

# CleanMobilEnergy

## Using renewable energy for charging



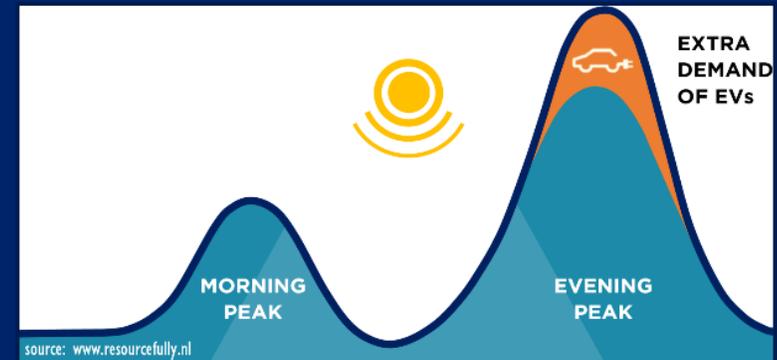
December 2020

# Project objective

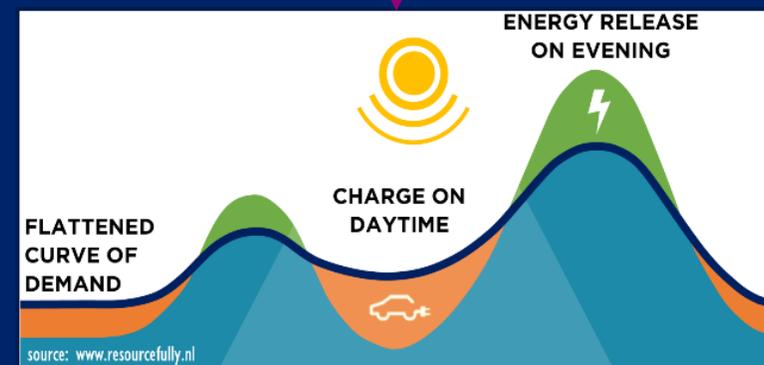
CleanMobilEnergy aims to reduce greenhouse gas emissions in cities by combining renewable energy sources energy storage and the charging of EV's using a innovative energy management system (iEMS).

Critical themes for the iEMS are:

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



City-level Optimisation



# CleanMobilEnergy Main Components

CleanMobilEnergy main challenge is the transnational development of an interoperable energy management system, iEMS for all cities:



- PV generation
- EV-fleet smart-charging
- Stationary storage
- Multiple flexible and non-flex city-consumption patterns
- Vehicle 2 Grid-solutions
- Near City Wind-energy generation
- Etc. etc.

# City pilots

Arnhem

The City Pilots in CleanMobilEnergy will act as launching pads - test-beds for implementation and improvement of the system in diverse environments:

Nottingham

Schwäbisch Gmünd

- user groups
- **city-situation governance**
- supply/demand profiles
- regulatory systems
- energy markets

# Governance in Arnhem

producers and consumers connected through the grid

## EV charging Arnhem



## Harbour (Cold ironing)



Solar farm  
(10MW)

Storage  
0.5 MWh

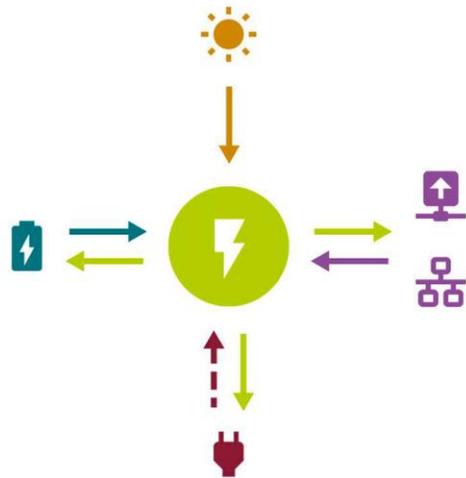


# Energy management

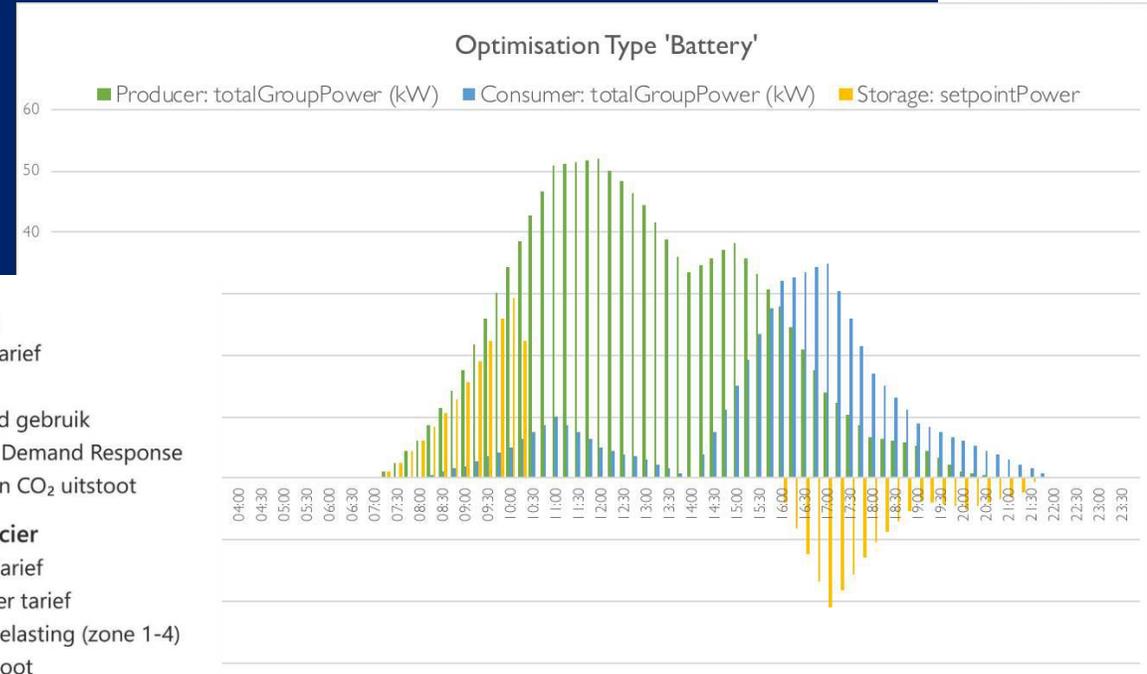
**Optimalisatie (€ / CO<sub>2</sub>)**  
Prijs of CO<sub>2</sub> optimalisatie  
'Eiland' of 'Netwerk' modus  
Emergency Demand Response

**Opwekking**  
Geïnstalleerd vermogen  
Locatie efficiëntie  
Opwekking  
Voorspelde opwekking

**Opslag**  
Opslag vermogen  
Genivelleerde opslagkosten (LCOS)  
Laad of ontlad vermogen



- Gebruik**
  - Energie tarief
  - Gebruik
  - Voorspeld gebruik
  - Prioriteit Demand Response
  - Vermeden CO<sub>2</sub> uitstoot
- Leverancier**
  - Energie tarief
  - Teruglever tarief
  - Energiebelasting (zone 1-4)
  - CO<sub>2</sub> uitstoot
  - Maximale piekvraag
- Netwerk**
  - Netbeheerkosten
  - Aansluitkosten



# Energy management

A screenshot of a web application interface for energy management. The browser address bar shows the URL: iems.openremote.io/main/?realm=arnhem#assets/7izzQQuPtEMbnvV2WoAmi2. The application has a dark blue header with the 'Arnhem' logo and navigation links for 'Kaart', 'Assets', 'Regels', and 'Inzicht'. A left sidebar lists various asset categories, with 'Storage' selected. The main content area displays details for a specific storage asset:

- INFO**: Manufacturer: SuperB, Model: 500 kWh Li-FePO4, User notes.
- LOCATIE**: A map showing the asset's location near N325 and Pleinweg.
- ATTRIBUTEN**: Carbon wallet (kg), Charge cycle, Charge state, Charged capacity (kWh).
- GESCHIEDENIS**: A dropdown menu for 'Attribuut' set to 'Charge cycle' and a dropdown for 'Tijdvak' set to 'Week'.

The Windows taskbar at the bottom shows the time as 9:39 on 4-9-2020.

# Governance

- Two cases: behind the meter or through the grid
- Behind the meter: interventions are possible
- Through the grid: only suggestions are possible
- City Pilot Arnhem: multiple stake holders, grid who is in “charge”?
- Public authority is no longer willing to intervene, only facilitates..
- So who is next?

# Thank you – any Questions?

For more information, visit:

<http://www.nweurope.eu/cleanmobilenergy>

Or contact Peter Swart at

[Peter.swart@arnhem.nl](mailto:Peter.swart@arnhem.nl)

# System functionalities in Arnhem City Pilot

## ➤ Forecasting

- **Solar generation** forecast based on the upcoming weather condition and PV capacity,
- **Demand** forecast in the harbor and EV charging points
- **Energy flow** and amount for **storage** forecast, amount going to/from the grid

