



**New Urban Energy**



City-zen is...



An EU-funded initiative in which the cities of Amsterdam and Grenoble develop and demonstrate energy efficient projects and build methodologies and tools for cities, industries and citizens to reduce CO2 and support the energy transition

# Innovation Categories

## Smart Grid Innovations



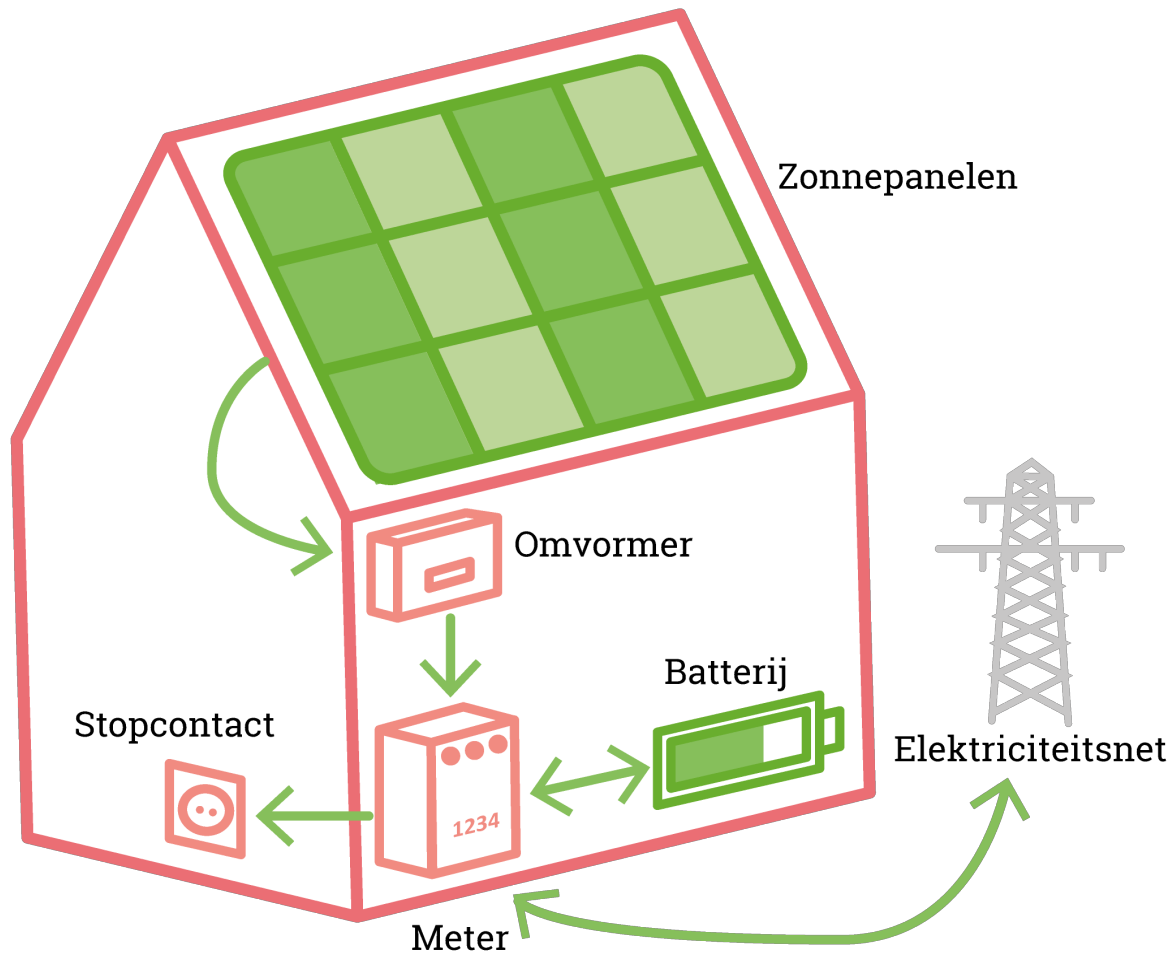
## Heating & Cooling Innovations



## Residential Retrofitting







## Smart Grid - Energy Storage



# 50 HOUSEHOLDS CONNECTED TO THE DEMONSTRATION SMART GRID WILL BE EQUIPED WITH REMOTELY CONTROLLABLE BATTERY SYSTEMS. TOGETHER, THEY FORM THE VIRTUAL POWER PLANT

## Topic

## Description



### Virtual Power Plant

The virtual power plant (VPP) will be utilized to access three value streams:

- Trading on energy markets with the combined capacity of 46 (soon to be 50) energy storage systems.
- Local consumption of locally generated sustainable energy.
- Supporting the local electricity grid through congestion management.



### Lithium-Ion battery cells

- The battery systems from Victron Energy contain 2 battery packs, each consisting of four lithium-iron-phosphate (LiFePO<sub>4</sub>) cells.
- The total storage capacity of the system is 5.12 kWh (2 x 200 Ah at 12.8 V)



### 5 kW, single phase inverter

- The DC output of the battery systems is inverted and transformed by a 5 kW single phase inverter from Victron Energy.



Battery system in the hallway  
Of a participant's residence



Abdaluhob Choho, Alderman of the Amsterdam municipality in charge of sustainability, and John van der Putten, participant in the City-zen Amsterdam Virtual power plant project.



Opened up battery system. The two Lithium-Ion cell packs are visible in the lower half. The inverter on the top.



# USE CASES VIRTUAL POWER PLANT



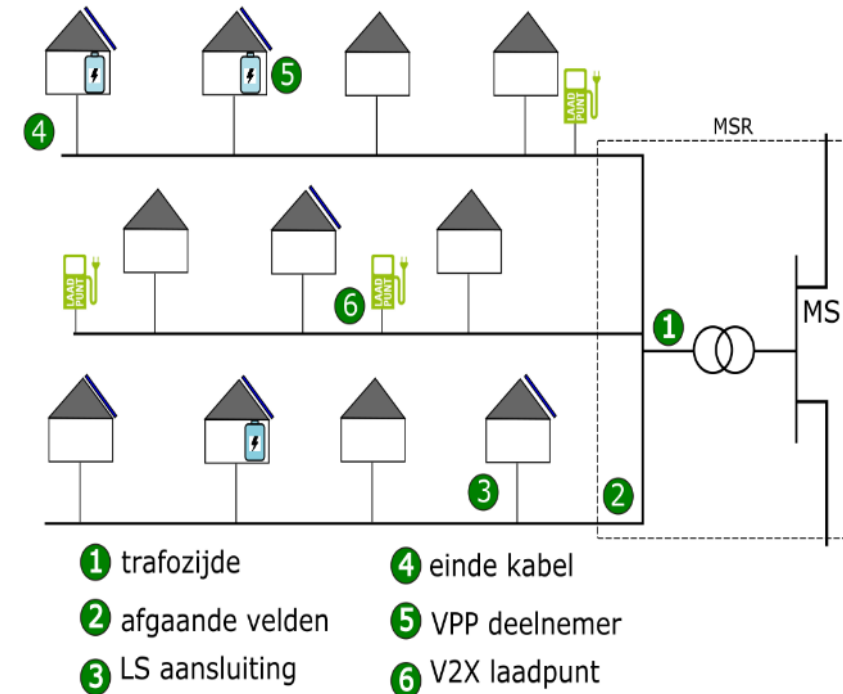
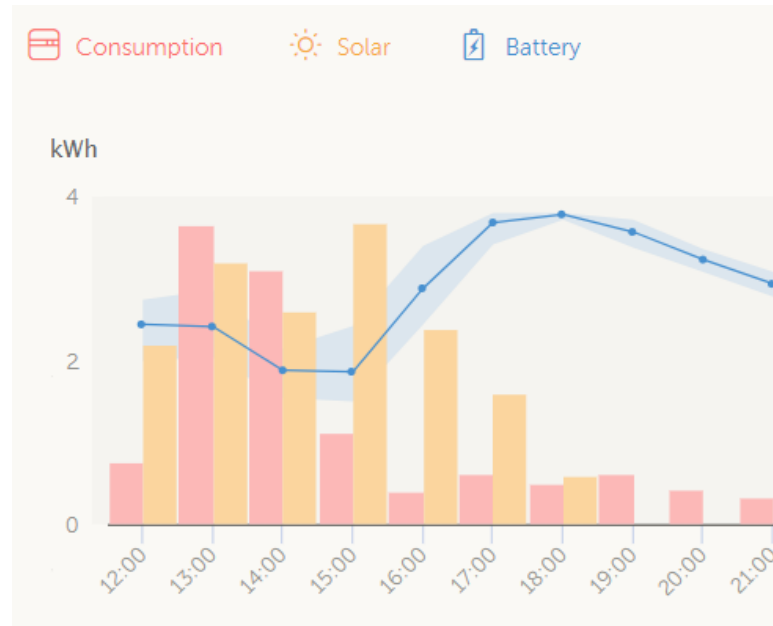
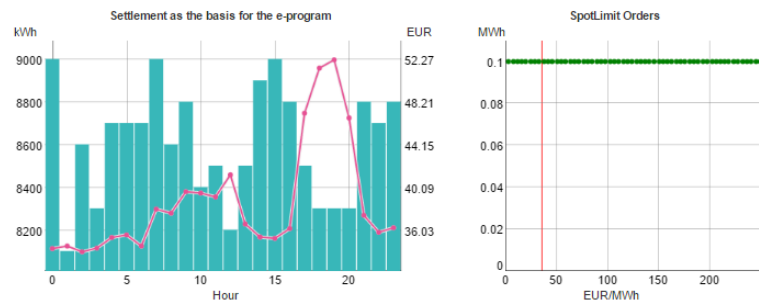
Trading on  
energymarkets



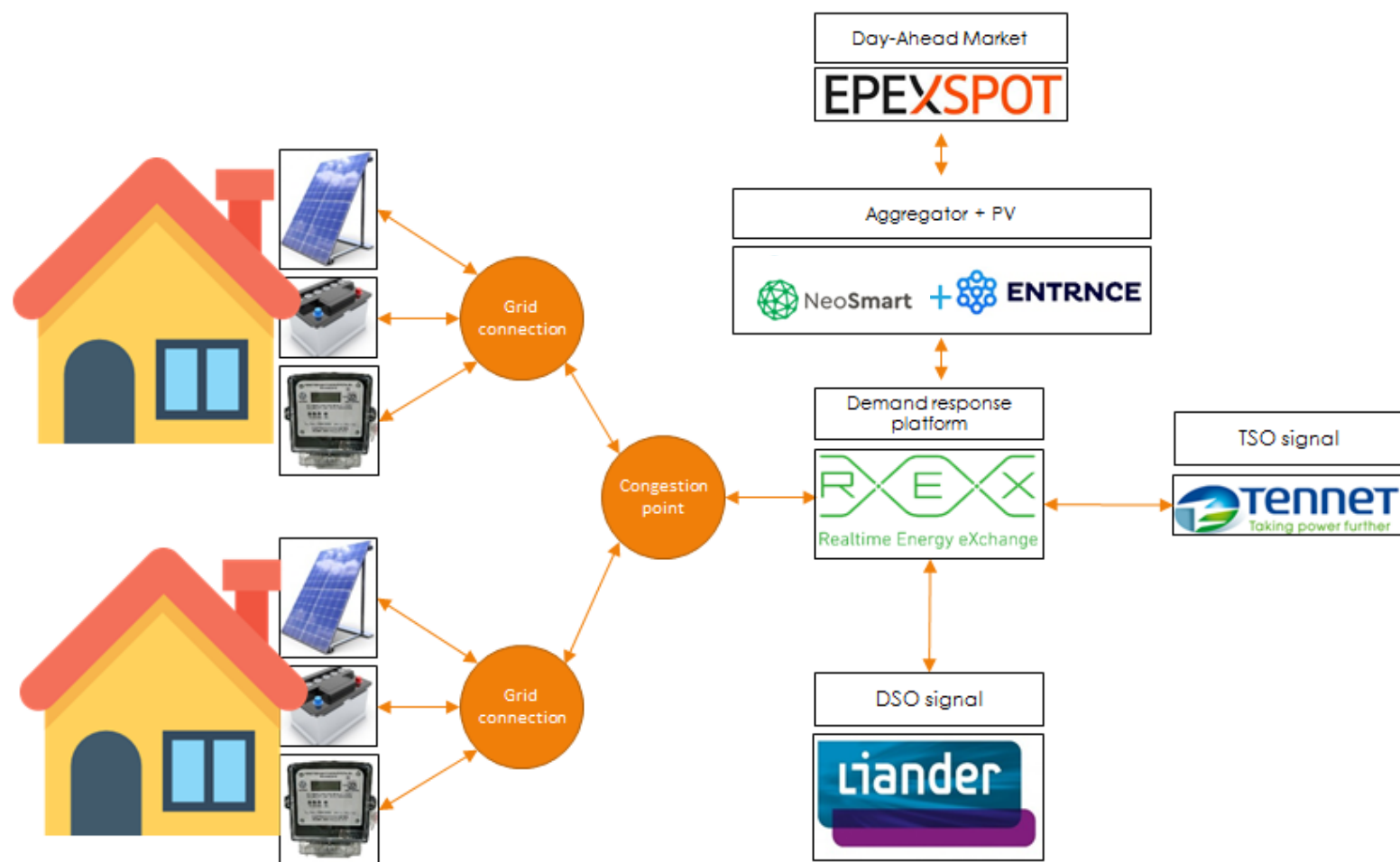
Use of local  
sustainable energy



Supporting the local  
electricity grid



# USE CASES VIRTUAL POWER PLANT



allliander

DISTRIBUTED SYSTEM OPERATOR

NeoSmart

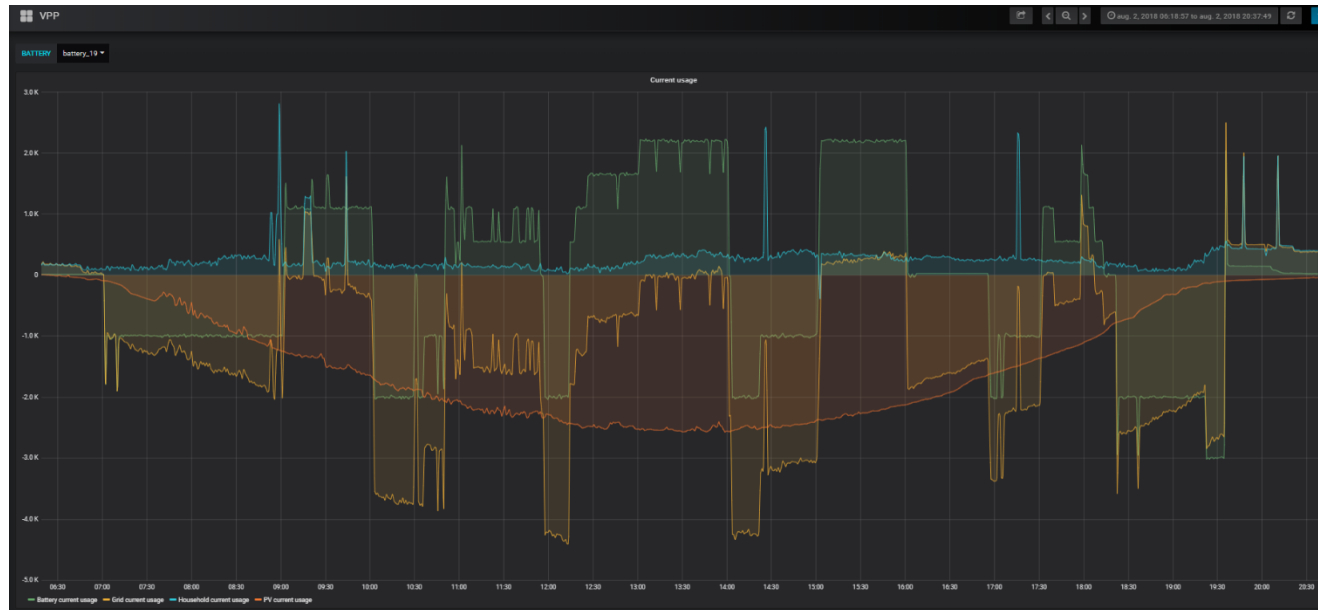
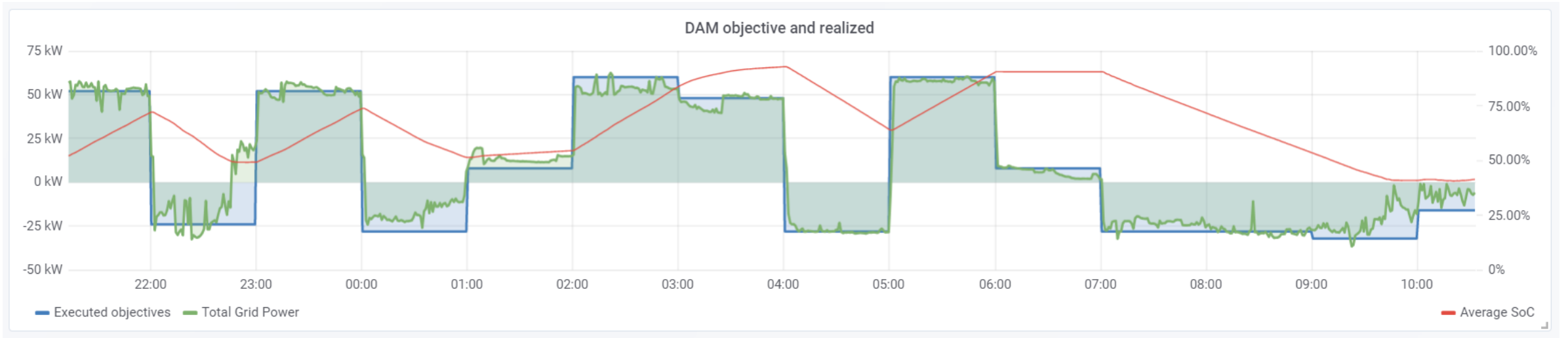
SUSTAINABLE ENERGY SUPPLIER

EX-CE ENERGY EXCHANGE ENABLERS

REALTIME ENERGY EXCHANGE



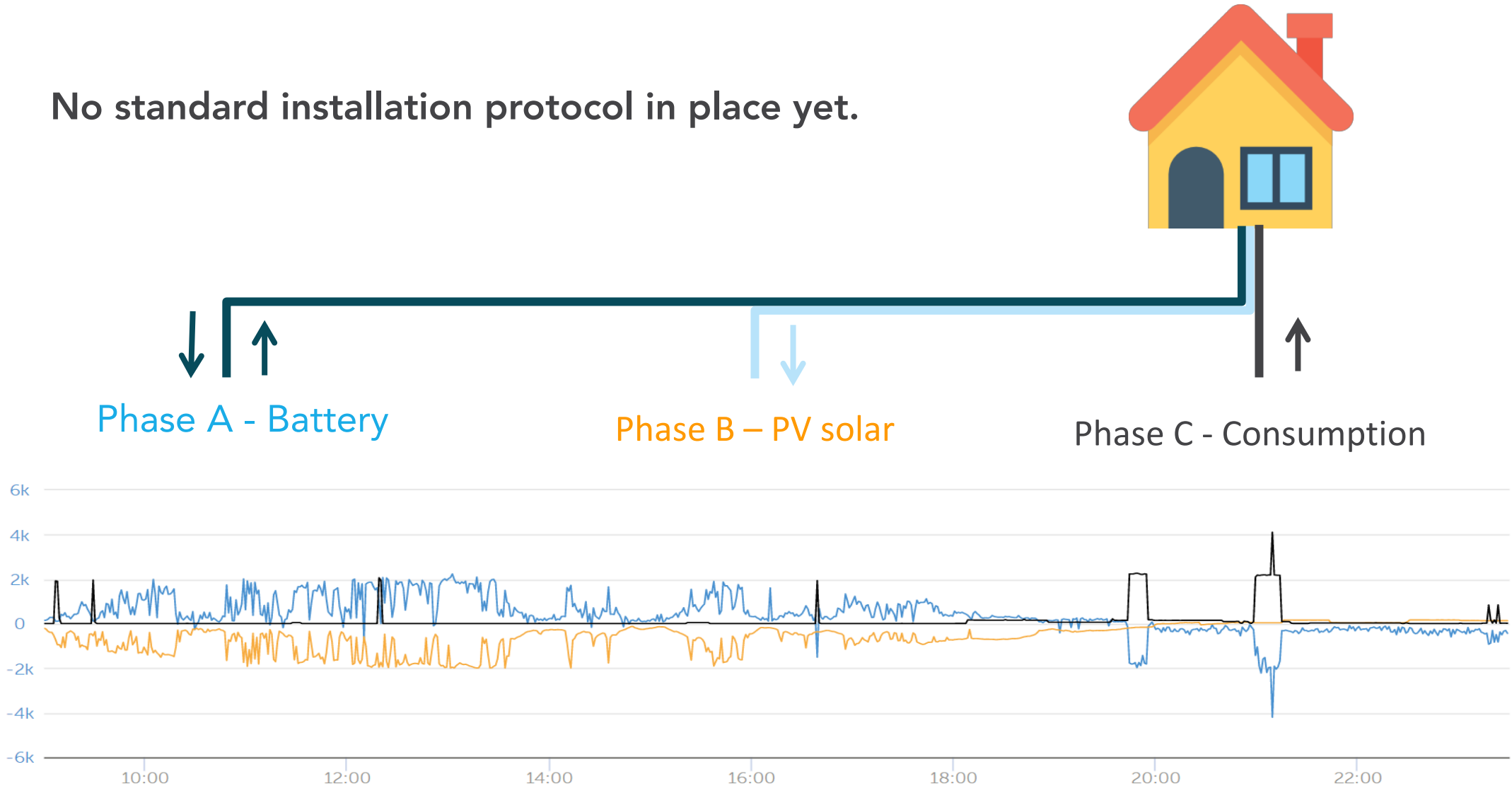
# THE VIRTUAL POWER PLANT IN ACTION





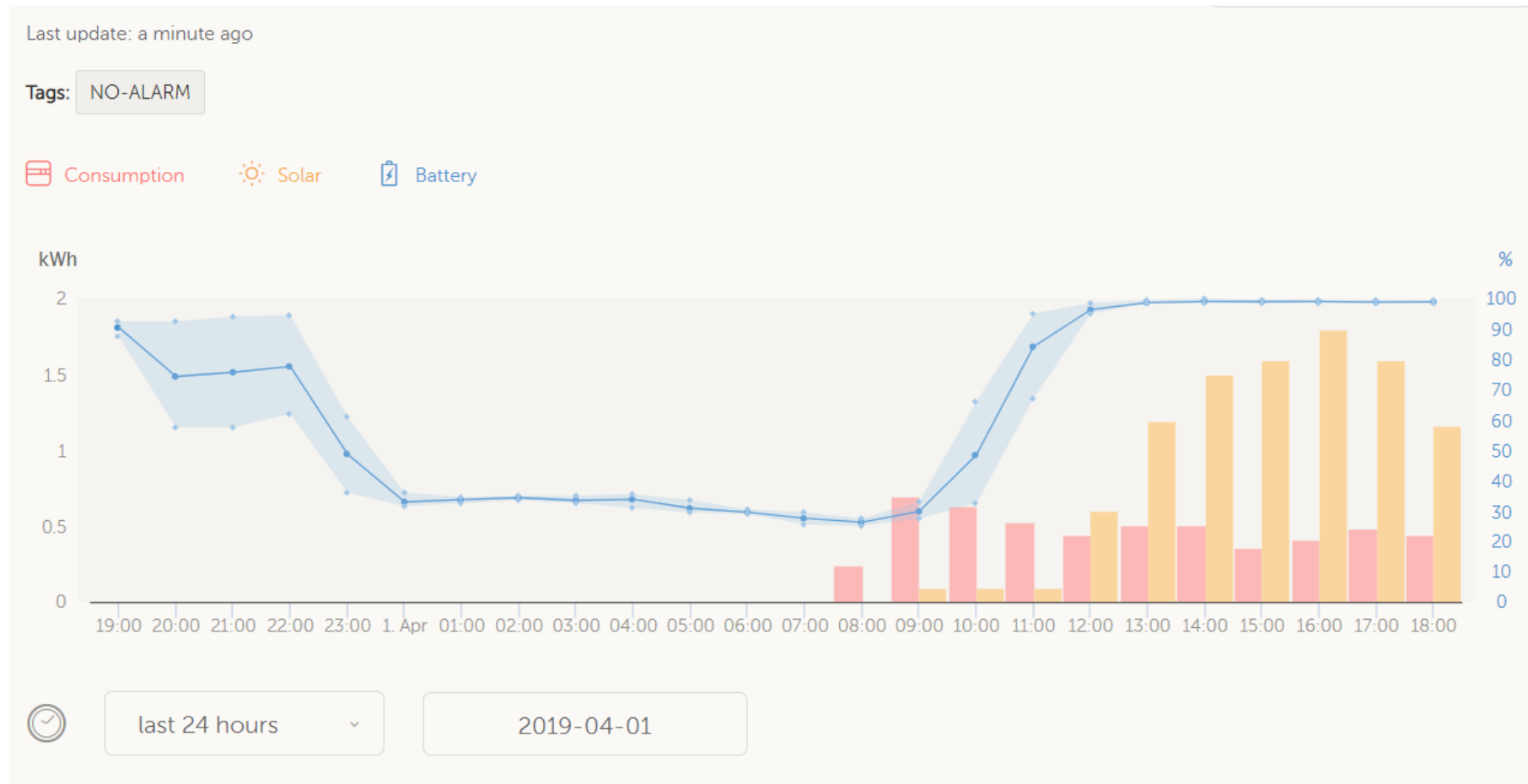
# >> LESSONS LEARNED VIRTUAL POWER PLANT - TECHNICAL

No standard installation protocol in place yet.





## LESSONS LEARNED VIRTUAL POWER PLANT - TECHNICAL



The reliability and security of communication networks for flexibility is by far not as high as the reliability and security of the electricity networks.



### **Motivation to join:**

- Excitement
- Insights in household energy
- Act as a collective
- Next step in durability

### **Resistance to join:**

- No headspace
- System is large and noisy,

### **Room for improvement:**

- Tooling needs to be easy to understand
- Personal connection
- Keeping active relation between cityzens and energy?





### **Other recommendation for future endeavors:**

- Currently, no off-the-shelf solutions are available for VPP applications in brown field situations; Therefore too much efforts needs to be put in making the tech and the communication devices work.
- Good understanding of the lay-out of the low voltage (LV) grid is a prerequisite for implementing E2E smartification efficiently. Without this accurate data, one cannot determine where to place the measurement equipment in the grid;



# Thank you!

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