

# STATE-OF-THE-ART VIRTUAL POWER PLANTS

**REScoop.eu conference, Zagreb, 1 June 2019**

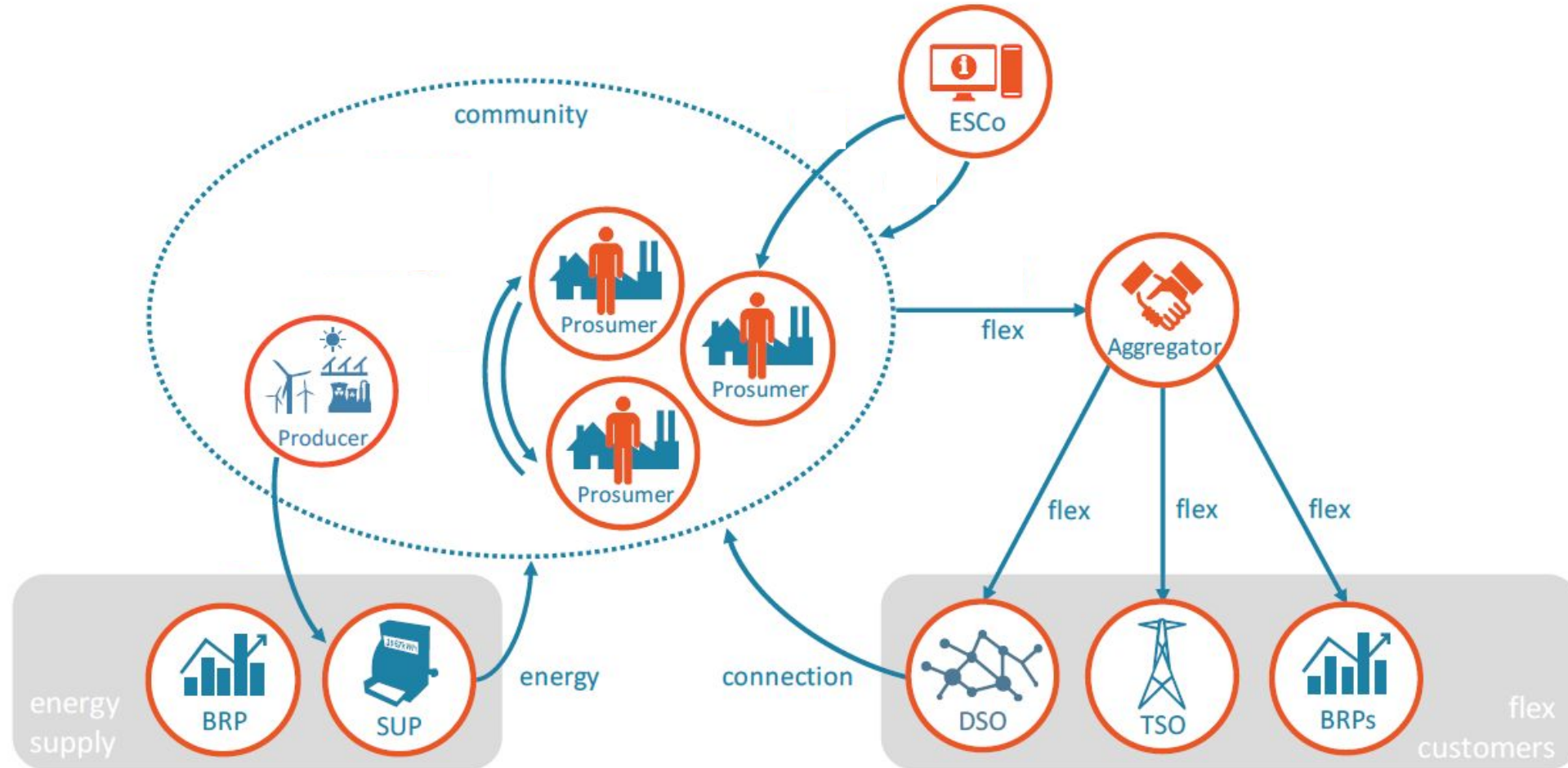
**Malte Zieher ([malte.zieher@buendnis-buergerenergie.de](mailto:malte.zieher@buendnis-buergerenergie.de))**

- **Board member of Bündnis Bürgerenergie**
- **Freelancer as Virtual Power Plant Expert**



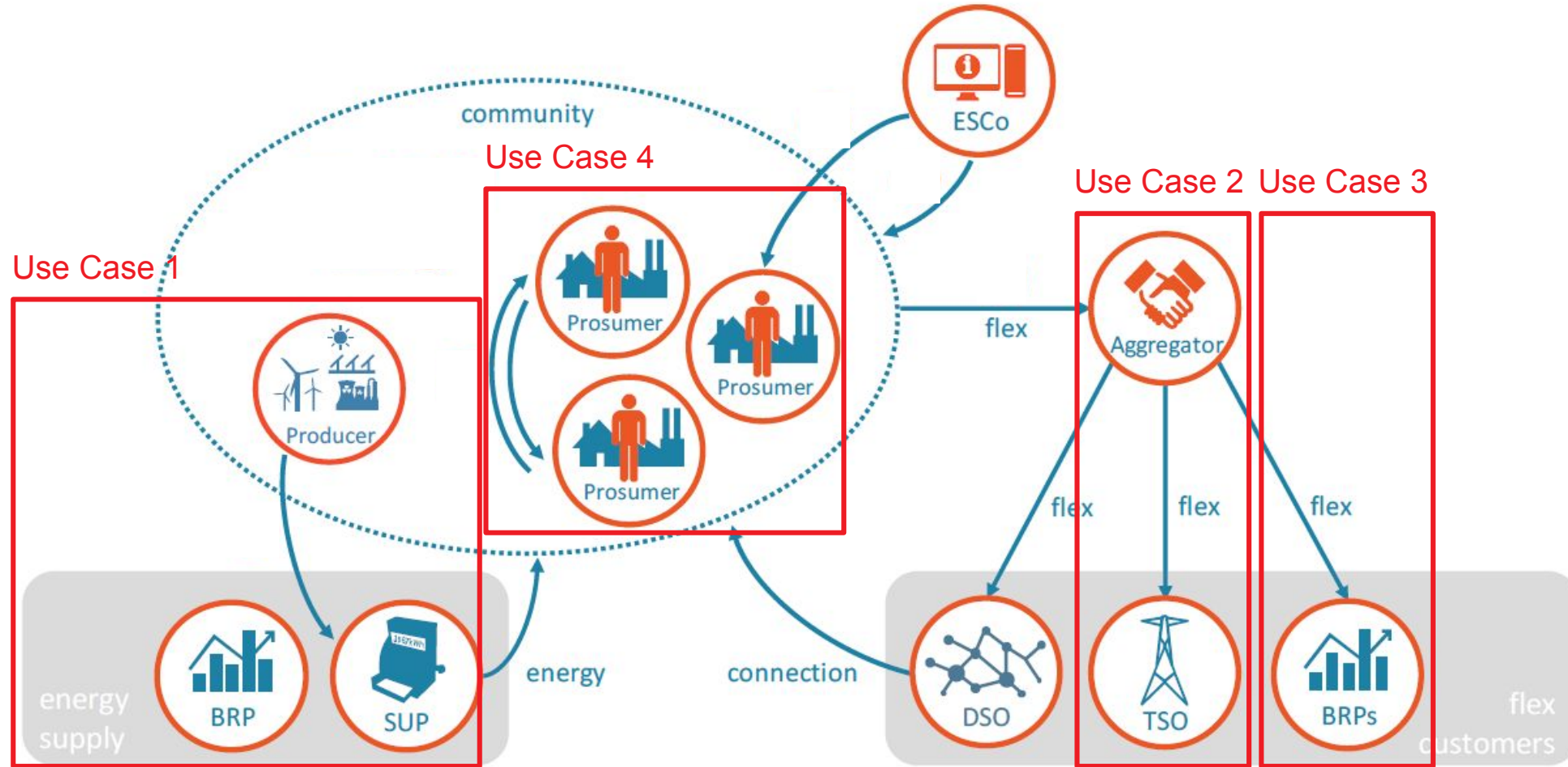
**BBEn**  
Bündnis Bürgerenergie e.V.

# SERVICES FOR CITIZEN ENERGY COMMUNITIES



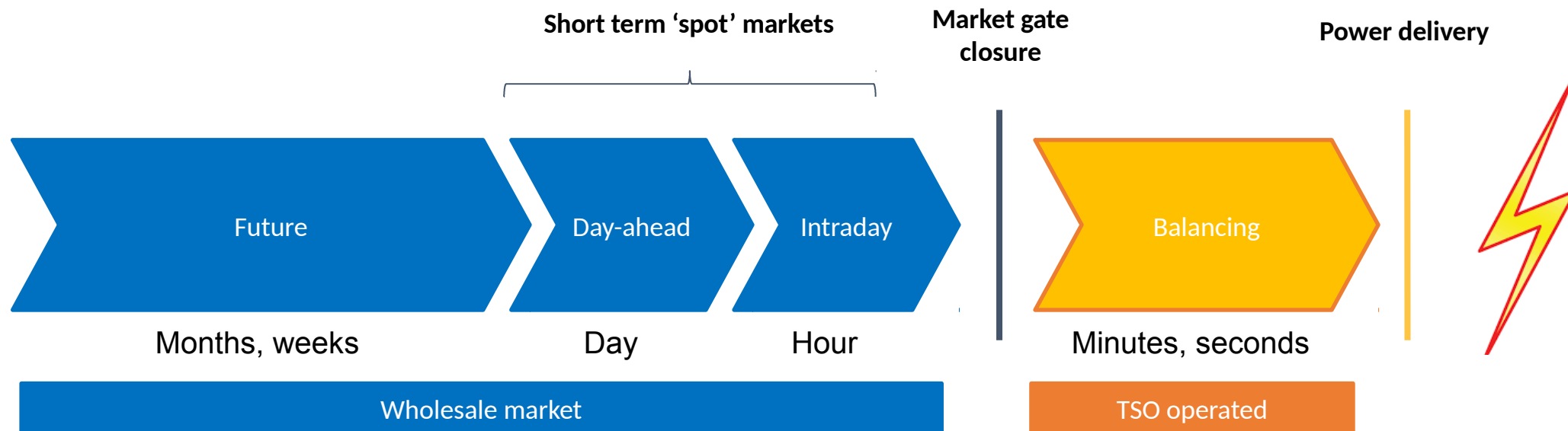
Energy and Flexibility Services for Citizens Energy Communities ([USEF 2019](#))

# SERVICES FOR CITIZEN ENERGY COMMUNITIES



Energy and Flexibility Services for Citizens Energy Communities ([USEF 2019](#))

# POWER MARKETS AND TIMEFRAMES



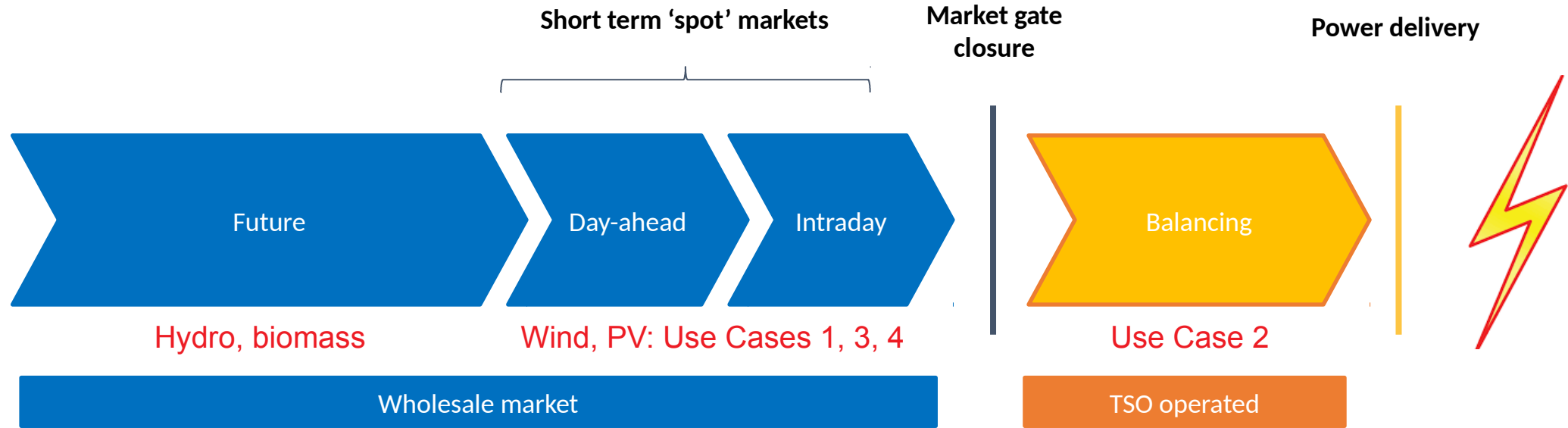
Logos of participants in the Wholesale market:

- CROP → X CROATIAN POWER EXCHANGE
- eeex
- epexspot
- NORD POOL
- cmie
- Icon of two hands shaking in a circle.

Logos of participants in the TSO operated Balancing market:

- ΑΔΜΗΕ (ANΕΞΑΡΤΗΤΟΣ ΔΙΑΧΕΙΡΙΣΤΗΣ ΜΕΤΑΦΟΡΑΣ ΗΛΕΚΤΡΙΚΗΣ ΕΝΕΡΓΕΙΑΣ)
- Rte (Réseau de transport d'électricité)
- RED ELÉCTRICA DE ESPAÑA
- amprion
- Tennet (Taking power further)
- HOPS
- Icon of a power transmission tower in a circle.

# POWER MARKETS AND TIMEFRAMES



Logos of power exchange organizations:

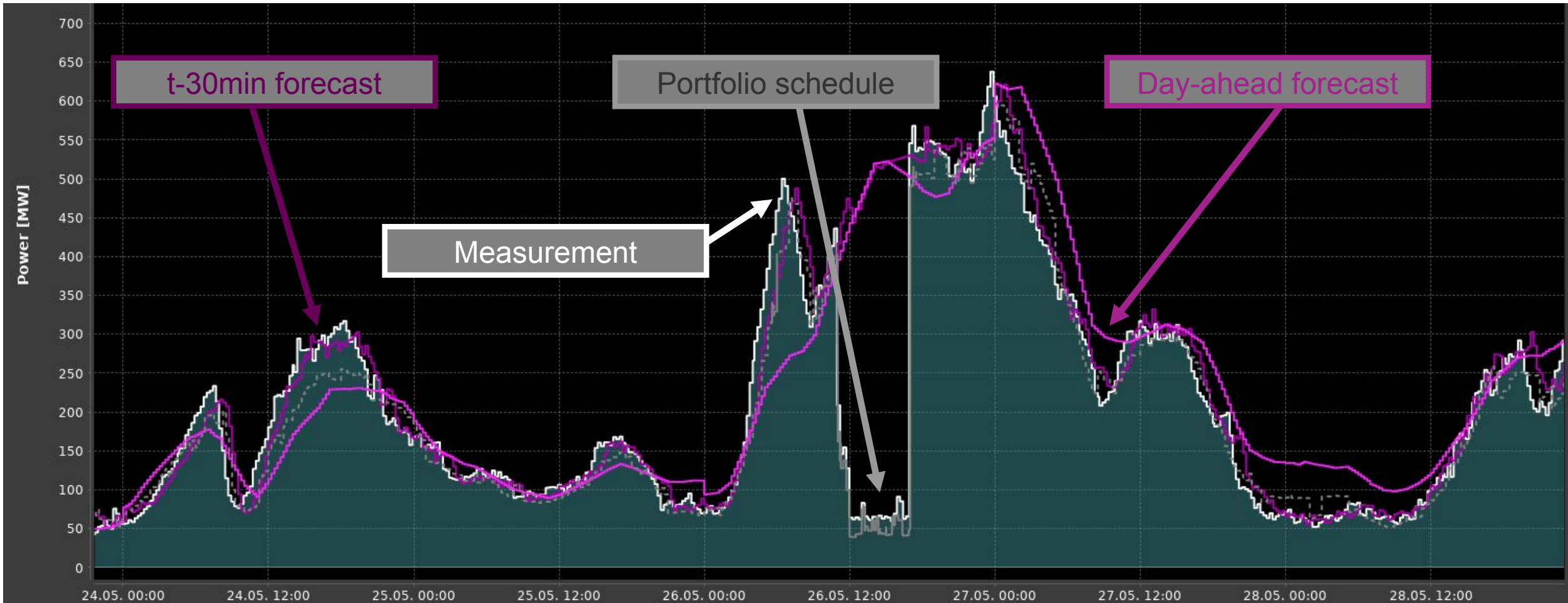
- CROATIAN POWER EXCHANGE (CROP)
- eex
- epexspot
- NORD POOL
- cmie

Logos of TSOs and power grid operators:

- AMMHE (ΑΔΜΗΕ)
- RTE (Réseau de transport d'électricité)
- RED ELÉCTRICA DE ESPAÑA
- amprion
- tennet (Taking power further)
- HOPS



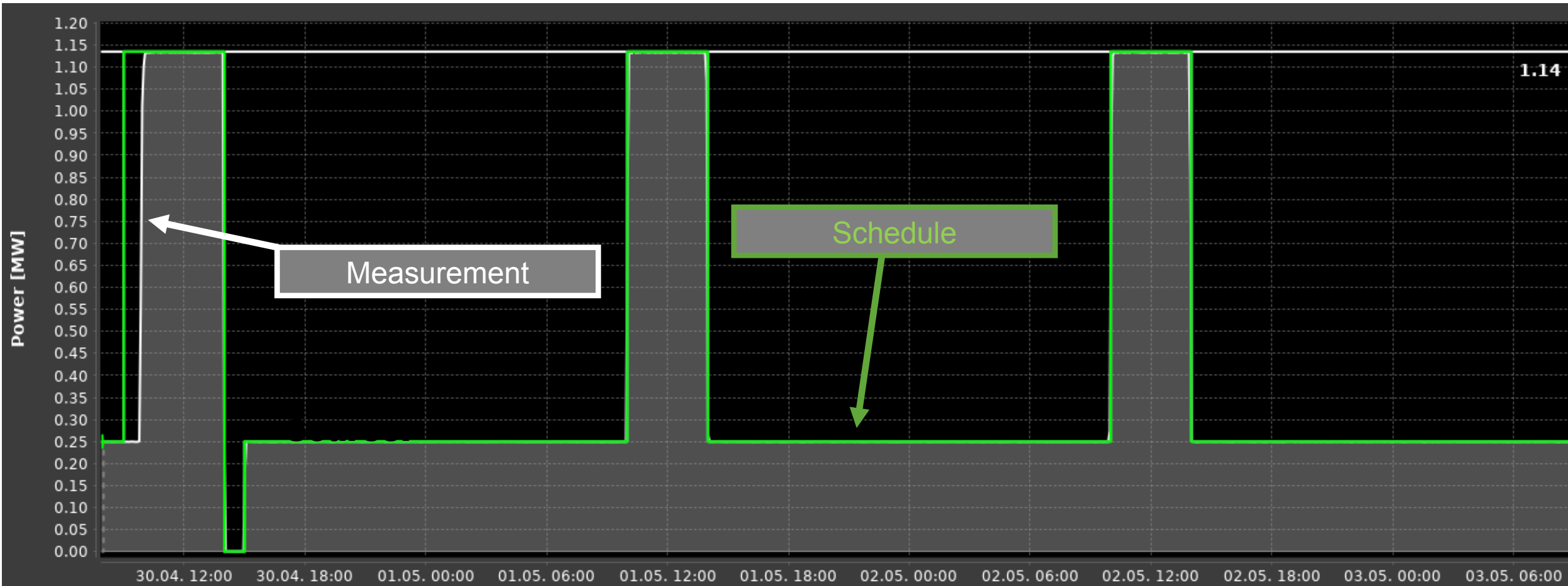
# USE CASE 1: POOL MANAGEMENT / SPOT TRADING



**Wind portfolio control due to negative prices**

Source: **energy & meteo**  
systems

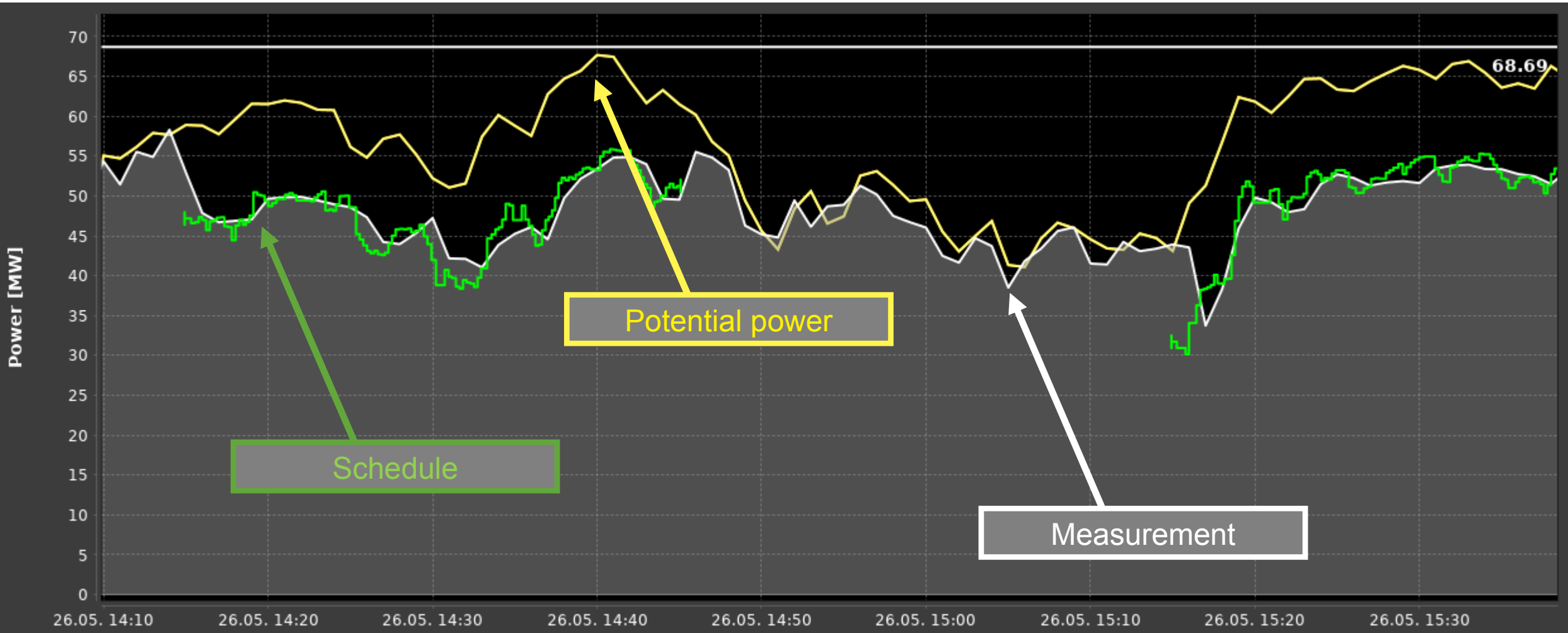
# USE CASE 2: FLEXIBILITIES TO THE TSO



**A biogas plant in the Frequency Restoration Reserve**

Source: **energy & meteo**  
systems

# USE CASE 2: FLEXIBILITIES TO THE TSO

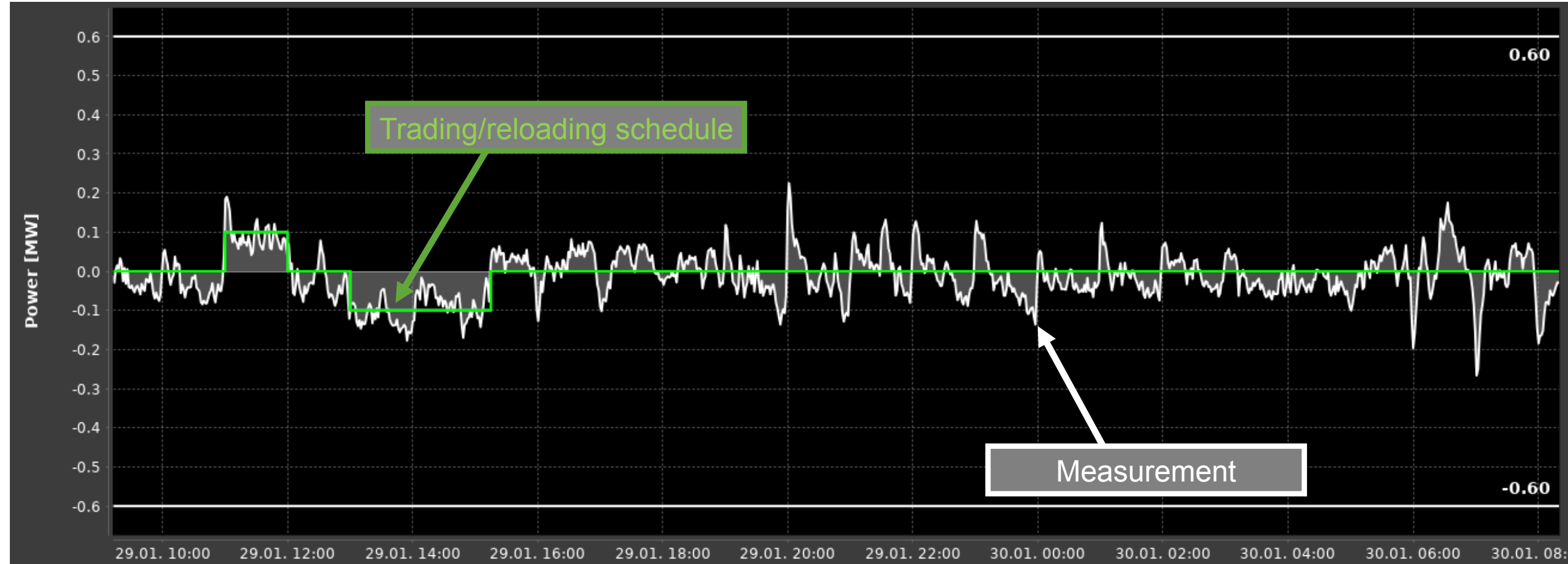


**A wind farm in the Frequency Restoration Reserve**

Source: **energy & meteo**  
systems



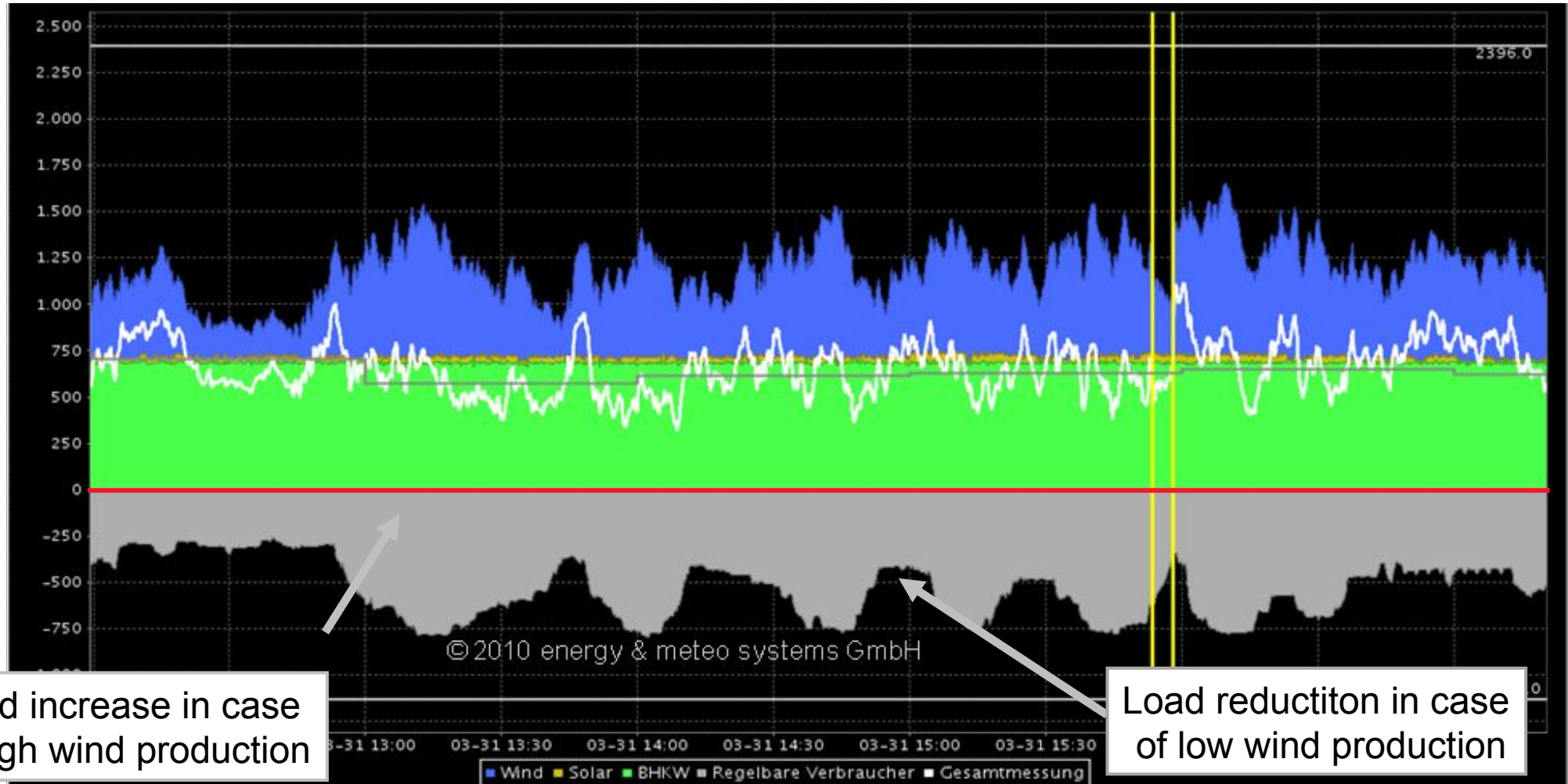
# USE CASE 2: FLEXIBILITIES TO THE TSO



**A battery in the Frequency Containment Reserve**

Source: **energy & meteo**  
systems

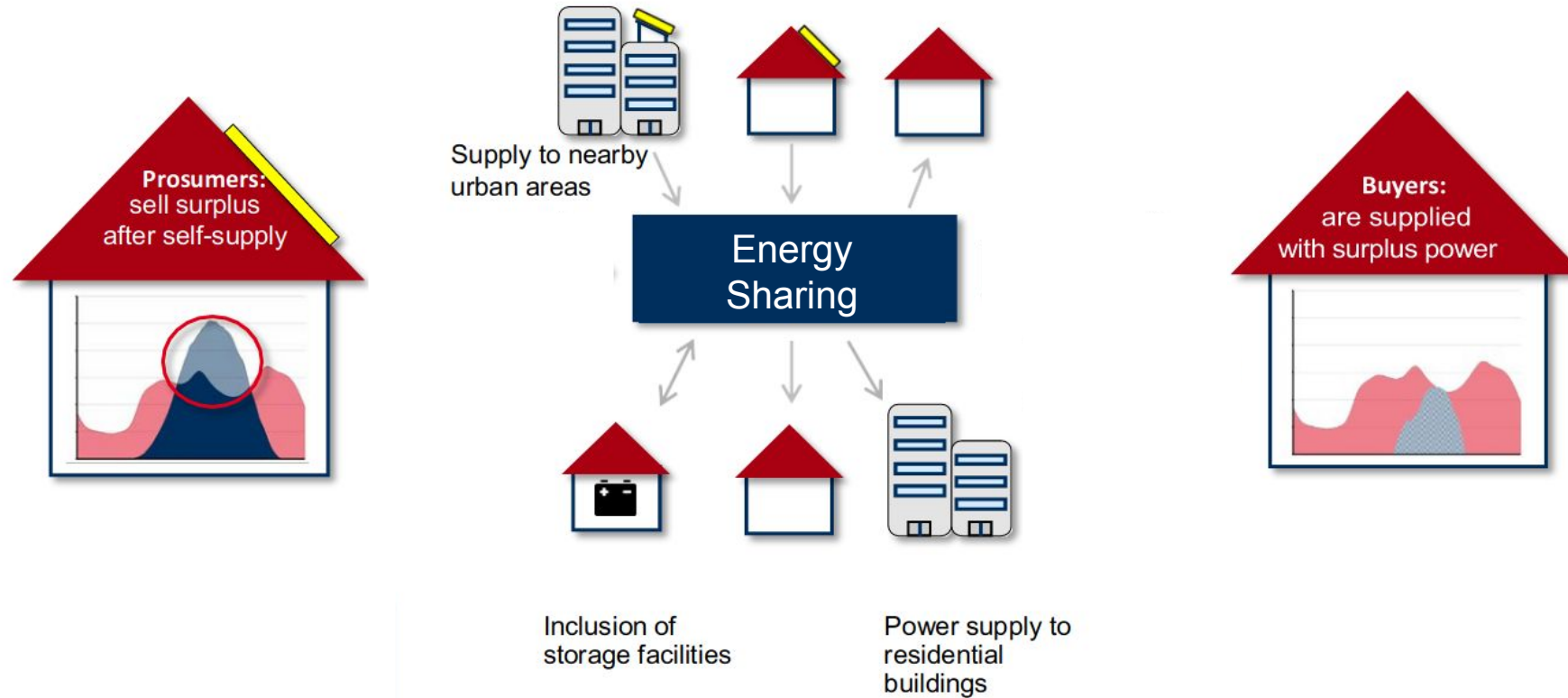
# USE CASE 3: FLEXIBILITIES TO THE BRP



**Demand response of a cold store**

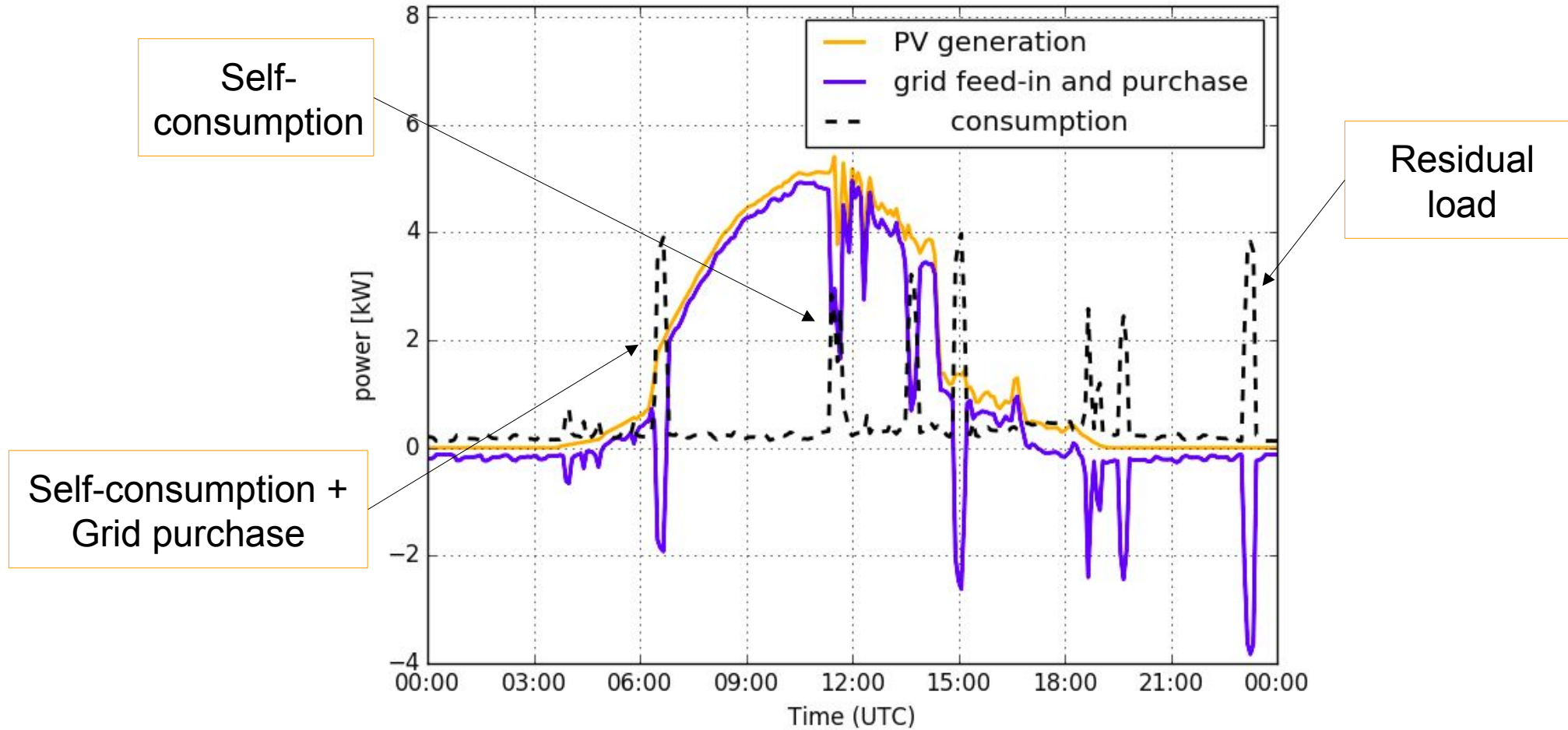
Source: **energy & meteo**  
systems

# USE CASE 4: ENERGY SHARING IN COMMUNITIES



Offsetting member's demand using the community's generation ([Energy Brainpool/BBEn 2017](#))

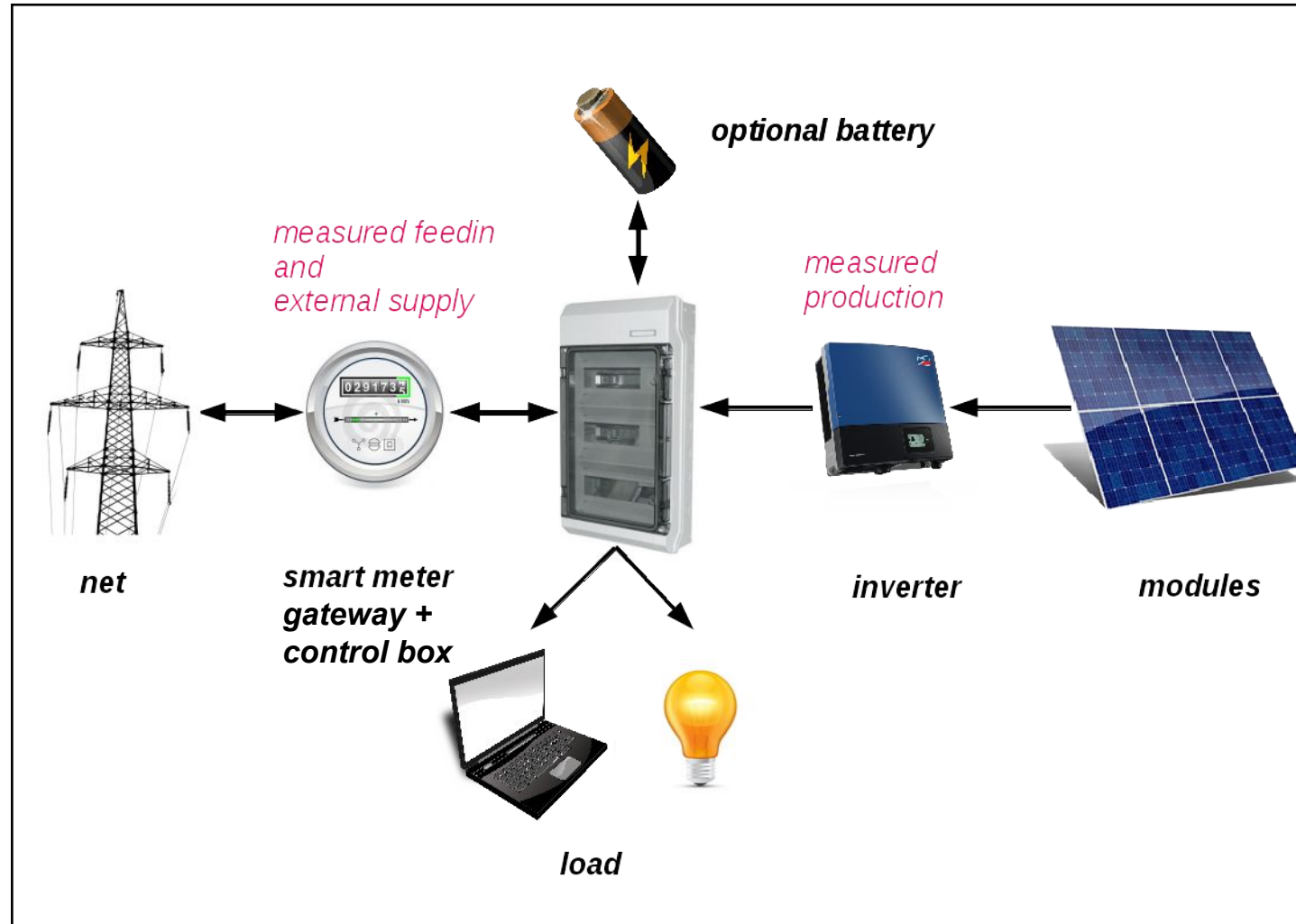
# USE CASE 4: ENERGY SHARING IN COMMUNITIES



Load and production profile of a random household

Source: **energy & meteo**  
systems

# USE CASE 4: ENERGY SHARING IN COMMUNITIES



**Household setup of a prosumer for energy sharing**