EXPERIENCE WITH SOCIAL-CVPP GENT - ENERGENT

Interreg North-West Europe cVPP
European Regional Development Fund

ORIGIN OF THE PROJECT & BUURZAME STROOMPROJECT

- Origin:
  - Some people in the neighbourhood wanted to investigate the possibility to share solar electricity.
  - They also wanted to keep this solar energy in the neighbourhood and were dreaming of a neighbourhood battery.
- The project BUURZAME STROOM was initiated
  - together with the city of Gent, DSO, samenlevingsopbouw, University and other partners.
  - GOAL: increase solar production, reach all kinds of target groups and investigate solutions for the electricity grid of the future (smart grid, energy storage/balancing).

BUURZAME STROOM – KICK OFF

PROJECT ZONE

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement No 731205.

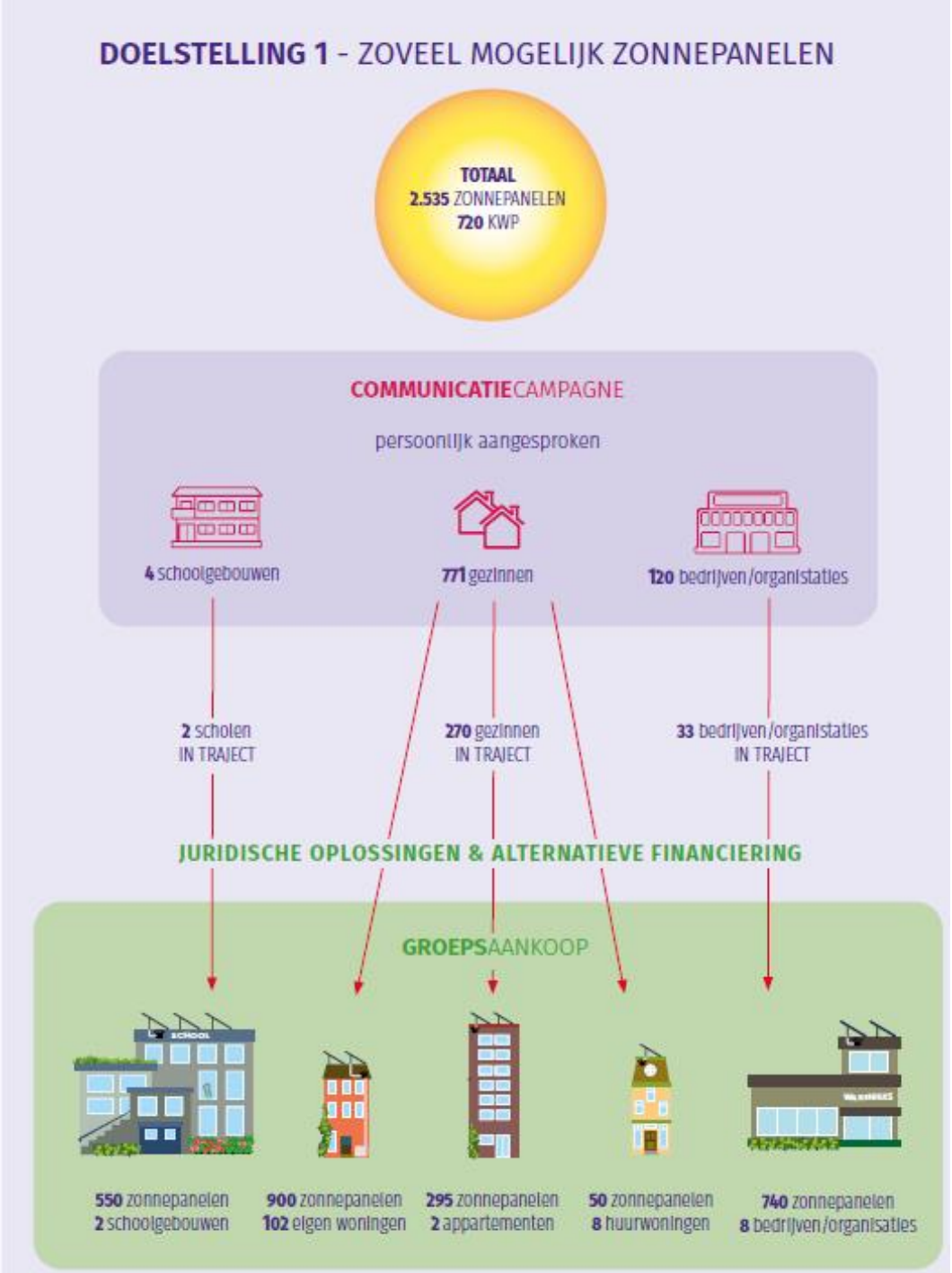
PROJECT ZONE - CARACTERISTICS

- Urban setting
- Densily populated
- Mixture of population: socio-vulnerable residents, residents with migration background, young well-educated families.
- Renovated houses, old houses, house-owners and tenants.
- SME's, public buildings and schools.

DETERMING THE COMMUNITY VALUES

- Online Enquery with focus group discussions
- Key Values
  - Stimulating RES in the neighbourhood and making it CO2 neutral
  - Creation of a community to battle climate change more effectively then individually - Decrease impact of big energy companies on energy market
  - Minimise cost for society (avoid grid cost- organise flexibility)

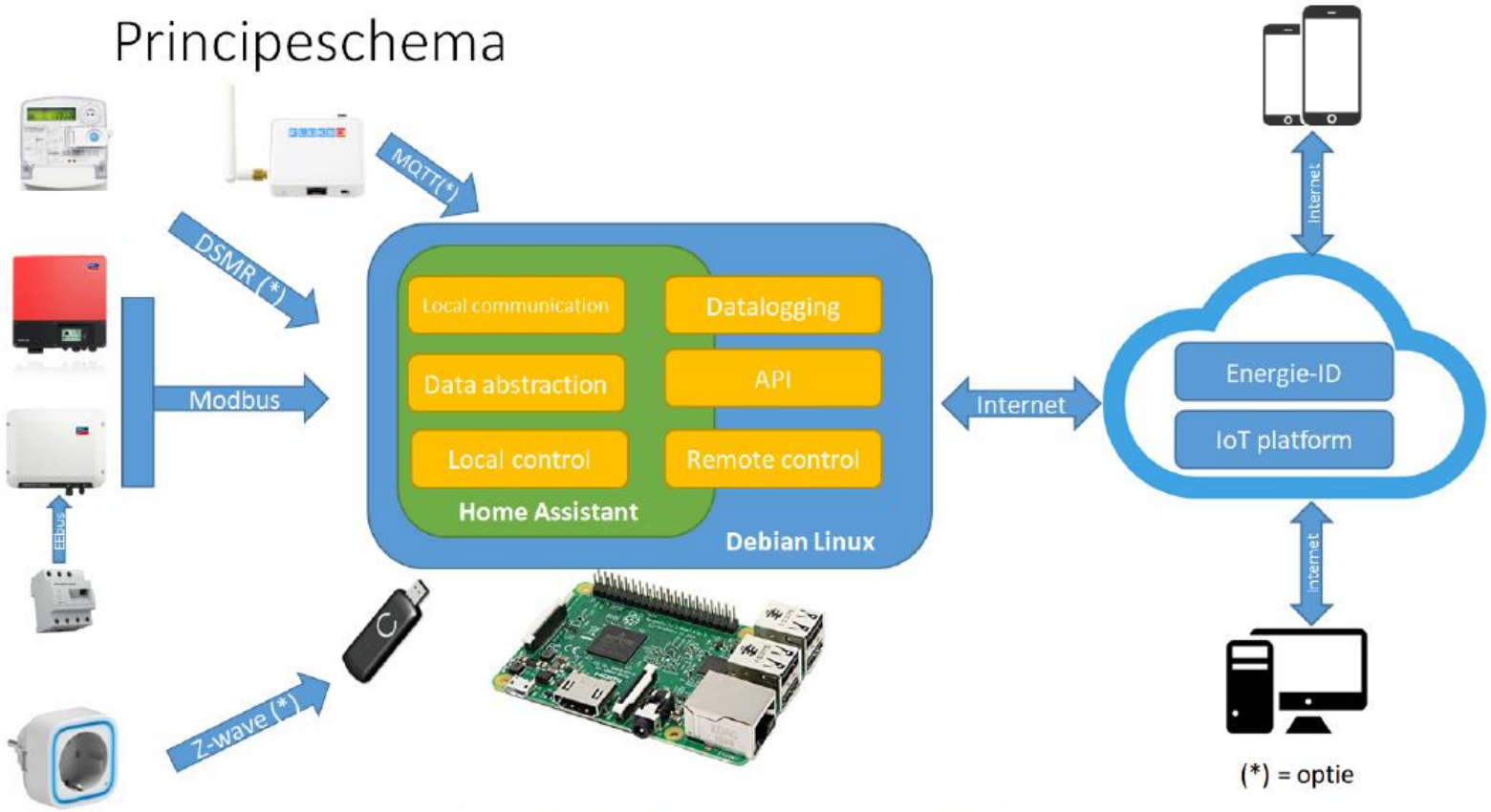
EXPANSION OF RENEWABLE ENERGY SOURCES: SOLAR PRODUCTION DOUBLED THROUGH THE PROJECT



ORGANISATION OF STORAGE

- 2 clusters of residential storage: 16 home batteries
- 1 battery at SME
- 2 pilots with thermal storage through hybrid Heat Pump
- Future extension with extra Heat pumps, EV's

RESIDENTIAL FLEXIBILITY THROUGH ENERGY MANAGEMENT SYSTEM (EMS)



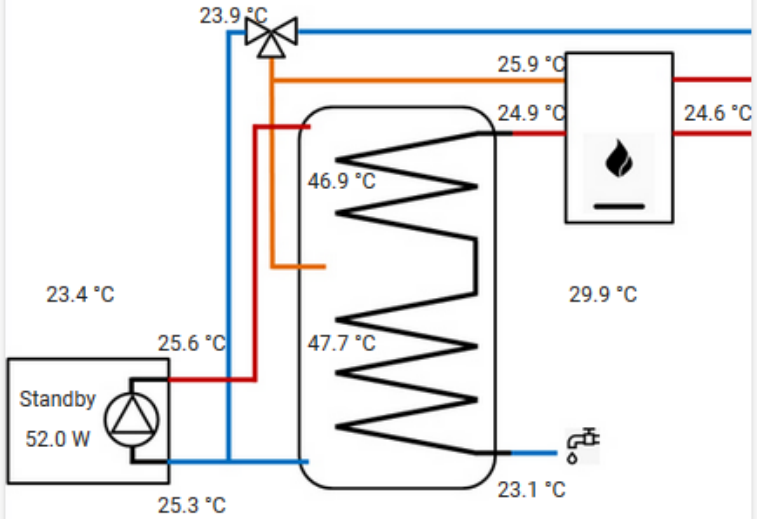
Figuur 1: principeschema van de aanbieding

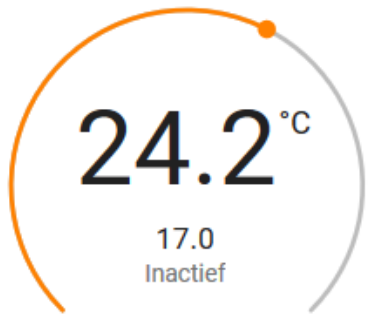
- Open source architecture: Home Assistant
- Low cost hardware: raspbery Pi
- Maximum flexibility to modify/expand EMS following future developments preventing lock-ins for Energent and participants.

Kempstraat

266	237	3063	1718.4	52	94.59	108	936.0	-2841	-869.0	3	321.0	1831	1432.4	497350	58236	24.2	22.6
kWh	kWh	W	kWh	W	kWh	W	kWh	W	kWh	W	kWh	W	kWh	0.001 m³	L	°C	°C
CAL1 total energy	CAL2 total energy	PV total power	PV total energy	HP power	HP energy	PH1 power	PH1 energy	PH2 power	PH2 energy	PH3 power	PH3 energy	PV power	PV energy	Gas	Water	Temperat... woonka...	Temperat... buiten

Hybrinator





tado Smart Thermostat

Viessmann

WP werkingsmodus	Standby
Setpoint HP heating	45.0 °C
Setpoint HP SWW	48.0 °C
HP temperature retour	25.3 °C
HP temperature depart	25.6 °C
HP temperature external	23.4 °C
HP temperature external system	47.7 °C
Viessmann monitoring	

Temperaturen

Temperature buffervat	46.9 °C
Temperature aanvoer SWW	23.1 °C
Temperature depart SWW	24.9 °C
Temperature SWW na ketel	24.6 °C
Temperature retour VW	23.9 °C
Temperature depart VW	25.9 °C
Temperature garage	29.9 °C

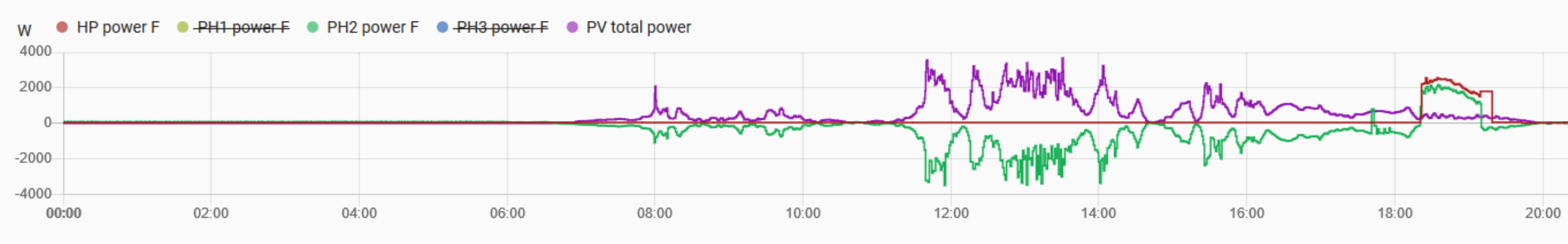
Sunspec

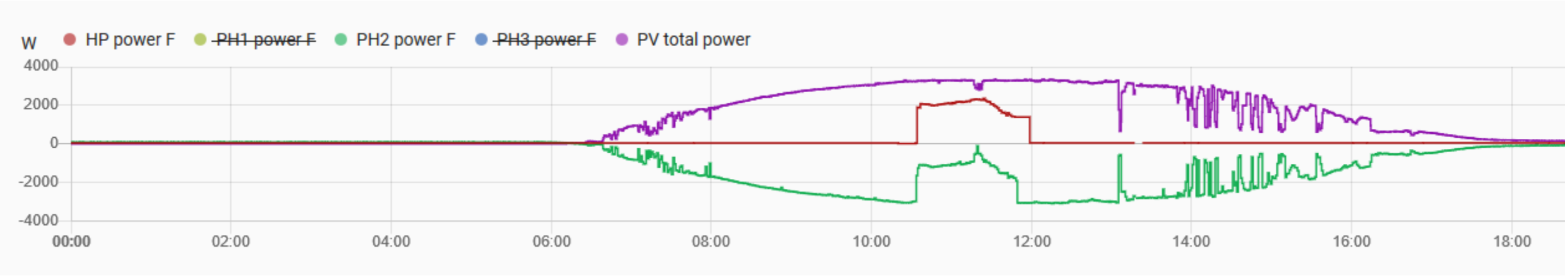
SB1500 AC power	1230.0 W
SB1500 AC energy	285.98 kWh
SB1500 AC voltage	244.6 V
SB1500 AC current	5.0 A

FLEXIBILITY OF HYBRID HEAT PUMP WITH THERMAL STORAGE

Noon

- A lot of Sun: high production
- Heating of thermal buffer





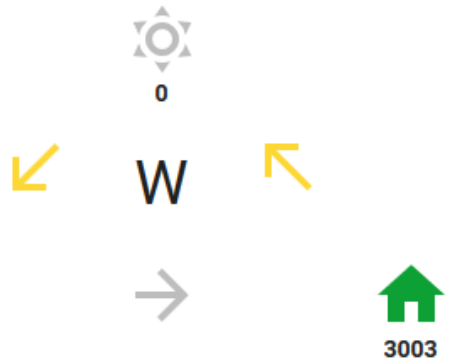
Spijkstraat 40

HOME

Sunny Portal

Sunny Portal

Power wheel



Batterij

Batterijstatus	opladen
Batterij op-ontlading	-34 W
Batterij peil	99
Batterij niveau	6.336 kWh

0 W
Zonnepanelen - opbrengst

99 %
Batterijniveau

22.84 kWh
Resterende zonne-energie

-3037 W
Verbruik

Zonnepanelen

opbrengst_pv_vandaag	0 kWh
opbrengst_pv_totaal	0 kWh

Sturingen

Spanningsregeling	Piekabsorptie	Buurtbatterij
Uit	Uit	Uit

Verbruik

Totaal verbruik	537 kWh
Netafname - totaal	1578.58 kWh
Netinjectie - totaal	1853.92 kWh

HOME

Algemeen

Grid guard	
Actieve regeling	Geen
Actieve regelactie	Geen
Metronoom	

Peak absorption

Piek absorptie sturing	
Ontlaadmodus	
solar_peak_time	13:30
Injectiepiek begonnen	

Spanningsregeling

Trap 1	238.0
Trap 2	240.0
Trap 3	242.0

Batterij

Manuele controle batterij	
Setpoint batterij	0 W
Power factor batterij	100 %
Block battery	
Set battery setpoint	
Set battery PF	
Battery heating	

System

Memory free	383.6 MiB
Processor use	12 %
Load (5m)	0.31
Memory use (percent)	20.6 %

Power factor regeling

PV

Manuele controle PV	
PV limitering	100 %
Power factor PV	100 %
Set PV limit	
Set PV PF	

Voltage control

Spanningscontrole	
Setpoint vermogensbegrenzing	100.0
Setpoint power factor	100.0

Vermogensregeling

Trap 1	0.98
Trap 2	0.96
Trap 3	0.94

Energent

Interreg North-West Europe cVPP

Devices **Clusters** Logout

Sync completed

Clusters

The Community Hybrinator	Details Remove
Labo	Details Remove
Buurzame Stroom	Details Remove
Buurzame Stroom SME	Details Remove
Spijkstraat	Details Remove
Engelstraat	Details Remove

+ New Cluster

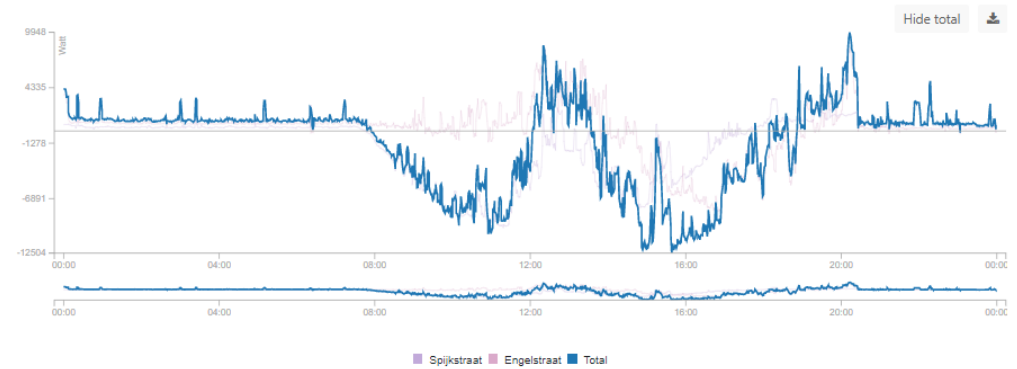
Dashboard

‹ Thu 18 Jun 2020 ›

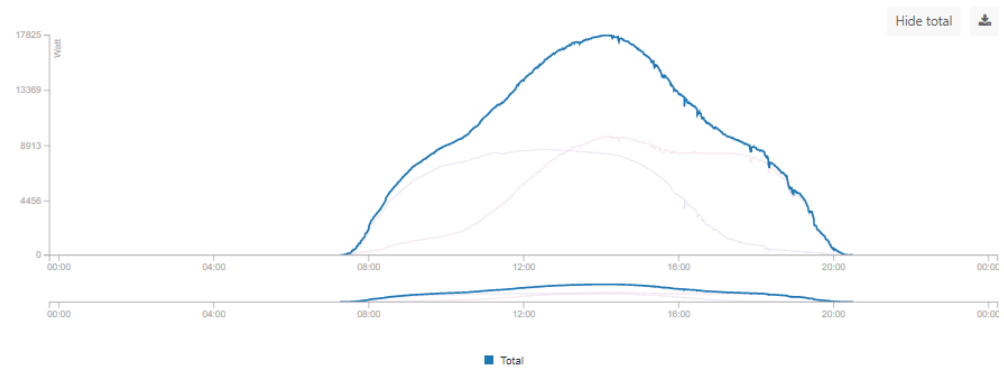
Dashboard

‹ Sun 5 Apr 2020 ›

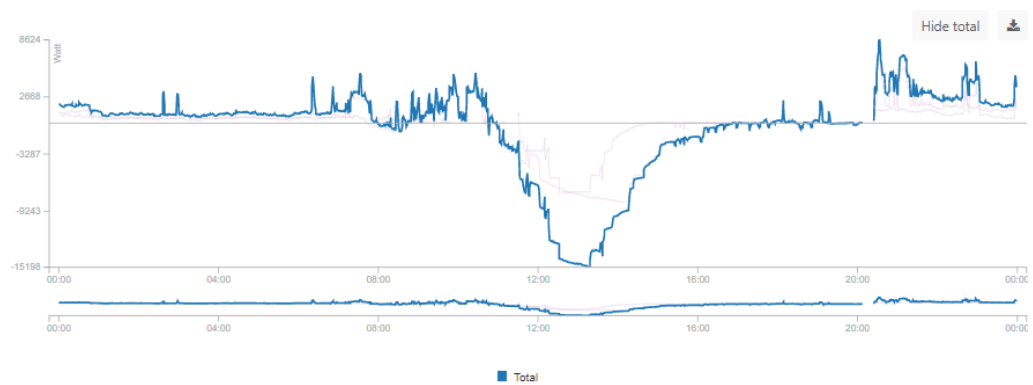
Grid interaction



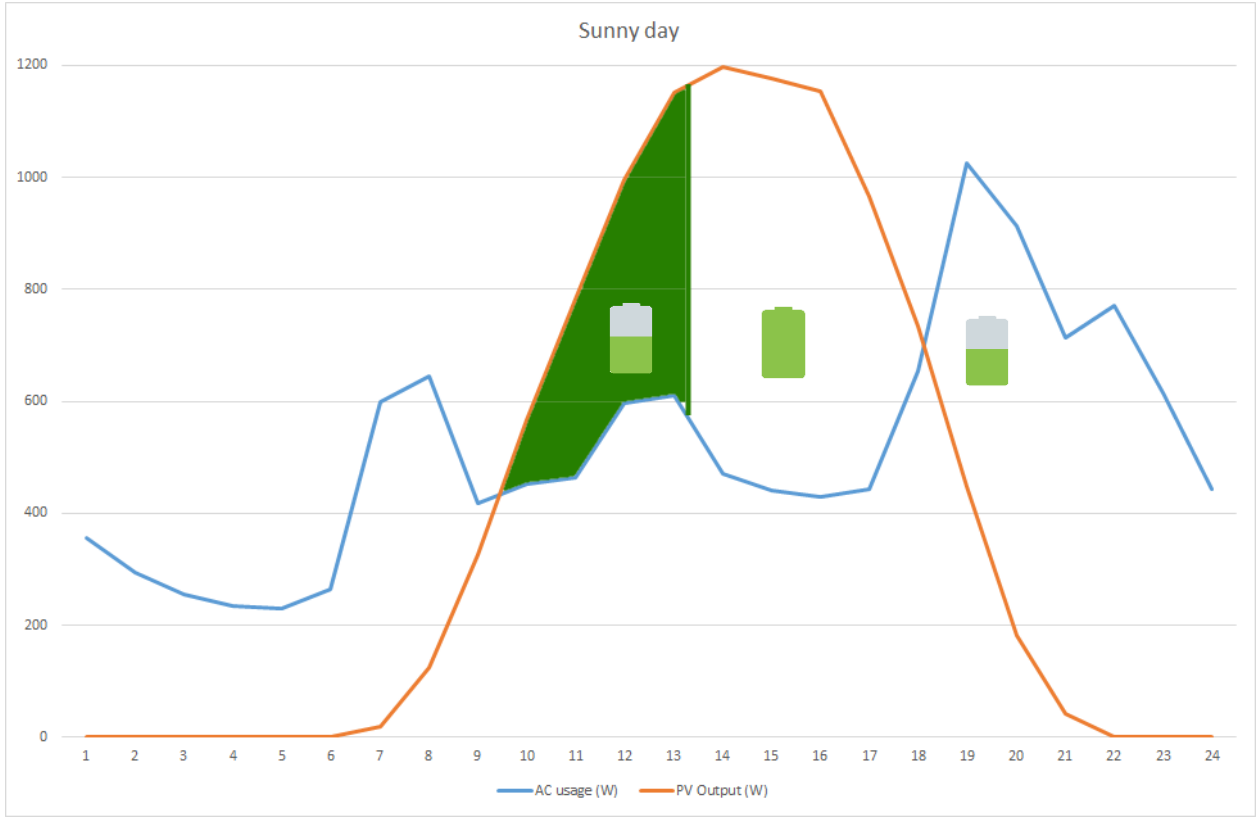
PV production



Battery activity



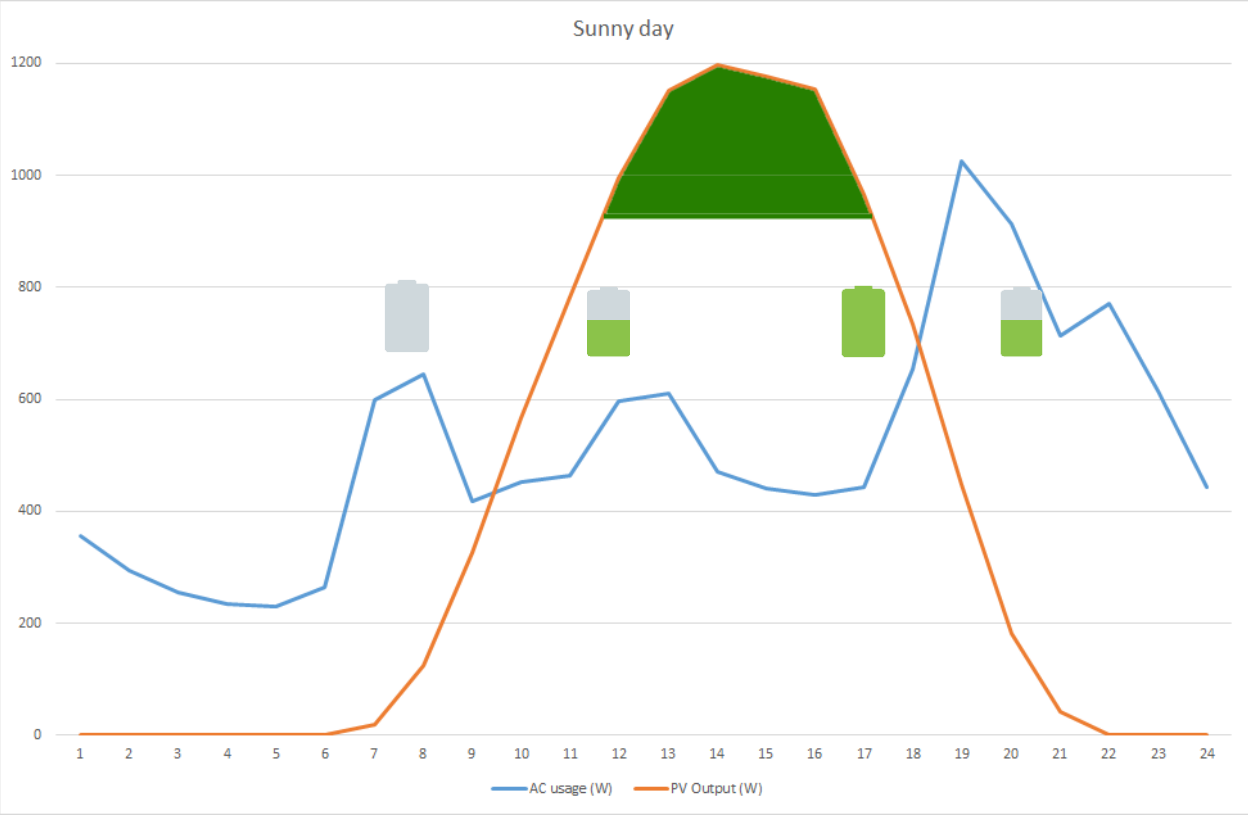
PROBLEM: OVERLOAD OF THE GRID



Noon

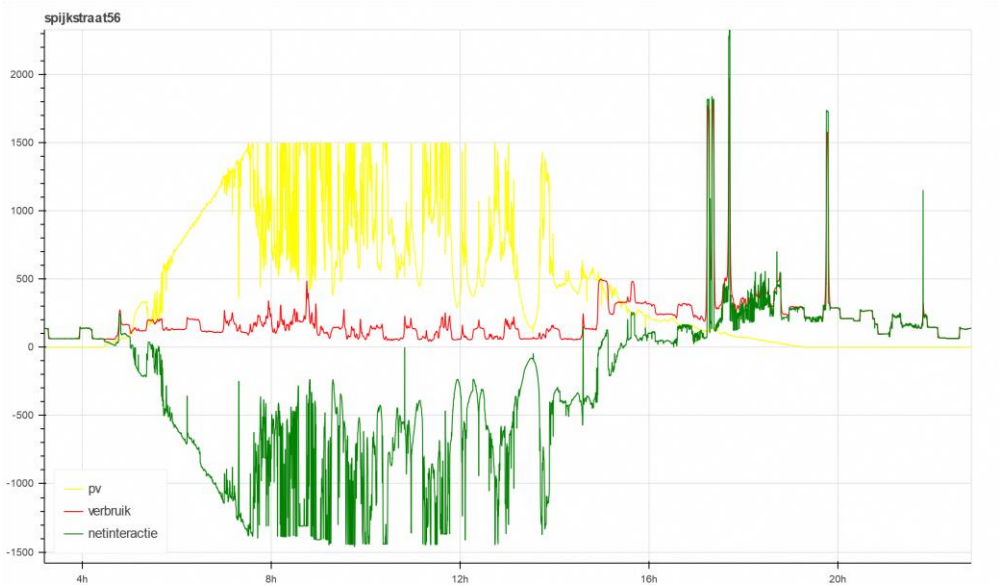
- A lot of Sun: high production
- Low consumption
- Batteries fully charged, Solar production loads the grid.
- Voltage on feeder increases
- Inverters are switched off, as tension on feeder rises to high.

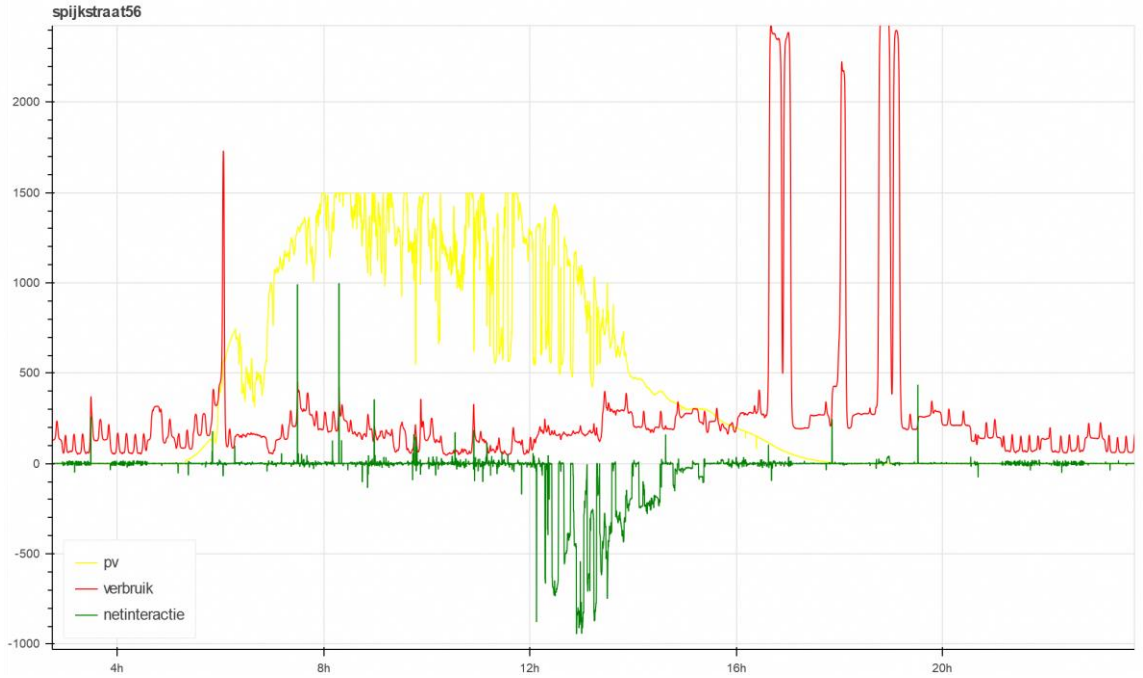
SOLUTION: TEST 1 PEAKABSORPTION



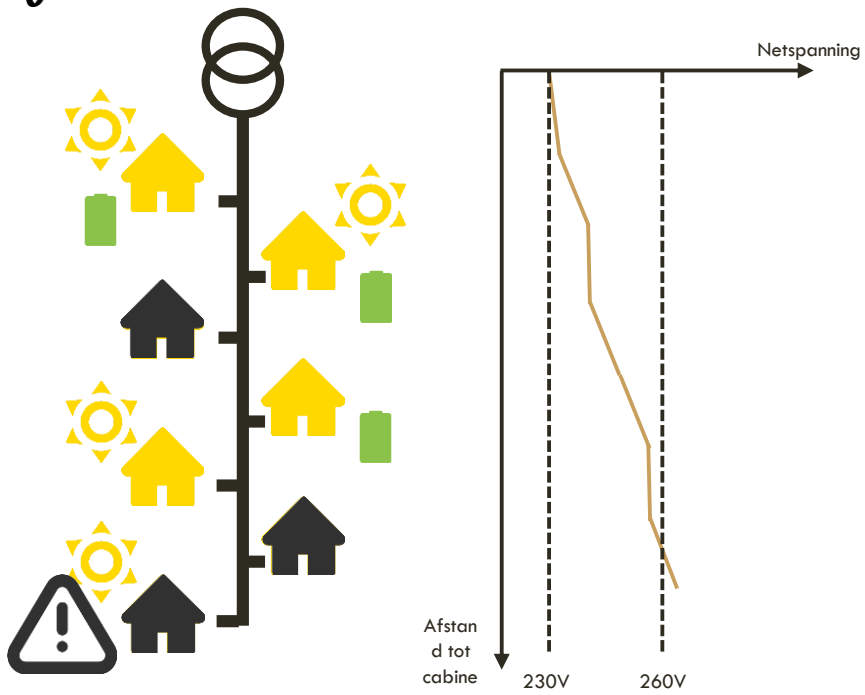
- Based on day ahead weather predictions, charging of batteries will be delayed to absorp noon peak optimally
- Evaluate impact on the grid.

SOLUTION: TEST 1 PEAKABSORPTION





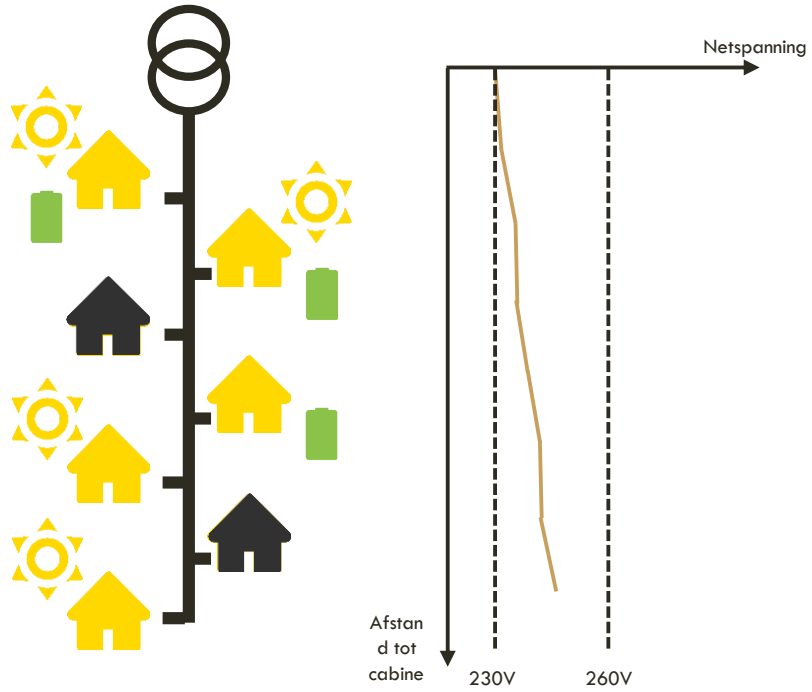
PROBLEM: A LOT OF SUN AND ALL BATTERIES ARE FULLY CHARGED



Noon

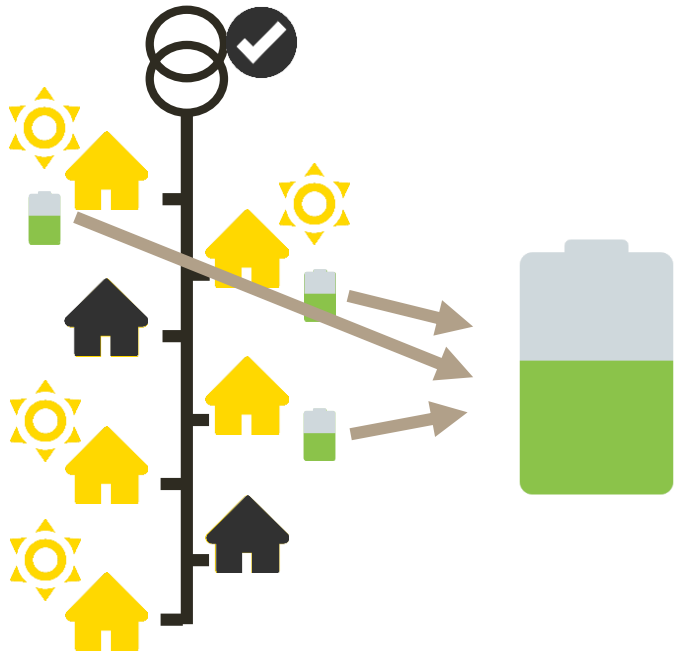
- Surplus of solar energy
- Tension on the feeder increases (the larger the distance till the MV transformator the higher the tension increases).
- Inverters are switched off, as tension on feeder rises to high.

SOLUTION: TEST 2
COLLECTIVE DECREASE OF SOLAR PRODUCTION



- As tension on feeder is increasing, EMS will send setpoints to all the inverters on this feeder to reduce production on all inverters.
- No inverters will get switched of.
- Solar production at individual level is lower, but sum of solar production on feeder is higher.

TEST 3
NEIGHTBOURHOOD BATTERY



- All solar inverters connected to EMS
- All batteries work together as a virtual neighbourhood battery to keep energyproduction in the neightbourhood.
- Exchange of energy throught the MV network will be reduced.
- Virtual neighbourhood battery could be used as ancilliary service towards aggregators.

FUTURE DEVELOPMENTS

- Organise more demand side management
  - Expand amount and type of controllable loads
  - Introduce hybrid heat pumps as an intermediate step towards full electrification
- Digital meters will be introduced in Flanders from 2020. Connection of P1 port of digital meters to the EMS is under development.
- Introduction of variable electricity prices and implications on business model of storage solutions.
- Flemish regulation on ‘regelluwe zones’ & Citizens Energy Communities, which might make ‘zonnedelen’ feasible. (involvement in Rolecs project)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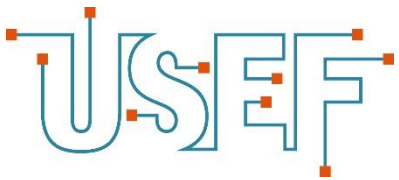
ENERGY SUPPLY


Comhairle Contae Thiobraid Árann
Tipperary County Council


USEF


alliander


DPL


Energent


Apeldoorn


KAMP C
duurzaam bouwen


energie ID

Energent

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Thank you!