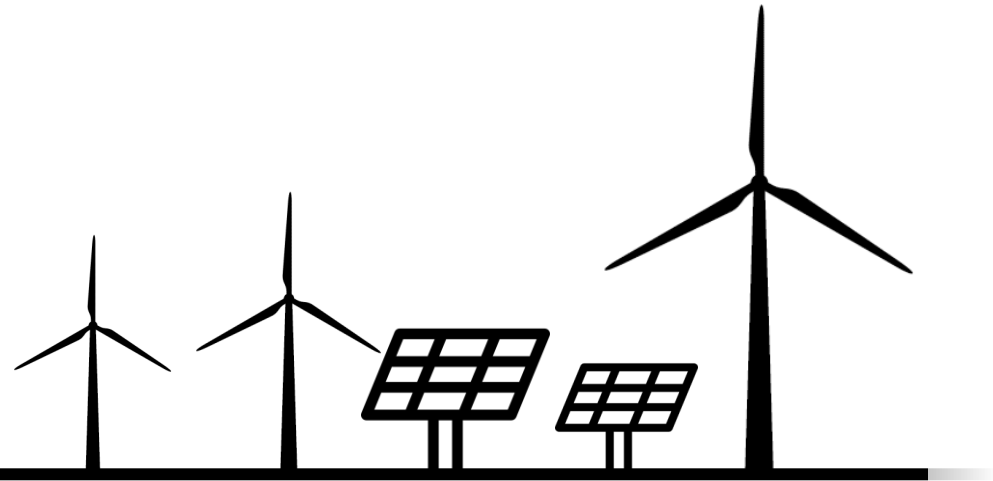


Must be equal



Consumption

Power Grid



Generation



Energy Markets:

- Forward and futures
- Day-ahead
- Intraday



Consumption

Power

Some perspective...

STRAVA



Dashboard ▾

Training ▾

Explore ▾

Challenges



Overview

Analysis

ooo

Martijn Verbeek – Ride



Give kudos

👍 32

💬 5



09:33 on Sunday, 21 May 2023 · Innenstadt, Germany

Rundum Köln

71.01 km

Distance

1:53:27

Moving Time

703 m

Elevation

266 W

Weighted Avg Power

1,577 kJ

Total Work



+38

Speed

Avg
37.6 km/h

Max
74.5 km/h

Heart Rate

143 bpm

172 bpm

Cadence

91

237

Power

232 W

726 W

Calories

1,580

Temperature

15 °C

Elapsed Time

1:58:21

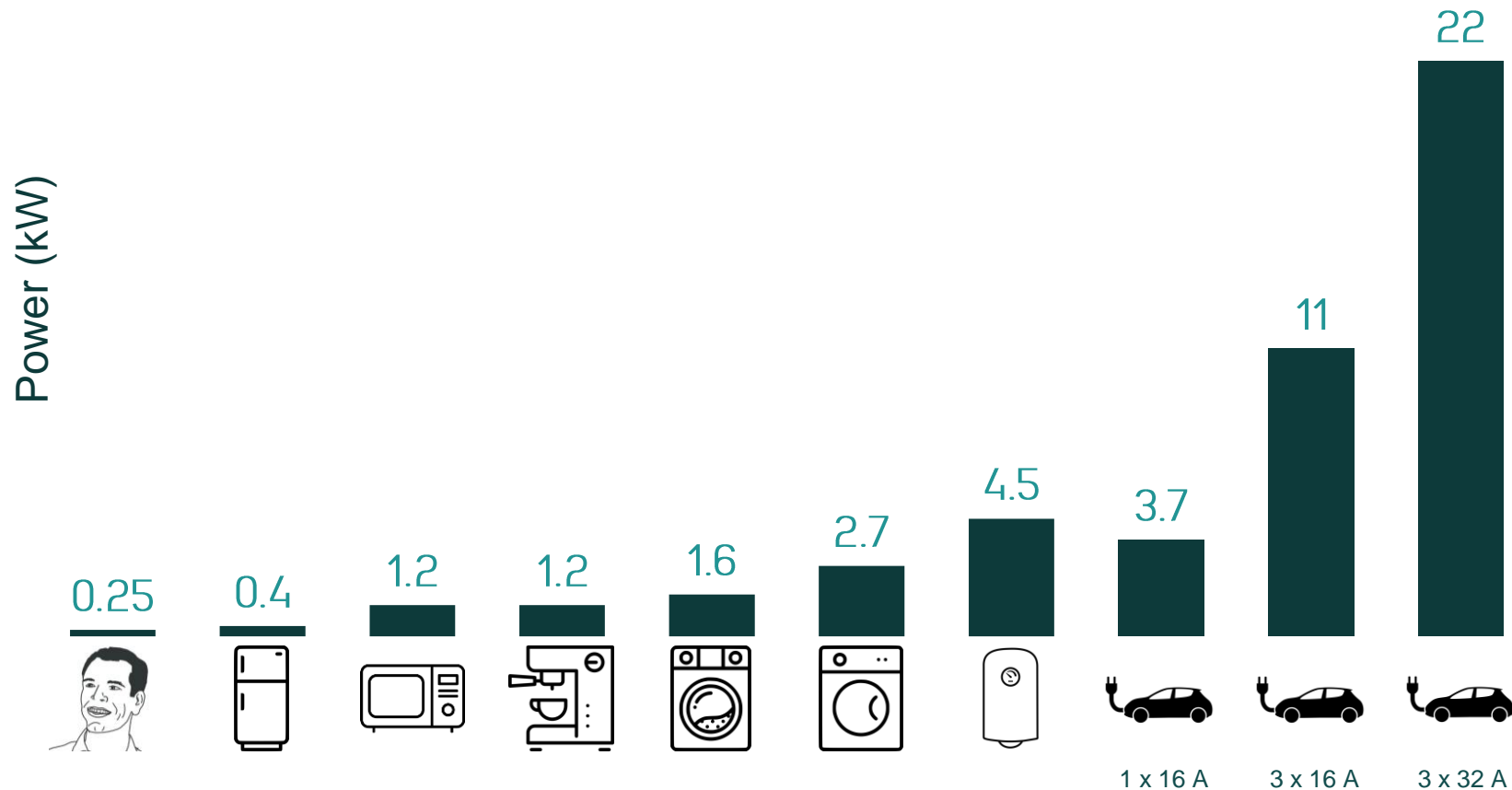
Show Less

Garmin Edge 1000

Bike: S-Works Tarmac SL6

Power

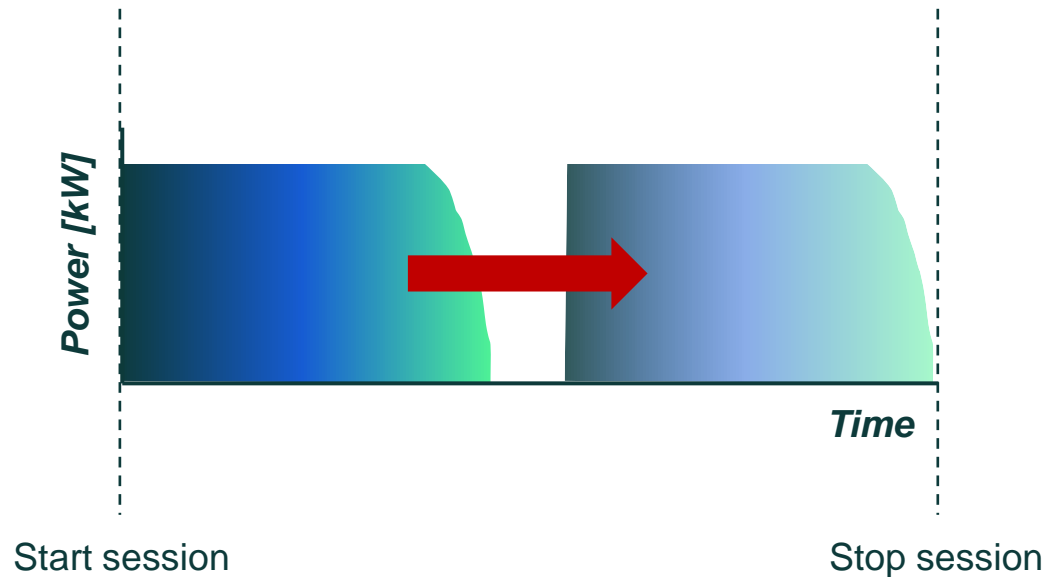
Some perspective...



A typical EV can take more power than multiple household appliances combined!

Or ~45 CEOs (11 kW)

Flexibility



Definition

“The capability of shifting energy consumption in time, within the boundaries of end-user comfort requirements, without changing its total energy consumption.”

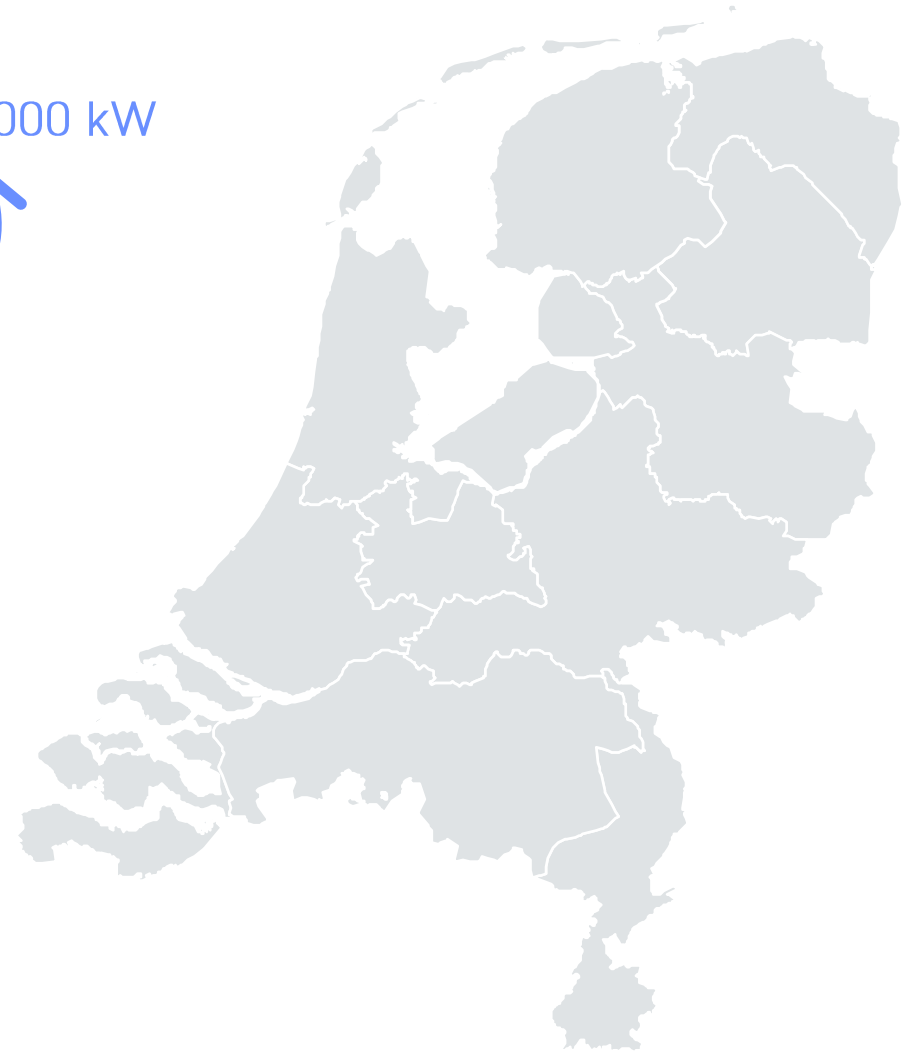
Power

Some more perspective...

Total installed capacity NL (2020):

42.2 GW

42 200 000 kW























10 Million























x 11 kW

Total potential 100 GW of flexible power!!

Flexibility

	Cost	Impact	Availability
			
			
			
			
			

Flexibility

	Cost	Impact	Availability
			
			
			
			
			

Electric Vehicles are a Key Enabler to a Renewable Future

JFK

Almost got it right!

Ask not what your country can do for you –
ask what you can do for your country.

John F. Kennedy



JFK

Almost got it right!

the grid your EV
Ask not what ~~your country~~ can do for ~~you~~ –
ask what ~~you~~ can do for ~~your country~~.
your EV the grid

~~John F. Kennedy~~

Bob Elders



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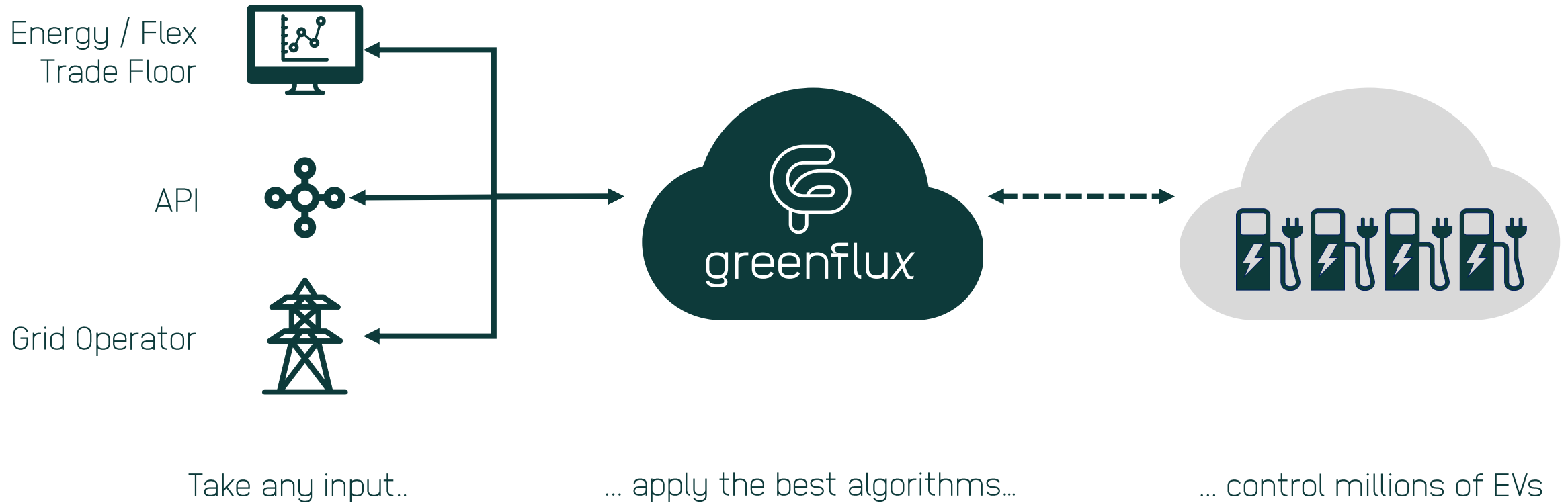
If only we had the technology...



How we implement it



How we implement it



We already apply this!

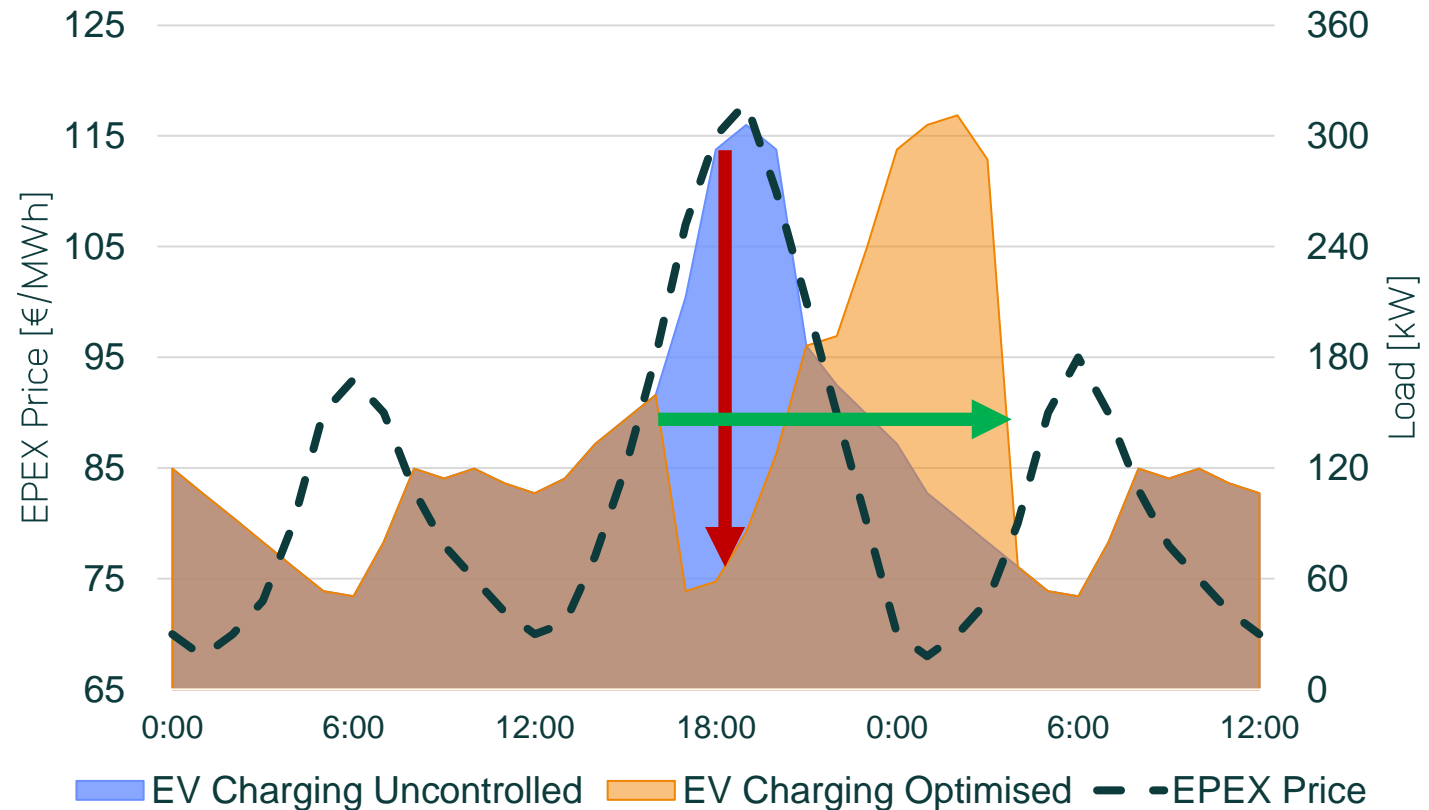
EPEX Price Steering Optimisation

Goal:

Minimize Energy Procurement Costs

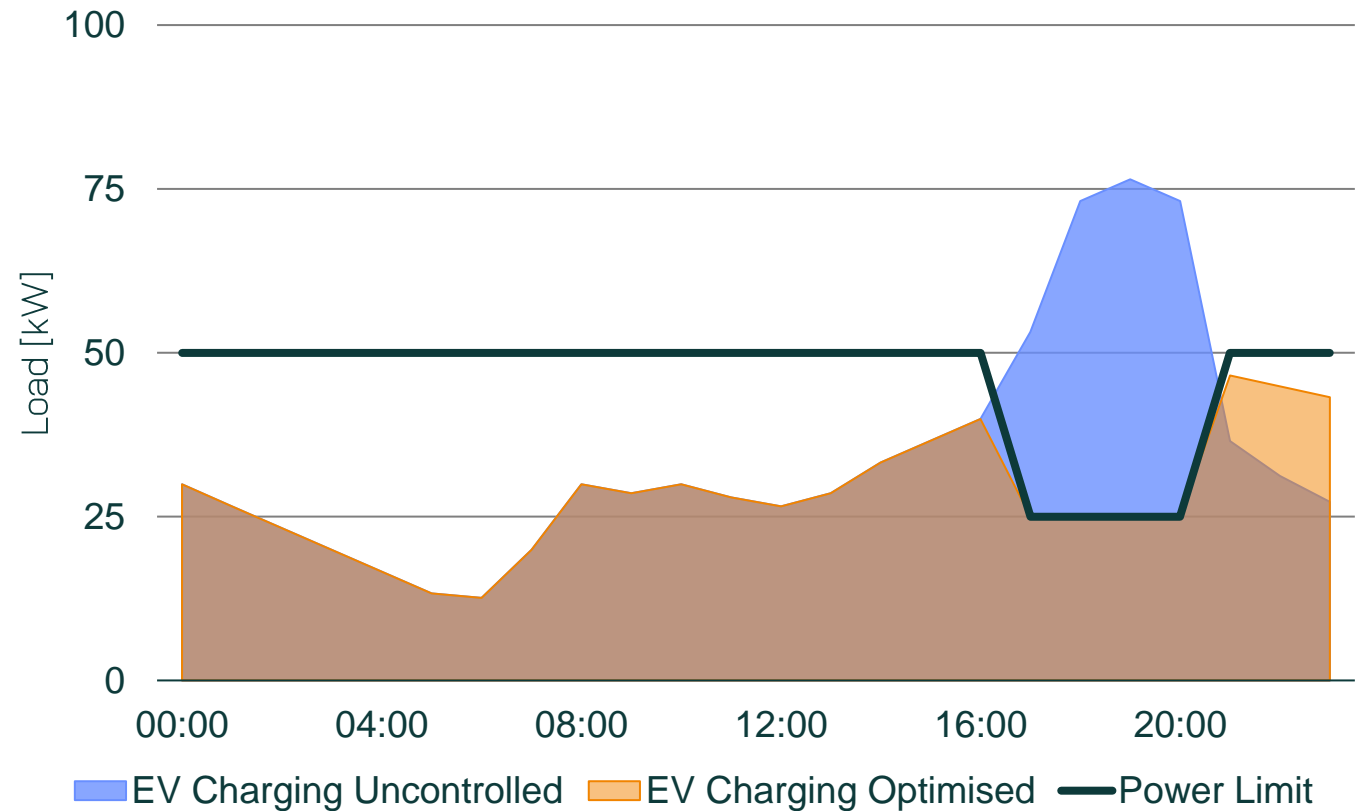
Two degrees of flexibility:

- Load reduction
- Time shift



What about Grid Congestion?

MV Transformer Load Reduction



Summary

Balance is crucial in a Power Grid

EVs offer the flexibility we need

Stabilise the grid by optimising for price

We already apply this in the field





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