

Europe's future city-transition: CleanMobilEnergy



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Resourcefully
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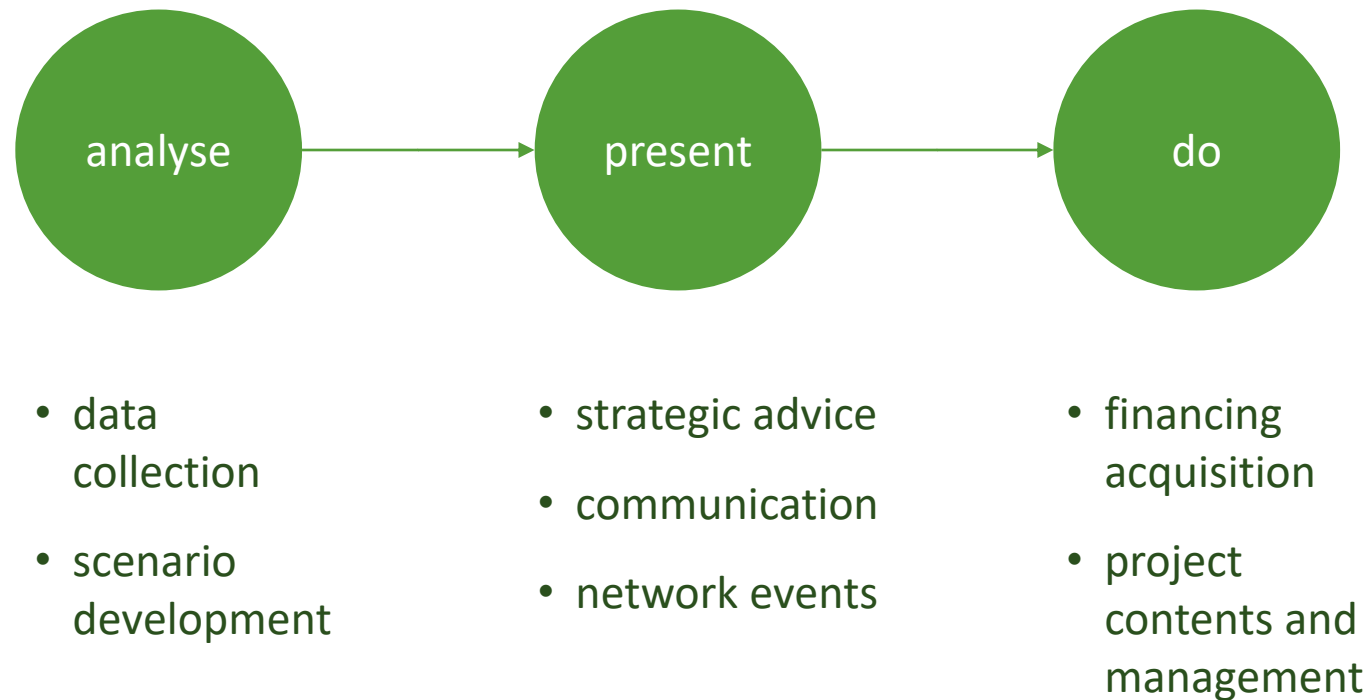
Over Resourcefully



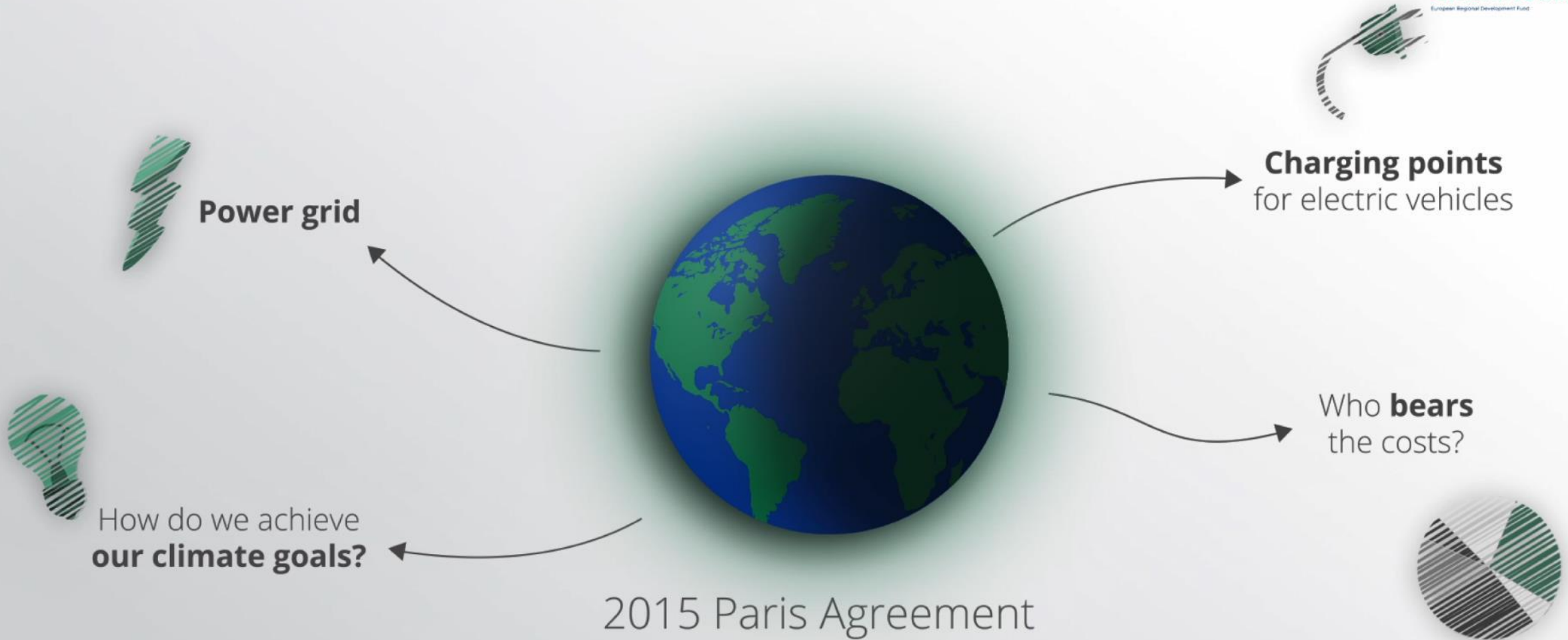
We are an urban energy transition consultancy based in Amsterdam.

Our mission is to accelerate Europe's sustainable energy transition.

We focus on optimal integration of local renewable energy and electric mobility in cities.



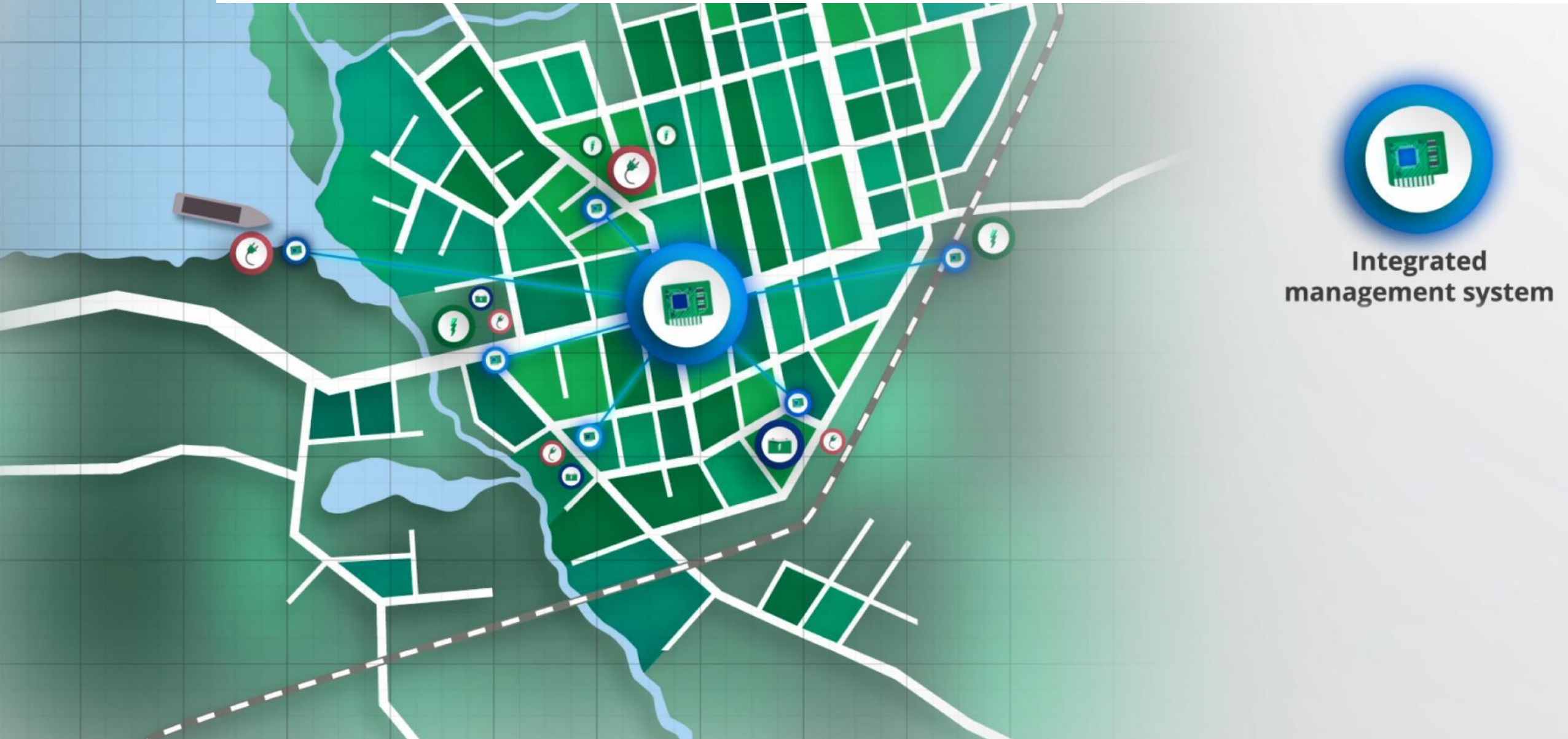
Paris agreements require change



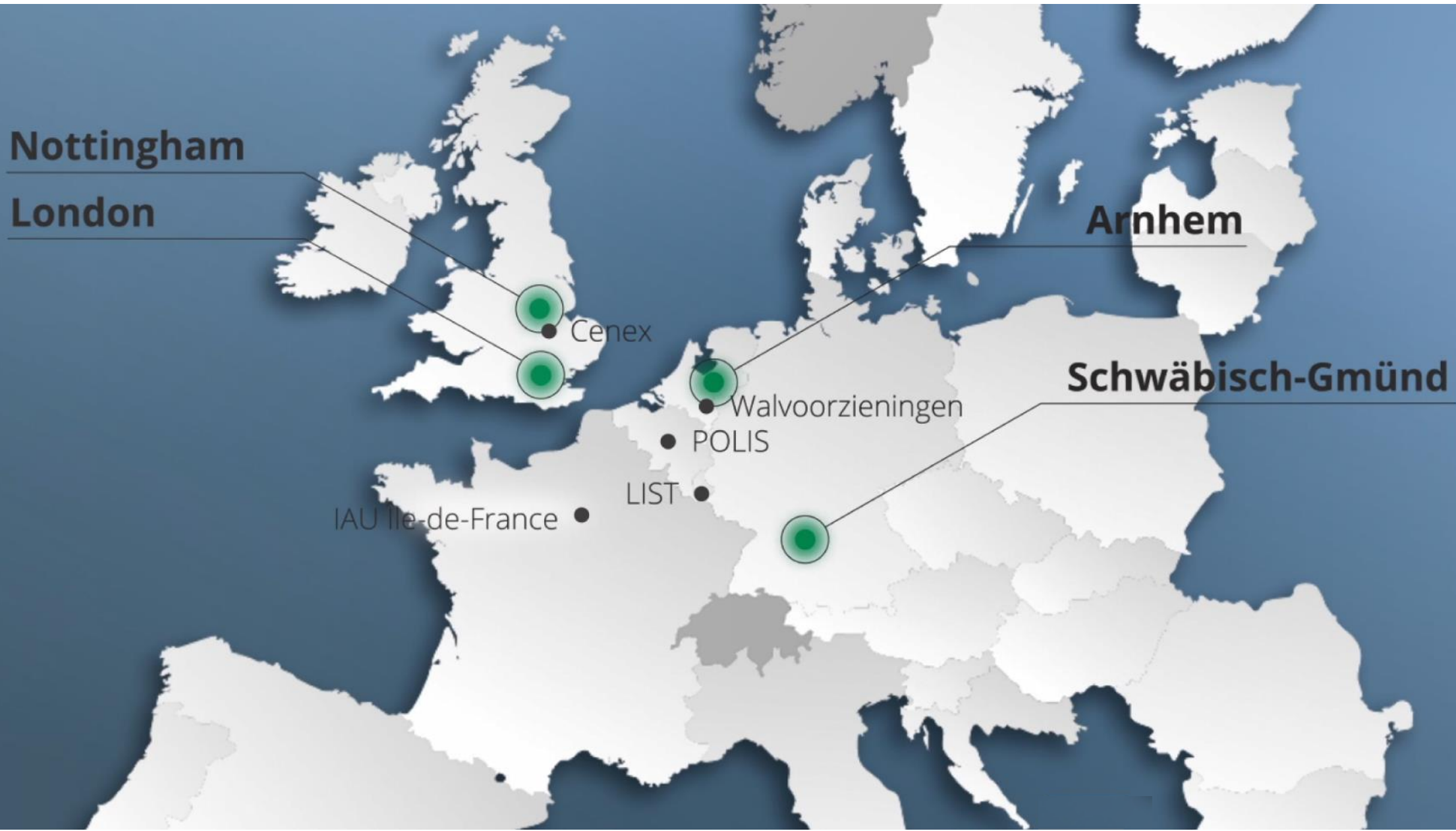
Cities want clean energy and mobility



Forecasting, monitoring and interventions ensure minimal CO₂ emissions & maximal energy independence



4 EU-Cities develop the transition system



4 different city applications, one system



Arnhem

Solar and battery, Car charging,
Cold ironing

Technical partners:
ProfiNRG, Allego



Nottingham

Solar and battery, Car and
bike charging, Building,

Technical partners:
BP Chargemaster, D2N2



London

Solar and battery, Car charging
Transport for London

Technical partners:
RE:FIT, Transport for London



Schwäbisch-Gmünd

Solar and battery,
Car charging

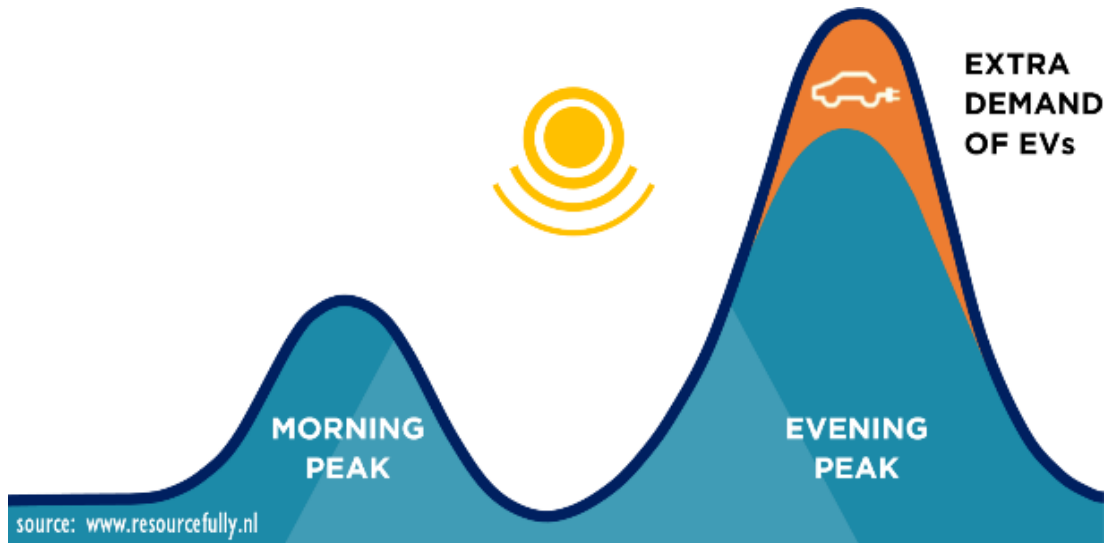
Technical partners:
e-mobil BW, Unicorn Energy

All 4 cities strive towards:

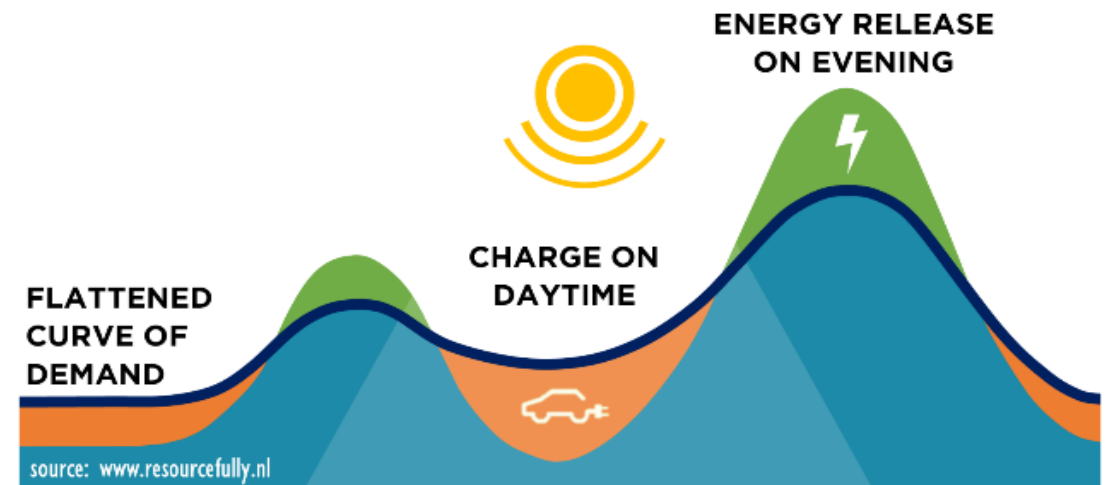
1) more solar energy 2) more e-mobility 3) more electric heating

ALL need smart management to avoid excessive costs

Future EV scenario



Smart scenario



Integrated system requires real-time data access to all components

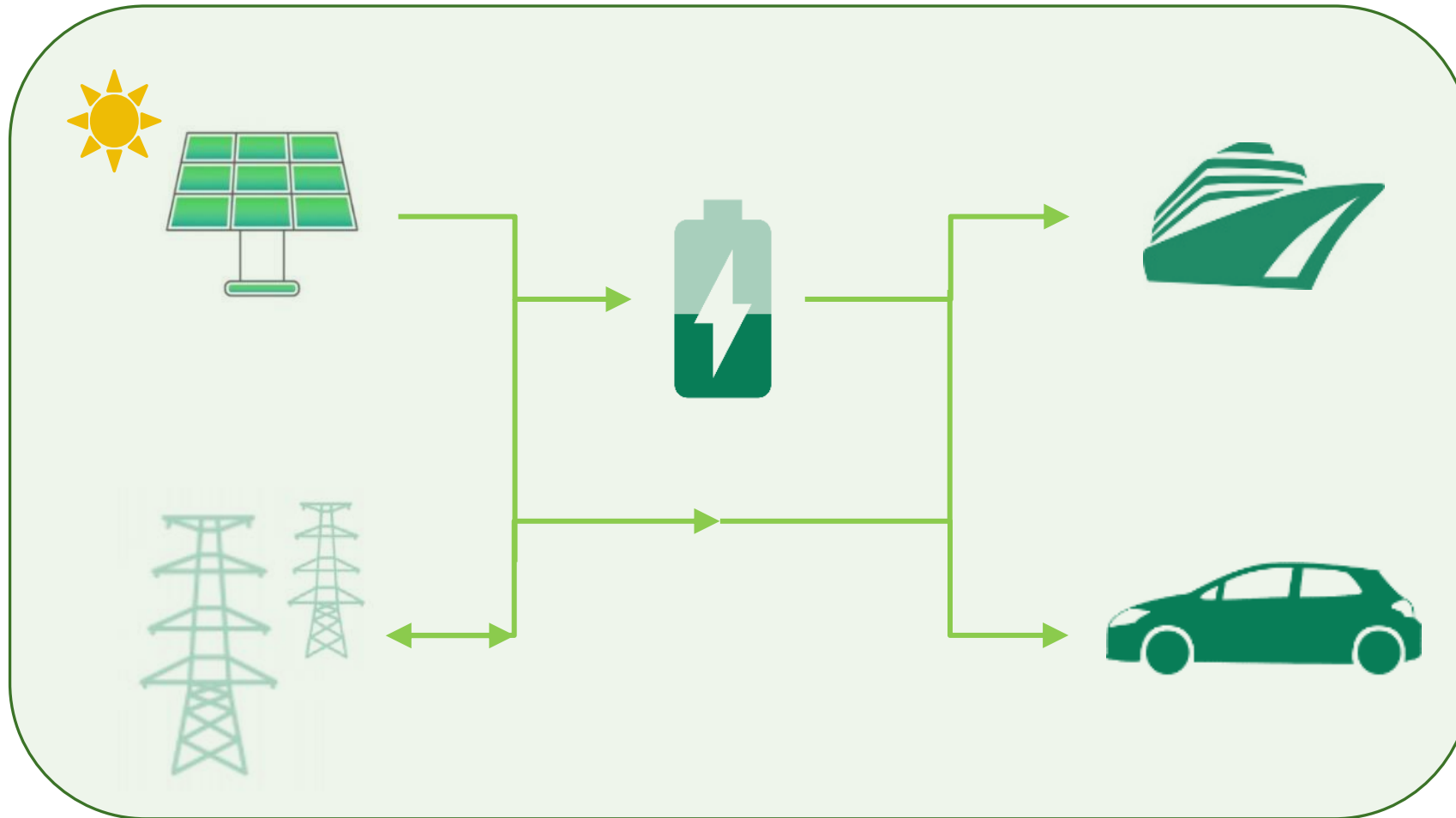


System components in Arnhem

Storage: 0.5MWh battery

Solar PV:
10MW
installation

**Grid
connection**



**Harbour energy
demand:**
Maintenance dock

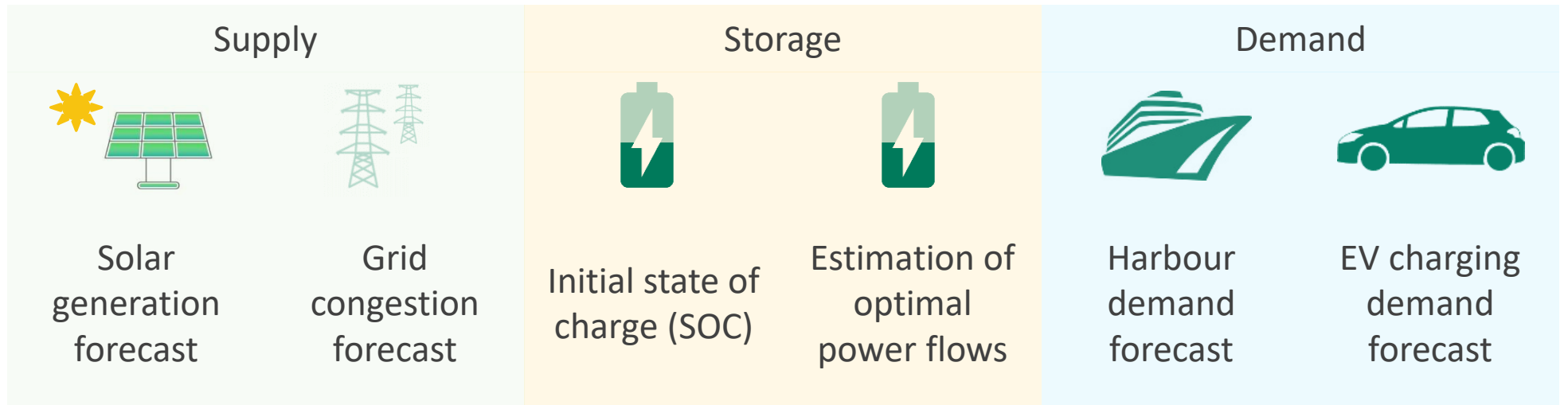
EVs: Allego public
charging points



System functionality overview - 1

- The EMS actions are categorised as Forecasting, Monitoring or Intervention
 - **Forecast** data enables the EMS to estimate the optimal power flow and use the storage to prepare for upcoming spikes in supply or demand

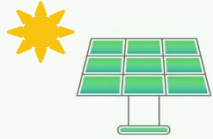





Forecasting



System functionality overview - 2

- The EMS actions are categorised as Forecasting, Monitoring or Intervention
 - Monitoring** ensures the EMS collects data to keep track of what is happening and adjust the storage power flows to ensure optimal distribution of energy and efficient usage of battery

Monitoring

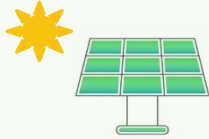




Supply		Storage		Demand	
					
Real-time solar generation	Grid flows	State of charge (SOC%)	Adjust battery charging / discharging	Harbour consumption	EV charging consumption



System functionality overview - 3

- The EMS actions are categorised as Forecasting, Monitoring or Intervention
 - Intervention** is triggered in situations when there is a mismatch in forecasted and actual monitored supply/demand or when grid power quality is at risk (see next slide for decision points)

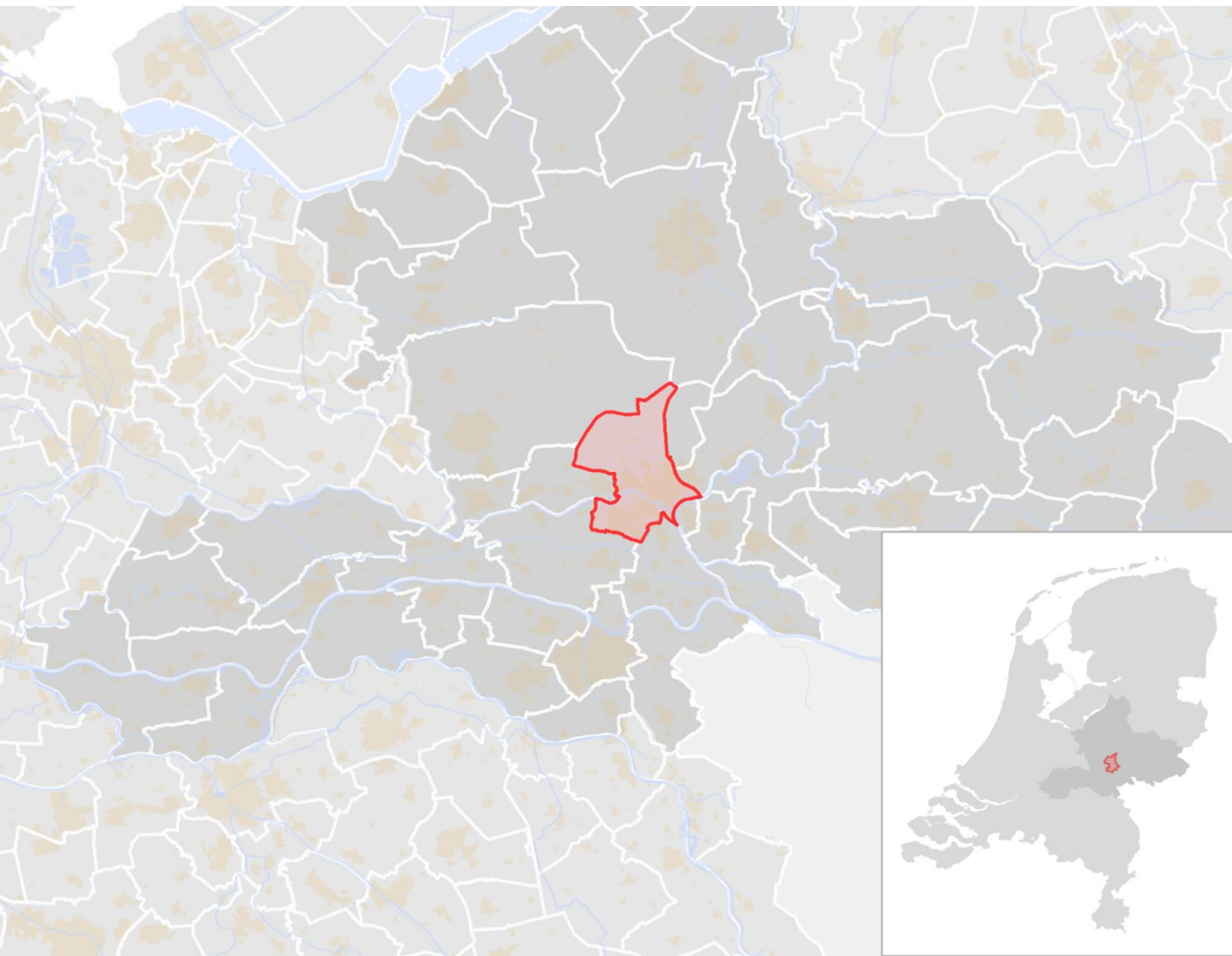
Potential Interventions

Supply	Storage		Demand	
				
Reduce output (Curtailment) if grid at risk	Deeper discharge	Full charging	Shift cold ironing demand	Shift EV charging demand



Charging sessions dataset from Arnhem

14



Arnhem



153.864 inhabitants



160 public charging points

Dataset



122.740 charging sessions

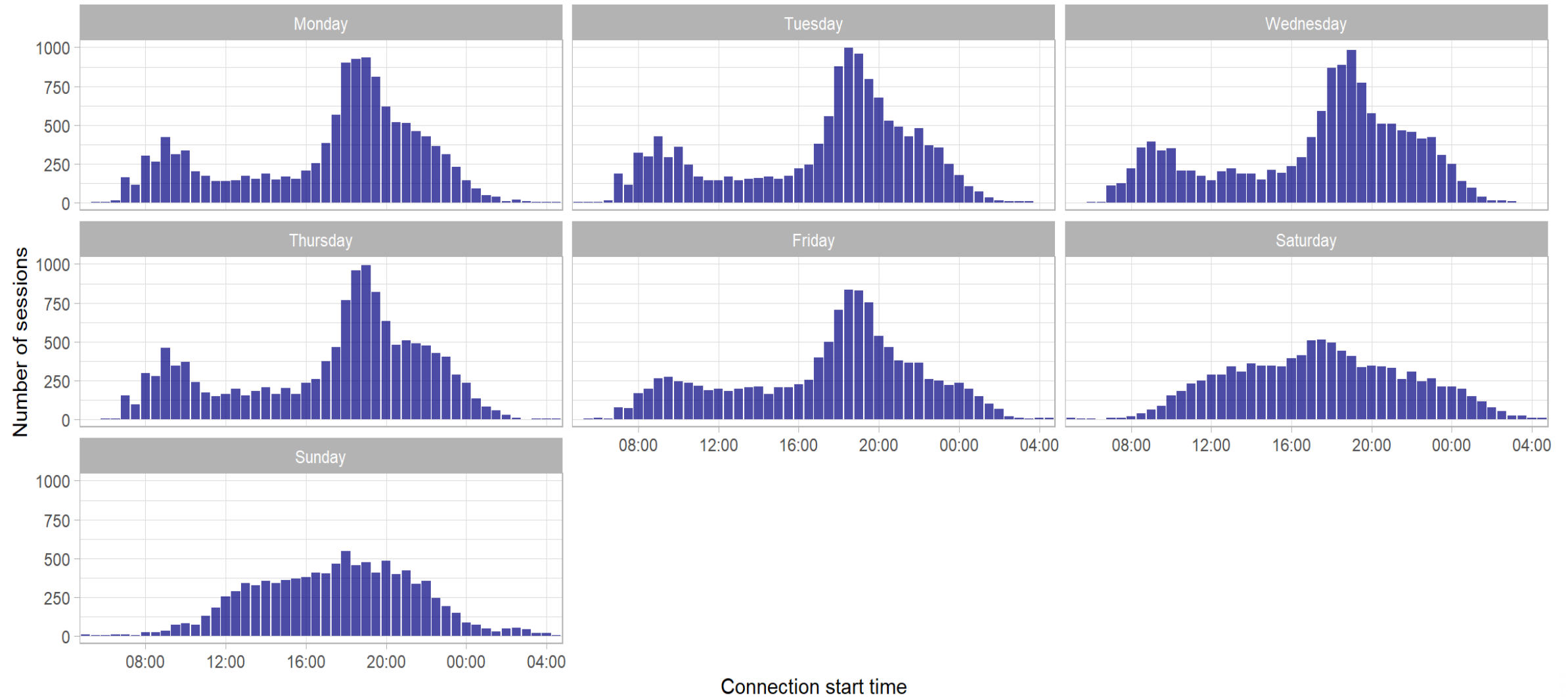


From 2016 to 2019



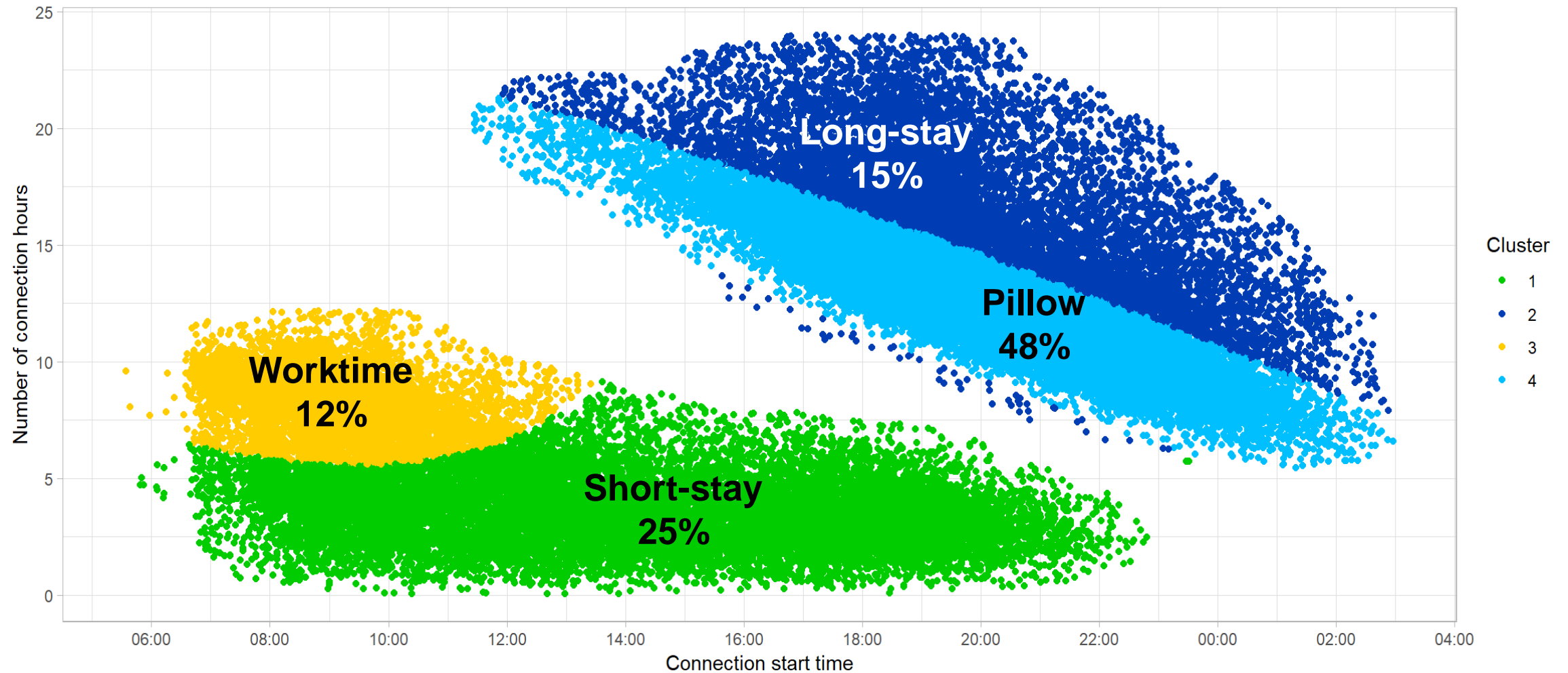
Charging profiles definition

15

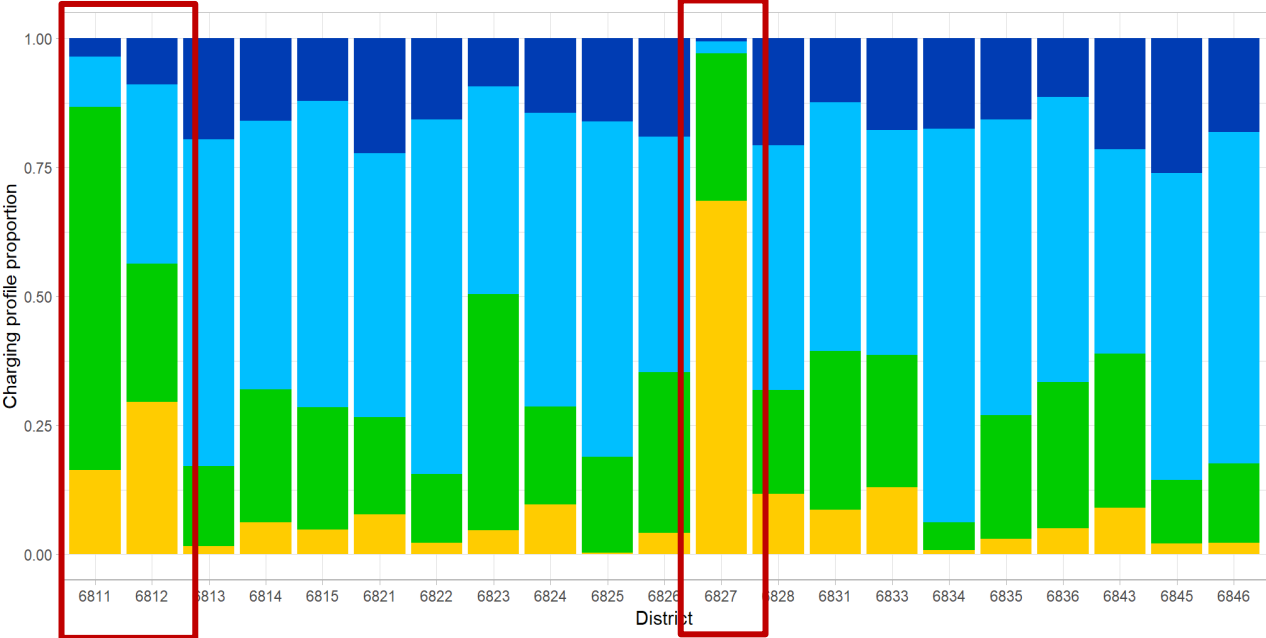


Clustering process

16



Neighbourhood type

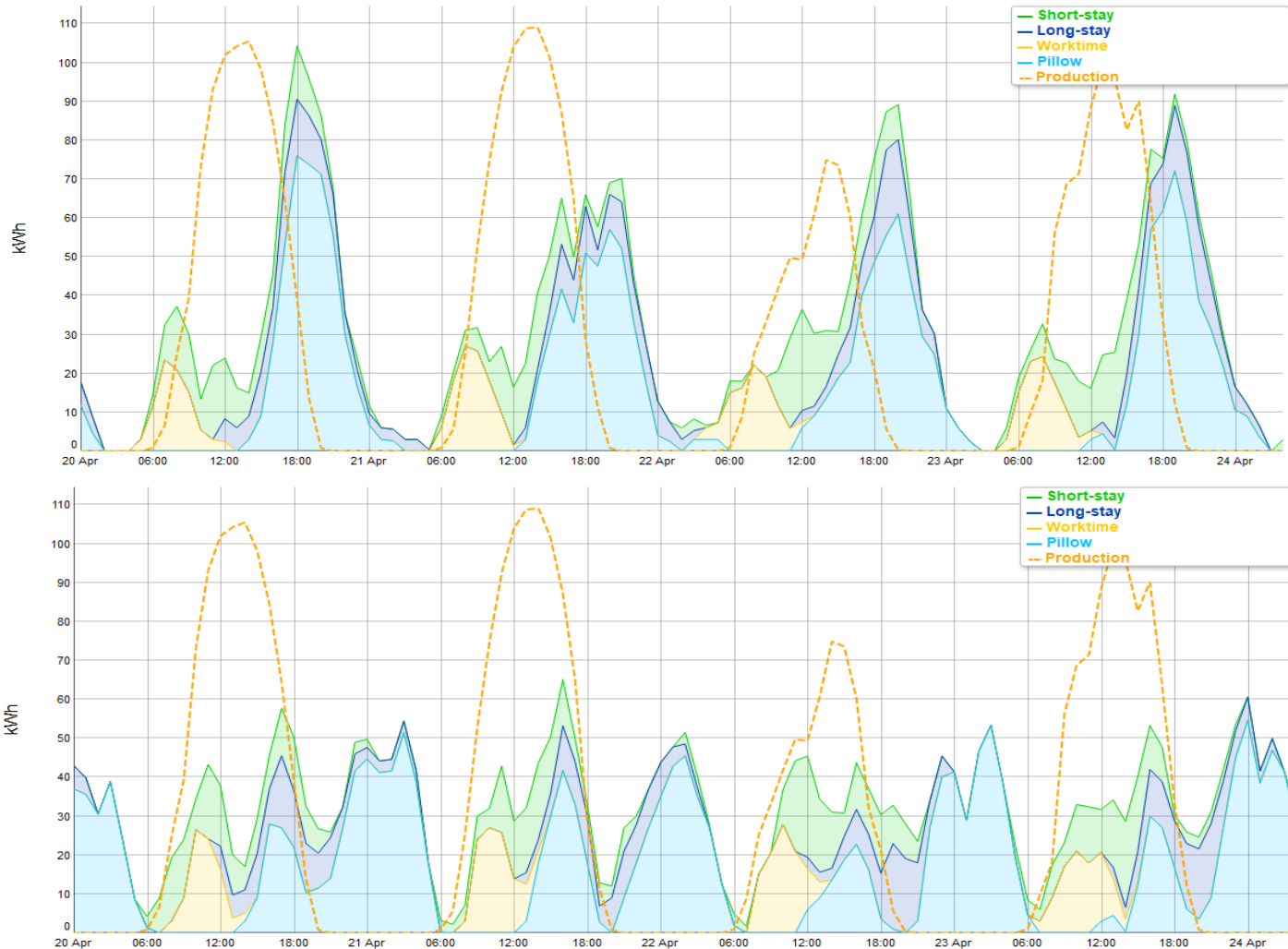


City Center
(Districts 6811,
6812)

Industrial area
(District 6827)



Smart charging simulation



?

Demand peak
- **36 kW (31%)**

?

Local consumption
+ **6,26 MWh (7,51%)**

?

CO2 emissions
- **3500kg**



Conclusions CleanMobilEnergy

CleanMobilEnergy demonstrates that reducing carbon emissions in cities **requires combining** renewable energy generation, storage, flexible charging of EV's, heat pump and building usage through an **integrated Energy Management System**.

Critical themes :

1. Interoperability
2. Scalability
3. Integrating monitoring and control of multiple devices

Open data is crucial in achieving all of the above themes.



Thank you

For more information regarding the CleanMobilEnergy project, please contact:

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