GEMEENTE Arnhem

Interreg North-West Europe CleanMobilEnergy
European Regional Development Fund

CleanMobilEnergy Project

DECEMBER 2021

Interreg North-West Europe CleanMobilEnergy
European Regional Development Fund

Partners

Lead Partner

Gemeente Arnhem

Sub Partner

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Project Partners

Nottingham City Council

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L'INSTITUT PARIS REGION

POLIS
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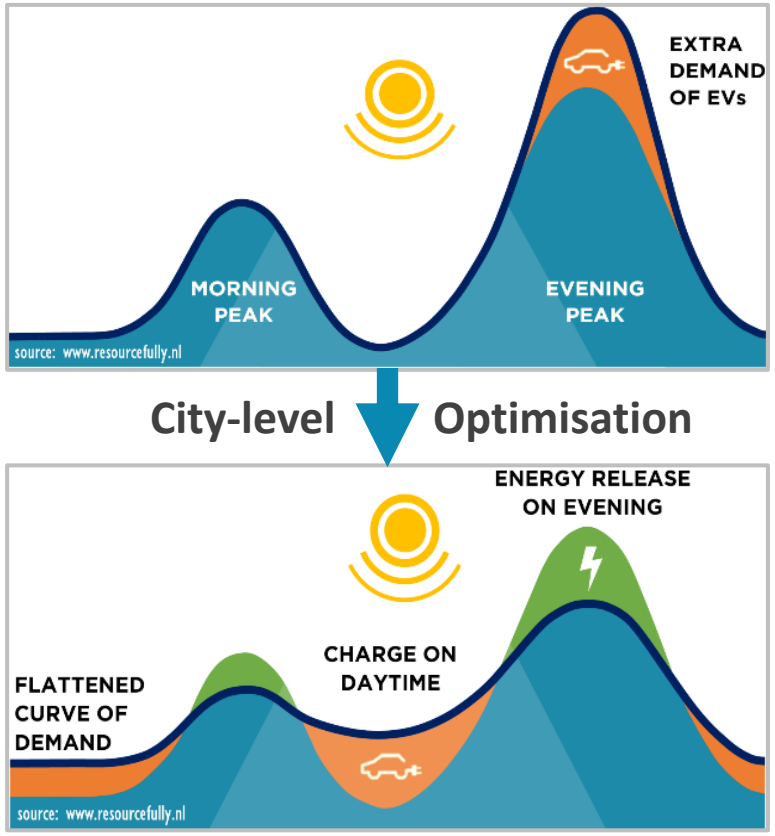
cenex nederland

Project objective

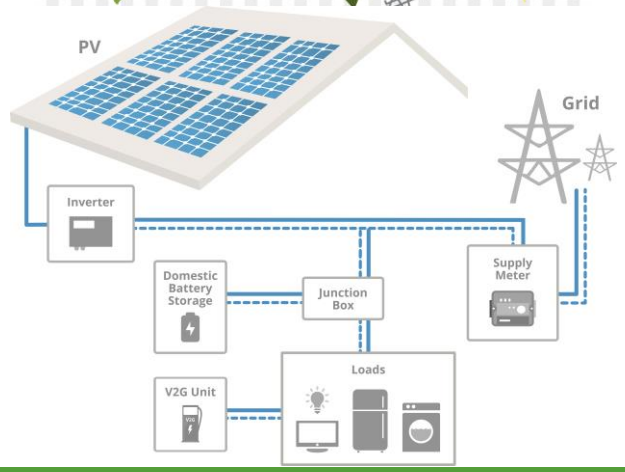
CleanMobilEnergy aims to reduce greenhouse gas emissions in cities by combining renewable energy sources energy storage and the charging of EV's using a innovative energy management system (iEMS).

Critical themes for the iEMS are:

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



CleanMobilEnergy Main Goals



To better balance energy demand (EVs) and RES supply, using EV's and innovative local solutions for temporary storage of RES.

This way:

1) *CO2-emissions will be minimised,*
2) *the threat of an expanding EV-fleet is turned into an opportunity (temporary storage and large consumption),*
3) *expensive grid reinforcements are avoided,*
4) *Combined business case for RES and EV-charging become profitable, encouraging future roll-out.*
5) Collect and store data that can be used for evidence and business transactions (accounting). Validated (trustworthy), reliable source of data.
6) Share and visualise the data to influence energy consumption behaviours.
7) Data to enable/improve forecasting of consumption/generation at local level.
8) Develop+test a communication protocol to allow diverse components to be connected to an EMS.
9) Support future procurements by identifying essential requirements for a CME system.

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City pilots

Arnhem

Nottingham

Stuttgart

Schwäbisch Gmünd

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

- user groups
- city-situations
- supply/demand profiles
- regulatory systems
- energy markets

Pilot example – Arnhem

EV charging Arnhem

Harbour (Cold ironing)

ENERGIEMANAGEMENT-SYSTEEM (EMS)

Solar farm (14MW)

Storage 0.5MWh

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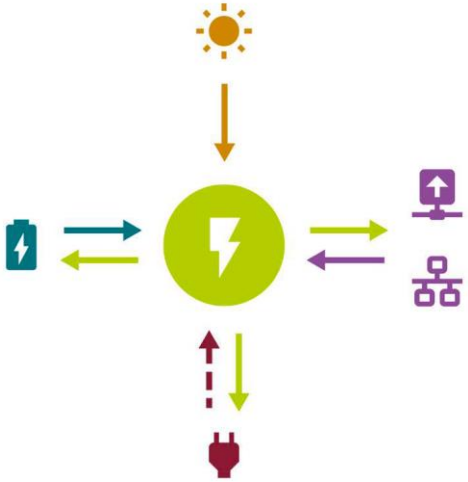
Interoperable Energy Management System

BACKBONE OF THE CME PROJECT AND OF DECENTRALIZED ENERGY PRODUCTION AND CONSUMPTION

Optimalisatie (€ / CO_2)
Prijs of CO_2 optimalisatie
'Eiland' of 'Netwerk' modus
Emergency Demand Response

Opwekking
Geïnstalleerd vermogen
Locatie efficiëntie
Opwekking
Voorspelde opwekking

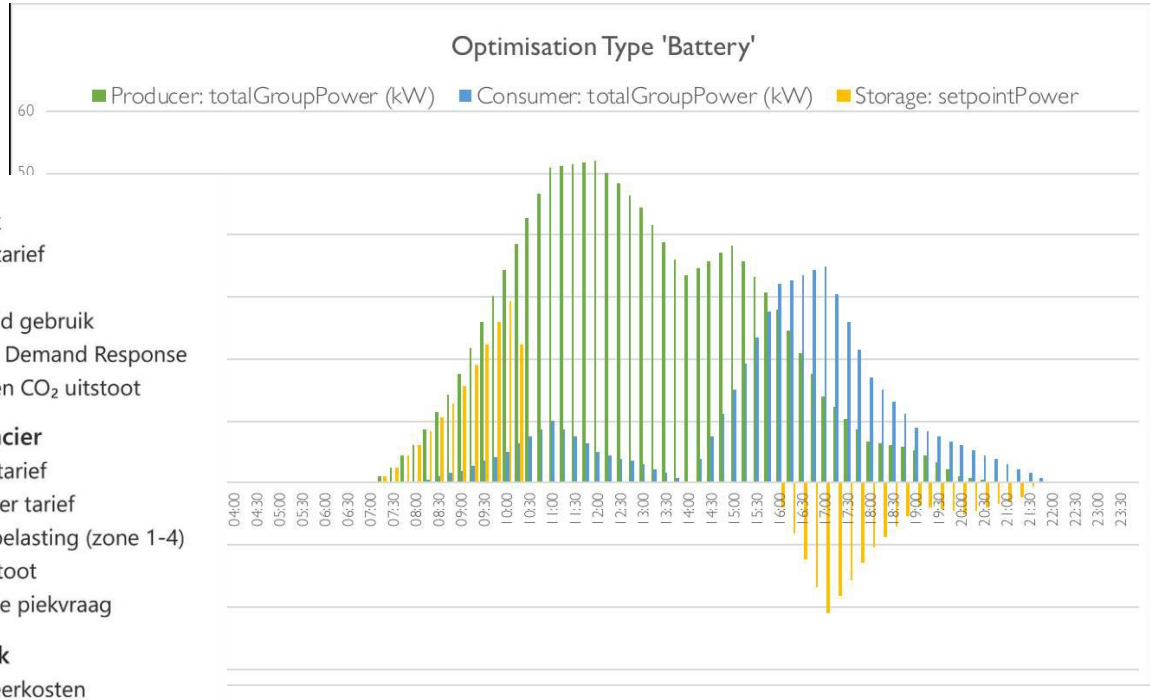
Opslag
Opslag vermogen
Genivelleerde opslagkosten (LCOS)
Laad of ontlaad vermogen



Gebruik
Energie tarief
Gebruik
Voorspeld gebruik
Prioriteit Demand Response
Vermeden CO_2 uitstoot

Leverancier
Energie tarief
Teruglever tarief
Energiebelasting (zone 1-4)
CO_2 uitstoot
Maximale piekvraag

Netwerk
Netbeheerkosten
Aansluitkosten



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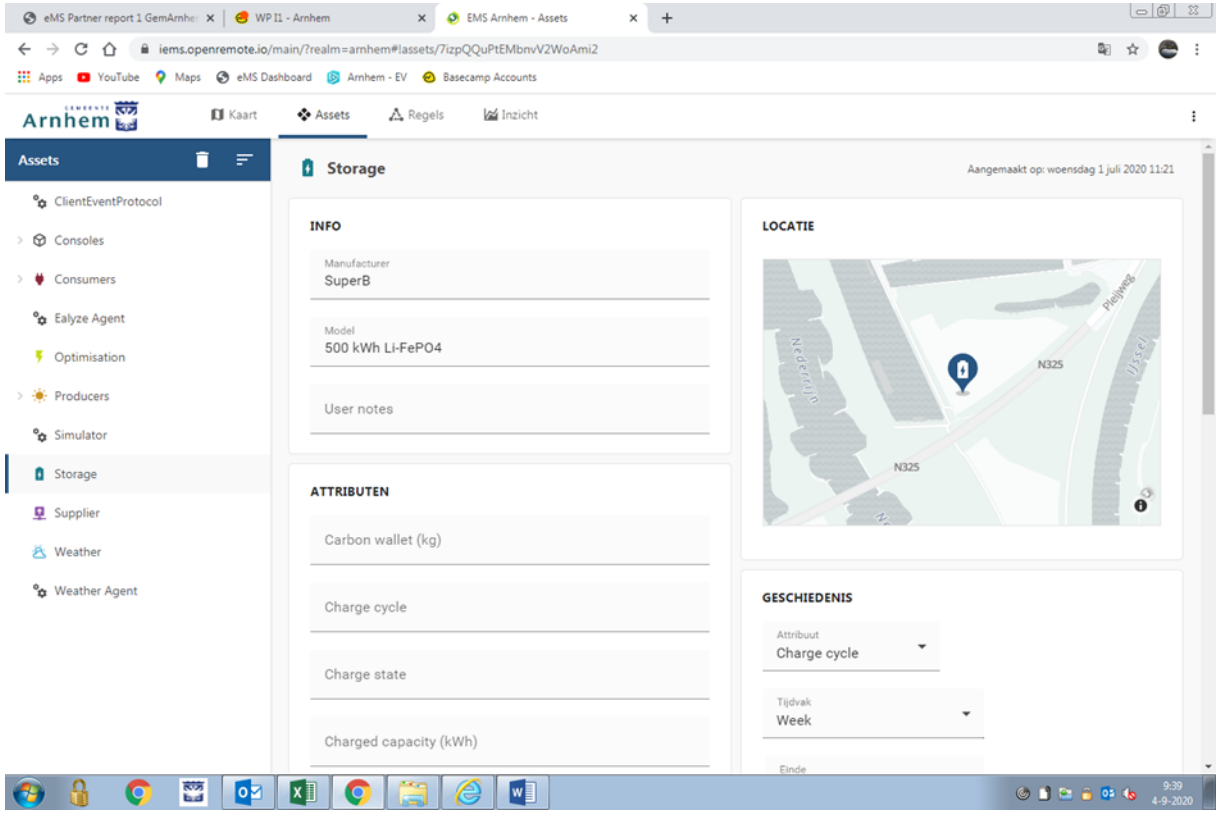
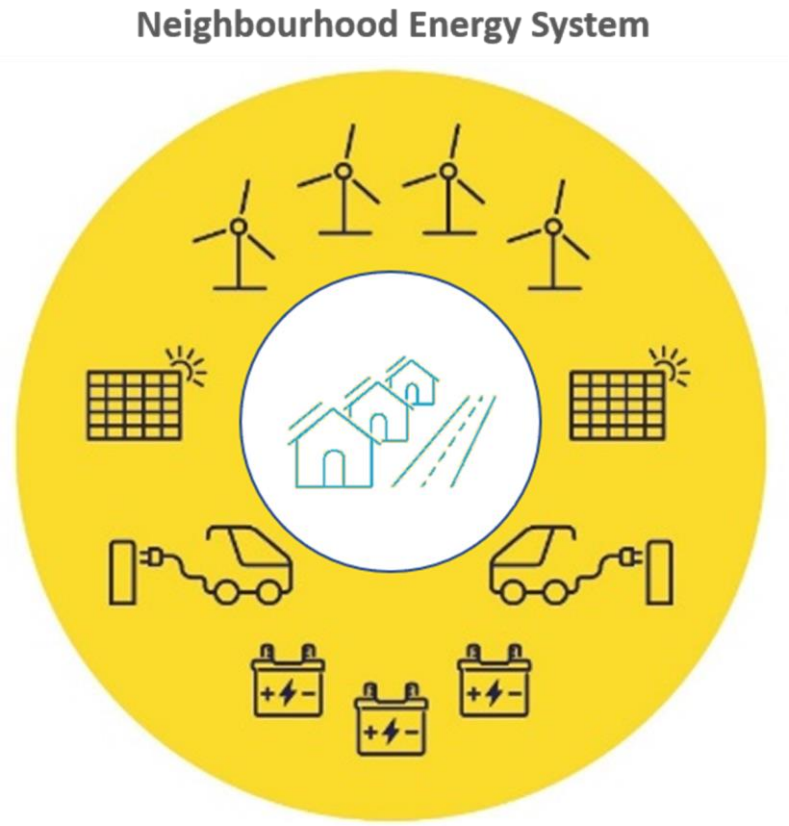
Energy management



Open source iEMS for others



A multi-stakeholder system requires a controller:

- with real-time access to flexible components
- which controls or suggests actions for participants
- with access to flexibility markets
- who processes the financial transactions
- who fulfils the needs of all participants
- with clear benefits for all stakeholders
- Easy to adapt and implement (open source)

Governance

- Two cases: behind the meter or through the grid
- Behind the meter: interventions are possible (Nottingham, Stuttgart)
- Through the grid: only suggestions are possible (Arnhem)
- 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?

Lessons learned

- Cable pooling is difficult: to share responsibility between different owners (wind and solar)
- Sharing a grid connection: make sure a contract is signed before operation….what costs are included?
- All parties should be partners: beggars can’t be chosers
- Governance!

Thank you – any Questions?

For more information, visit:

http://www.nweurope.eu/cleanmobilenergy

Or contact Peter Swart

Peter.swart@arnhem.nl

Extra slides

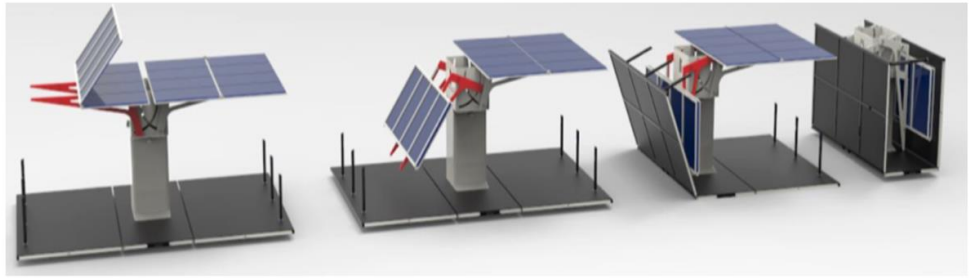
New projects for iEMS

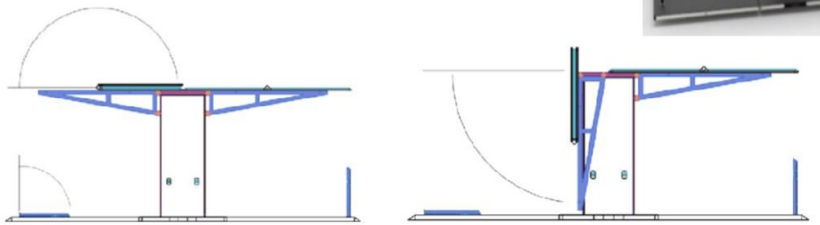
Neighbourhood energy system plus battery

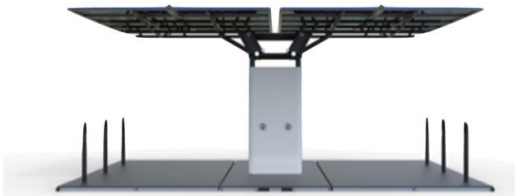
Solar carport with charging and building

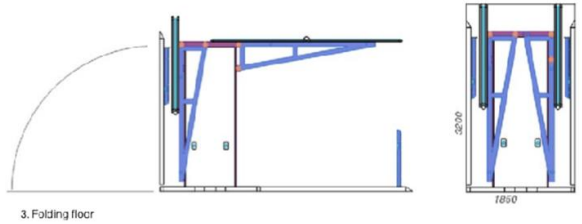
Schwäbisch Gmünd

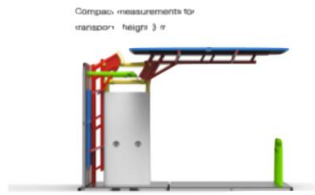
Stuttgart











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System components in Arnhem City Pilot

- 14 MW **solar field**, which might link to the wind generation in the future,
- 0.5 MWh **storage** with Li Fe PO4 batteries,
- Various Allego's **charging points** in the city to be included,
- A dock in **Arnhem harbour** for cruise maintenance (**cold-ironing**),
- **Existing grid** to be connected to the system

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