Navigating the Energy Frontier: Mastering Energy Management Systems (EMS)

Tom Libion

26/09/2023

PARTNER FORUM 2023

HAULOGY

THE IT ENERGY LEADER

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WHO ARE WE ?

FOUNDED IN

2005

FOCUS ON ENERGY & UTILITIES

100%

ACTIVE CUSTOMERS

70+

HAULOGIENS

185 AND COUNTING...

FOCUS COUNTRIES

3

BELGIUM
NETHERLANDS
FRANCE

EXPECTED TURNOVER 2023

21 M€ ↑ 35%

CONSISTENT YONY GROWTH 20% TO 30% LAST YEARS

EXPERTISE DOMAINS

3

SOFTWARE ENGINEERING
ARTIFICIAL INTELLIGENCE
ELECTRICAL ENGINEERING

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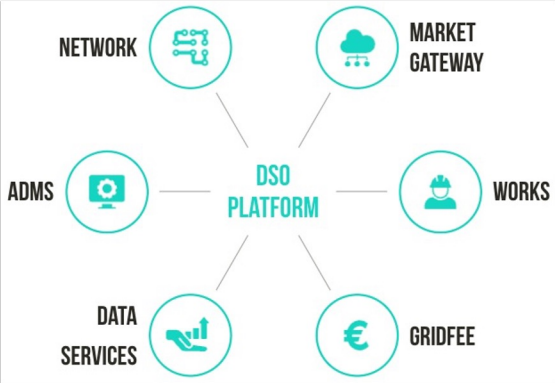
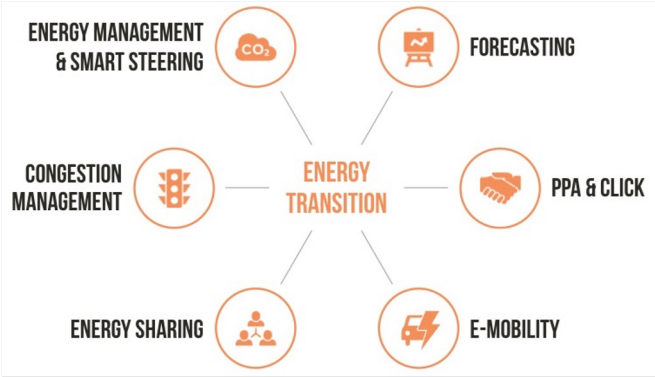
OUR OFFERING





Services

BUSINESS CONSULTANCY → AI EXPERTISE → SYSTEM INTEGRATION → MANAGED PLATFORM SERVICES → BUSINESS PROCESS OUTSOURCING

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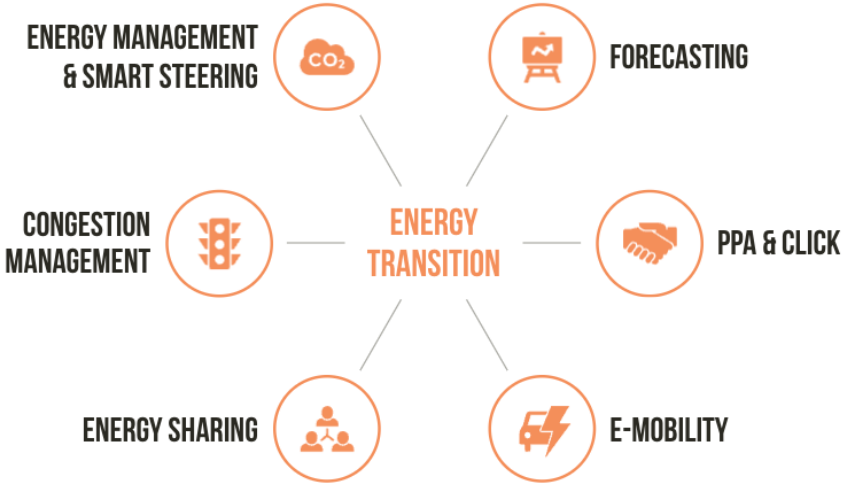
FOCUS ON THE ENERGY TRANSITION

How can we help you ?



OUR REFERENCES

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THE NEW CHALLENGES OF ELECTRICTY TRANSITION

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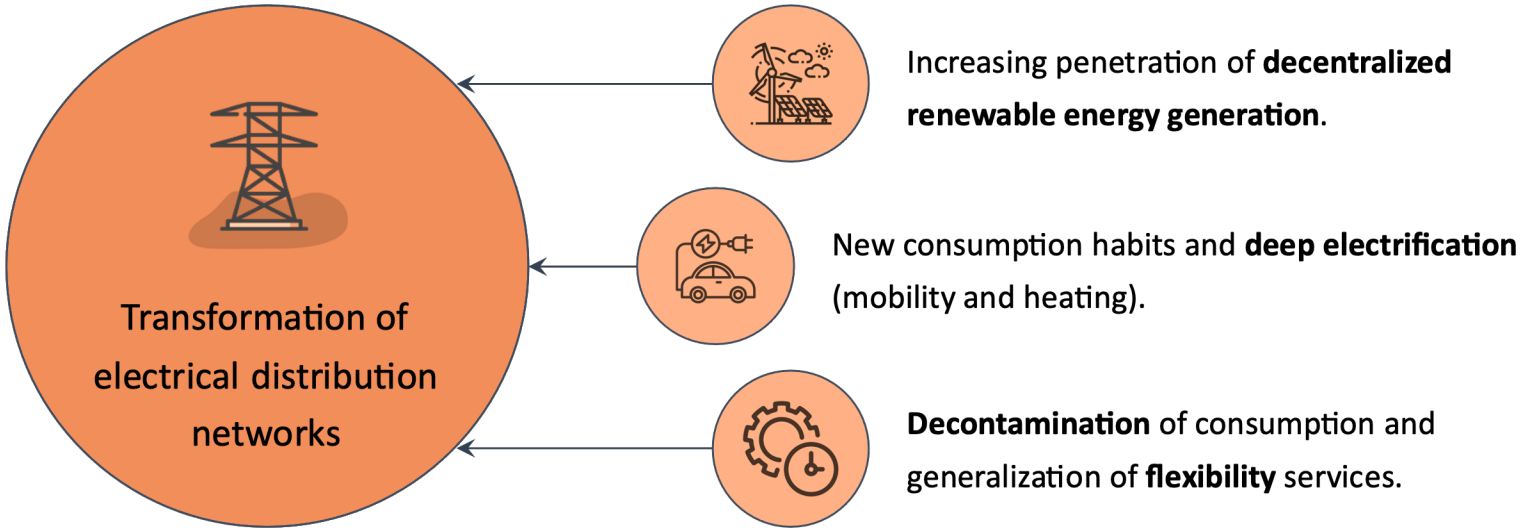
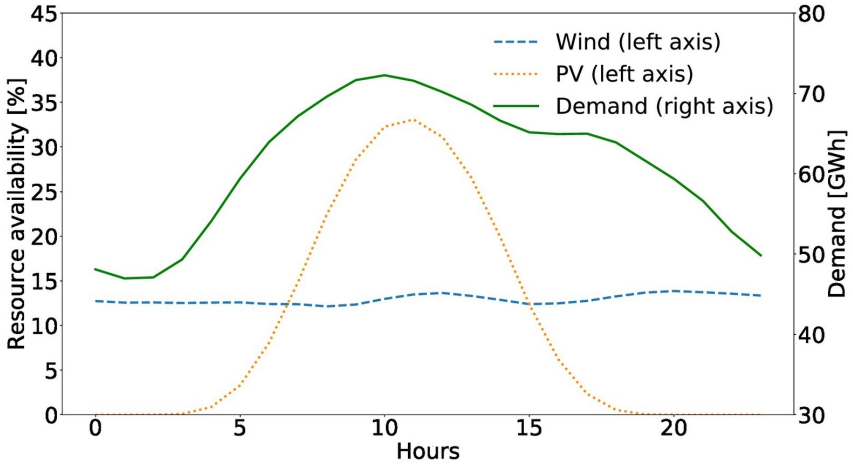
ELECTRICAL DISTRIBUTION FACING THE CHALLENGES OF THE ENERGY TRANSITION

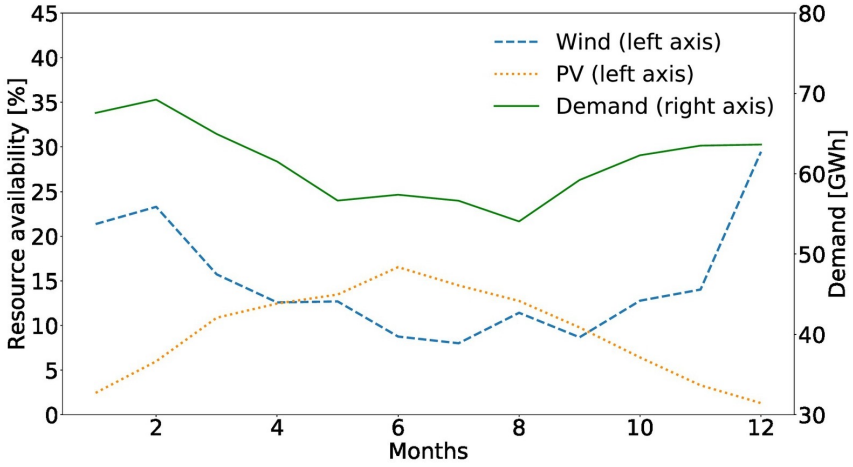
The current **energy transition** is leading to a significant **transformation** of the role of **electrical distribution networks** in the energy systems of today and tomorrow.



INTERMITTENCE OF RENEWABLE ENERGY PRODUCTION



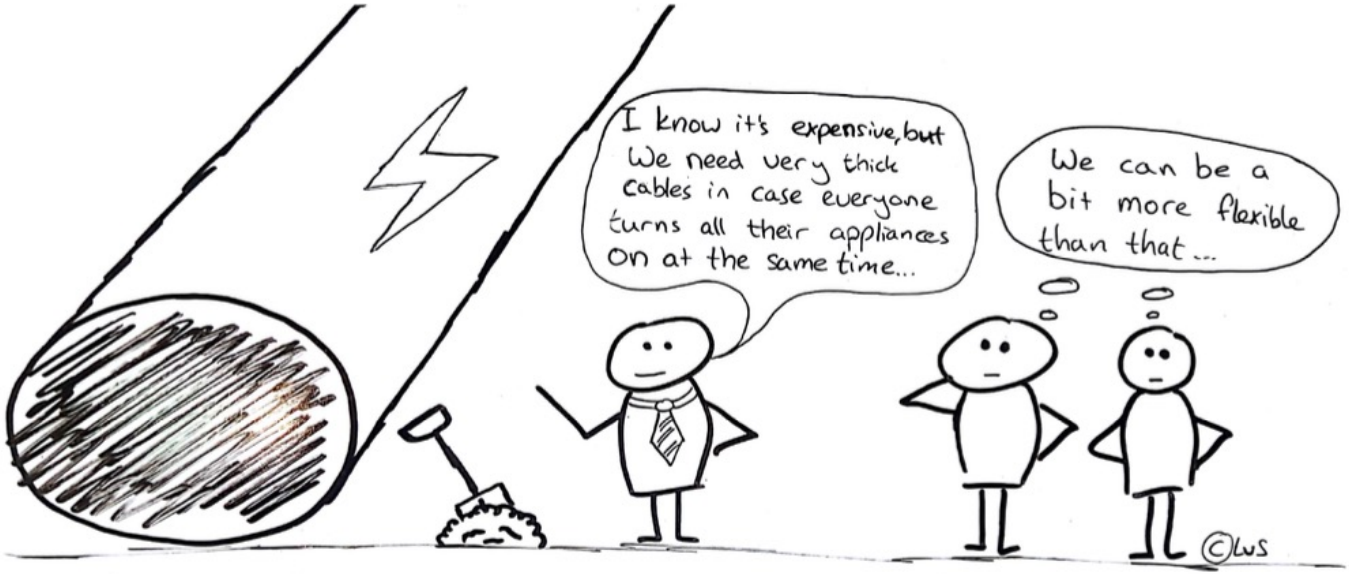
(a) By hour over a day.



(b) By month over a year.

Source: https://www.sciencedirect.com/science/article/pii/S0140988319302440
"By hour over a day" shows the hourly values for each variable averaged over the whole year.
"By month over a year" shows the hourly values for each variable averaged for a given month.
Electricity demand is based on data for the German electricity market in 2014 taken from ENTSO-E (2016). Resource availability for wind and solar is calculated as observed market production for a given hour relative to nominally installed capacities based on data from German transmission system operators (50Hertz, 2018, Amprion, 2018, Tennet, 2018, TransnetBW, 2018).

INTERMITTENCE REQUIRES FLEXIBILTY



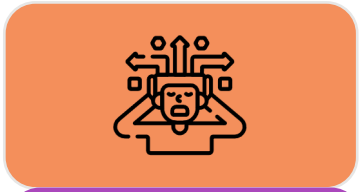
THE NEW CHALLENGES OF ENERGY SUPPLIERS

Market Volatility	The price difference on the Belgian energy market was up to €500 per Mwh on the same day
Lack of differentiation	All energy suppliers offer green, local energy and additional services.
Increasing renewable production	Prosumers are proliferating, making it increasingly challenging for energy suppliers to accurately procure the requisite amount of energy for their portfolios.

THE ENERGY SUPPLIER IS NO LONGER TAKING RISKS

Market Volatility

Predictibility



Lack of differentiation

New Offerings

Increasing renewable production

Adaptability

DECARBONATION TAKES CENTER STAGE

Policies

Reduce emissions by at least 55% by 2030

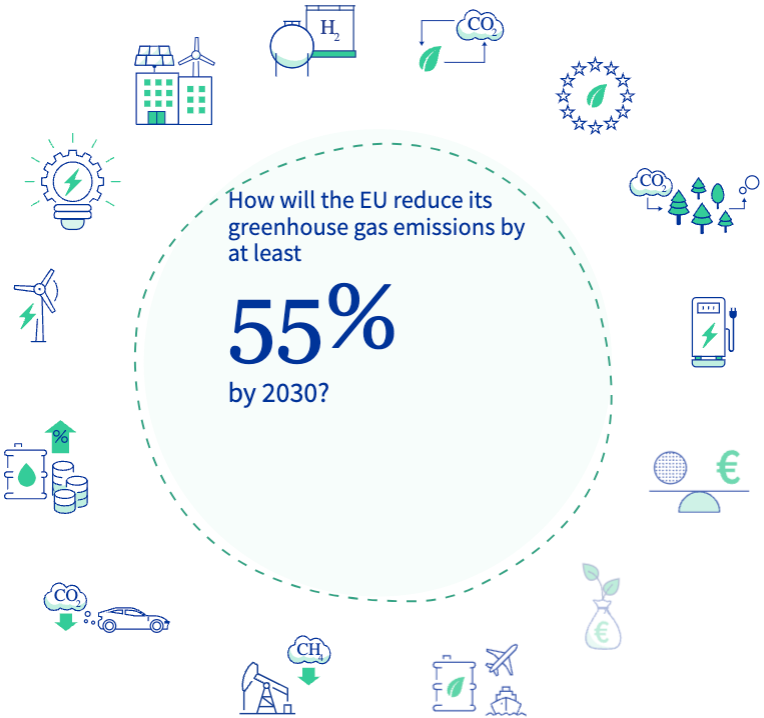
Target net-zero by 2050

Reduce gas emissions 50 below 2005 levels in 2030

Competitiveness risks

FIT FOR 55 & ENERGY TRANSITION

- Energy Production:
  - Shift from fossil-based systems to renewable energy sources
    - Solar
    - Offshore Wind
    - Onshore Wind
    - …
- Electrify Consumption:
  - Heat Pumps
  - Electric Cars
  - Electric Transport: trucks, busses, …



MASTERING THE ENERGY COSTS

To become or to make something become smaller in size, amount, degree, etc.

Cambridge Dictionary

To learn how to do something well

Reduce

Master

- Grid congestion
- ESG Policies
- Electricity Prices

EXPLICT VS IMPLICIT FLEXIBILITY

EXPLICIT

- Contract with an aggregator or directly with an actor interested in flexibility (e.g. a DSO or TSO Elia System (Ancillary) Services)
- When this actor needs flexibility, you are required to deliver the amount of flexibility for a specific amount of time
- Non-compliance may result in a penalty.
- Technical constraints (eg. Min. capacity)
- Administrative constraints: contractualisation, penalties
- **Competition will increase** due to battery parks, low voltage assets, ...
  → **price will decrease (Elia objective)**

IMPLICIT

- **Energy prices are dynamic** and reflect the (dis)balance between demand and supply and/or the available capacity of the network
- **Increasing price volatility** due to intermittency, RES, ...
- No specific capacity requirement
- Financial Incentive to **shift energy demand to moments when prices are low**

HAULOGY AMEO OPTIFLEX

OUR SOLUTION

THE « SMART BATTERY-UPS » CONCEPT

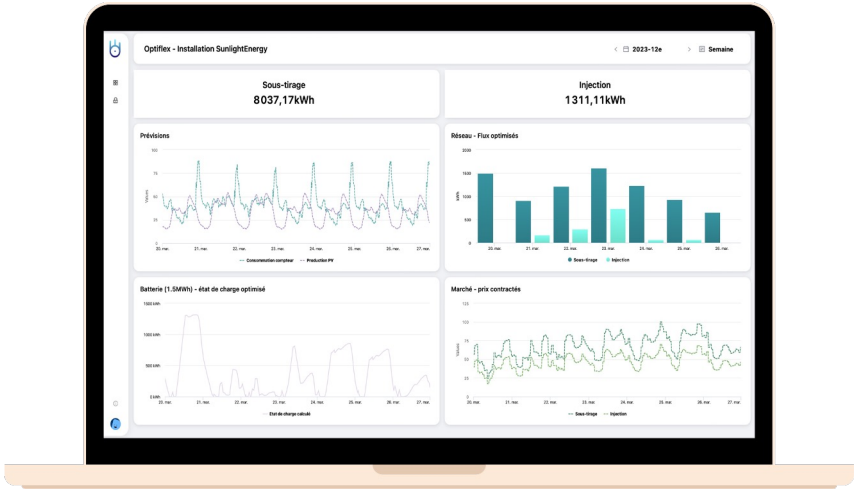
Battery-UPS ***flexibility*** refers to the ability to charge and discharge based on various parameters set within the solution, such as cost in euros or equivalent CO_2

Battery ***resilience*** refers to the ability to always have a charged portion in the event of a power grid failure, thus ensuring a continuous supply of energy

OUR SOLUTION

An AI-based software that controls energy site in order to :

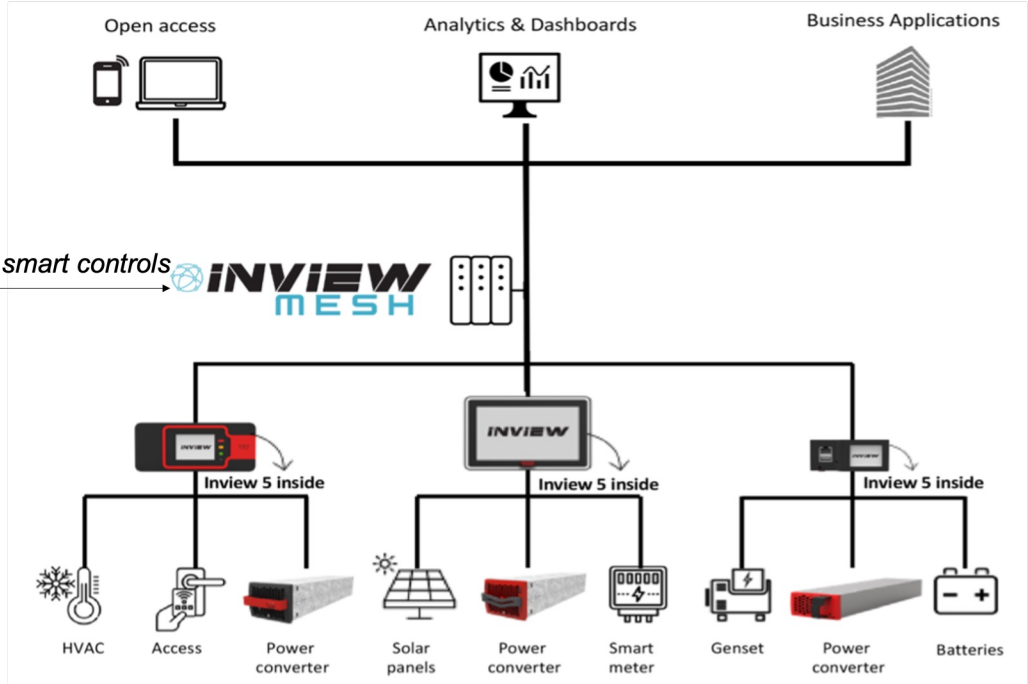
- Forecast the profiles
- Optimize technically and economically
- Respect business constraints



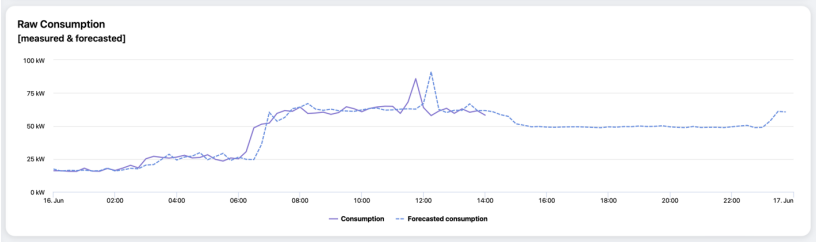
ARCHITECTURE OF THE SOLUTION

AMEO OptiFlex

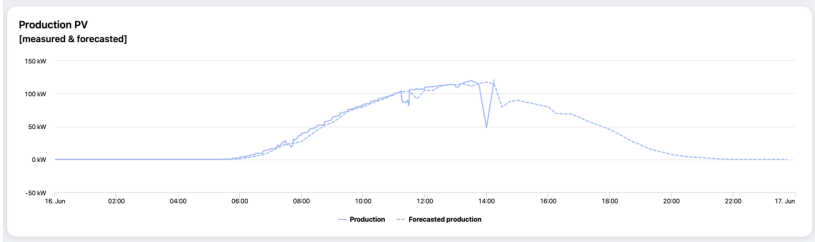
Exchange of data and smart controls



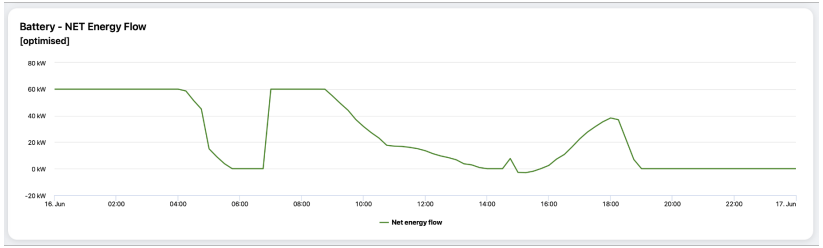
WHAT DOES IT LOOK LIKE ?



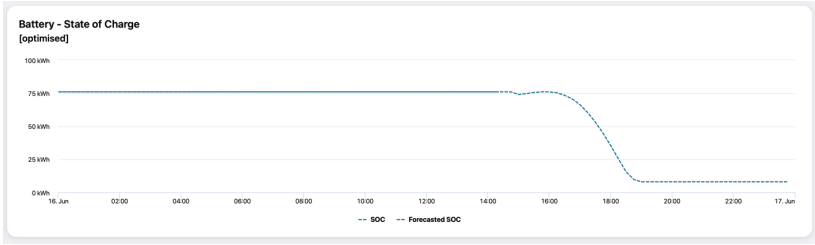
Consumption Profile



Production Profile



Commands to the Battery



Price Optimization

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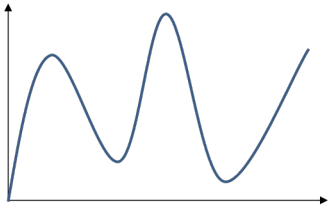
WHERE ARE THE BENEFITS ?

Time-varying cost per kWh

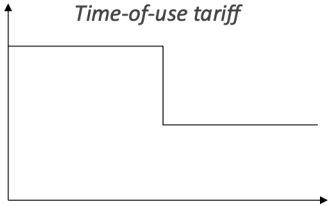
Gain on hourly price differential

Spot-like hourly tariff



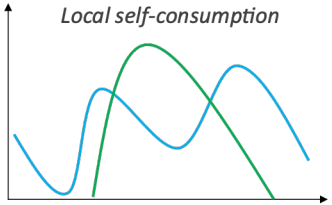
Gain on change of tariff period

Time-of-use tariff



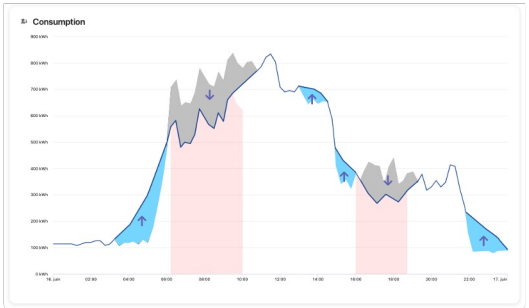
Reduction of carbon emissions

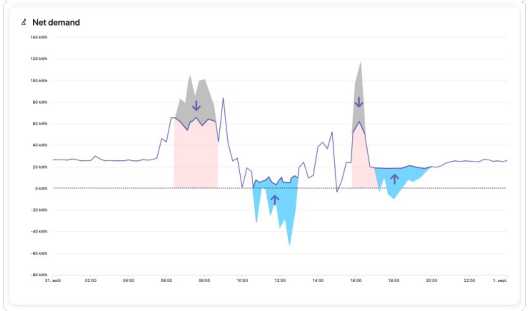
Local self-consumption



Demand shifting

*Forecast, flexibility optimization/planning, and real-time control by **AMEO Optiflex***





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Q&A

Thank you
for your attention

Check our website

www.cet-power.com

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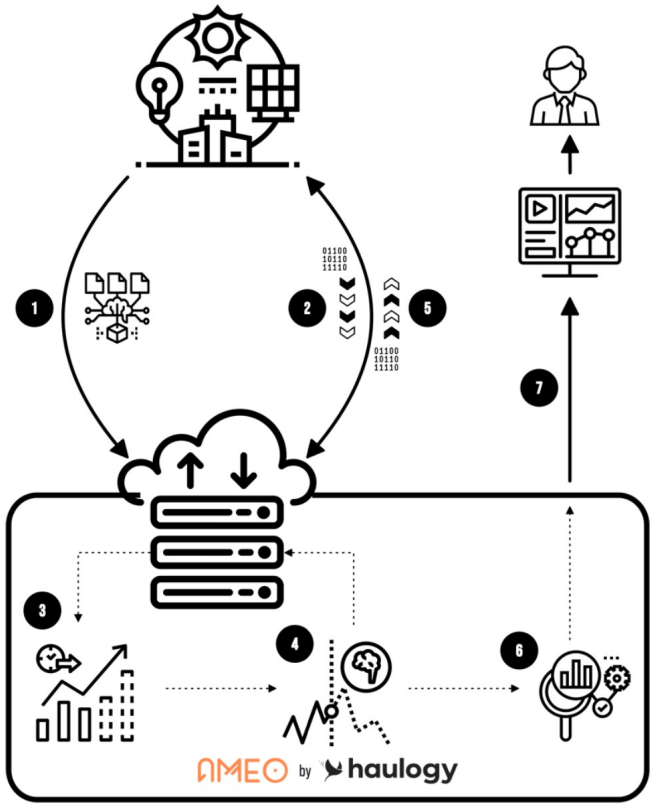
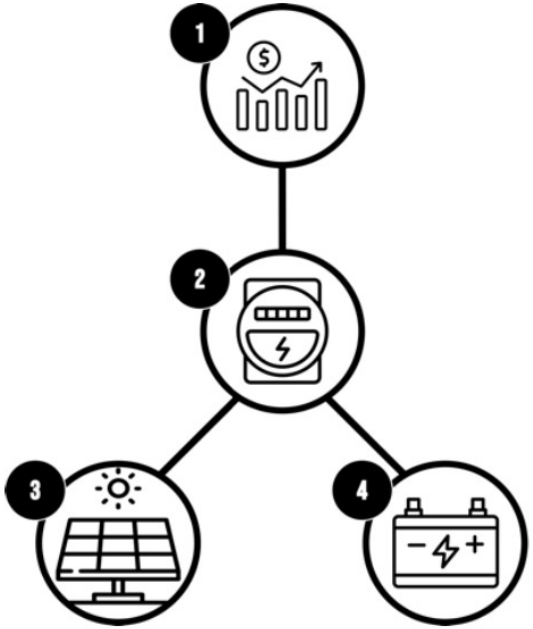
AMEO OPTIFLEX STEP BY STEP

1. An **energy model** of the site to be monitored is built and encoded in AMEO Optiflex
2. The real-time acquisition flow of the measurement data is configured, and the solution starts to **collect** them.
3. AMEO Optiflex performs a **predictive analysis** of balances and energy costs for the current day and the next day using site-specific artificial intelligence models.
4. An optimal **shifting plan** of the demand is computed based on the predictive analysis.
5. Control instructions are transmitted in **real time** to the site's communication devices



THE MODELED CONCEPT



1. A **« Market » node** represents the cost formula applied by the supplier and possibly following market indices (e.g. spot market prices).

2. A **« Meter » node** from the network operator providing the metering data (net flow) for supplier billing and network charges.

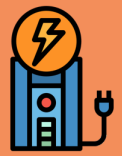
3. A **« Photovoltaic » node** represents a PV production source located downstream of the meter. Its production can be self-consumed or injected into the grid depending on local consumption.

4. A **«Battery» node** represents a storage capacity that can be controlled and monitored by AMEO OptiFlex in order to minimise the energy costs defined by the nodes ❶ and ❷ while taking into account local production ❸.

THE SMART UPS CONCEPT

3 scenarios

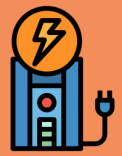
SCENARIO 1



The storage is sized for backup only.

The storage is nothing else than insurance policy.
There is no payback strictly speaking, it pays off in case of

SCENARIO 2



OPTIFLEX

The storage is sized for backup only.

We add AMEO OptiFlex in order to optimize energy flows keeping the UPS function ready for outages.

SCENARIO 3

OPTIFLEX

AMEO Optiflex is used to find optimal sizing of all site components in line with local contingencies.

AMEO OptiFlex is used to optimize energy flows keeping the storage function ready for outages.