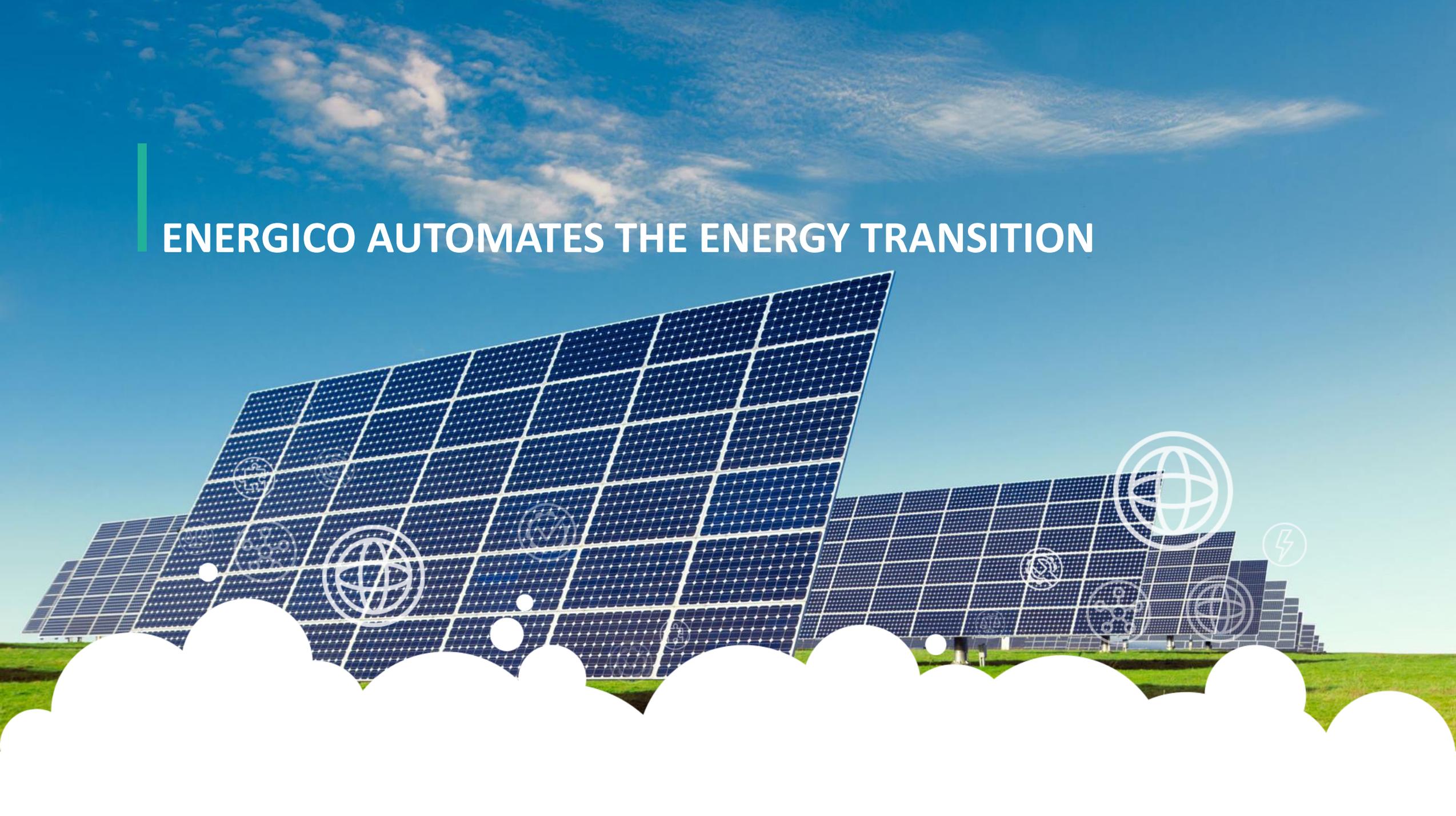


Studium Generale:
'Accelerating the electrification in the process industry'
Optimizing renewable power





ENERGICO AUTOMATES THE ENERGY TRANSITION

ABOUT ME



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+31624511882

Specialty: everything under control

AGENDA

- INTRODUCTION OF CROONWOLTER&DROS & ENERGICO.ENERGY
- ENERGY TRANSITION → AMBITIONS & CHALLENGES
- THE ROLE OF ENERGY MANAGEMENT
- SMARTER SUSTAINABLE TOGETHER.
- THE ROLE OF THE INDUSTRY; OPPORTUNITIES



INTRODUCTION OF CROONWOLTER&DROS & ENERGICO.ENERGY

WHY DO WE DO WHAT WE DO?

We are system integrators.

That is our passion

For this we have the knowledge,
experience, products

IT Security

System integration

Automation

Energy

Data Hosting

IEC-61850

Information-modelling



ENERGY NEUTRAL TUNNEL

“DE GROENE BOOG” A13/A16



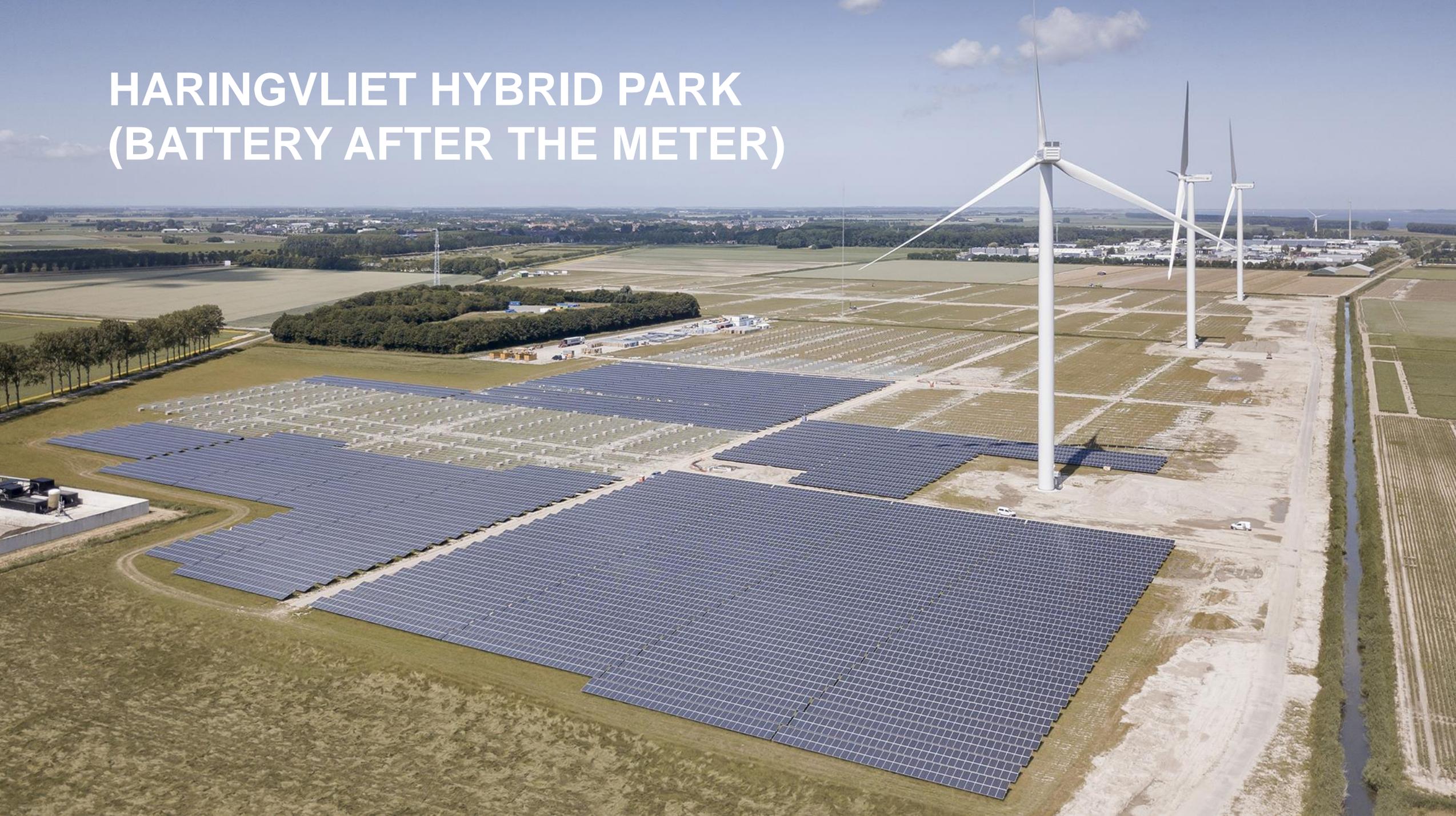
KRIEGER'S FLAK



TENNET 110-150 KV – TURNKEY SUBSTATION RENOVATION



HARINGVLIET HYBRID PARK (BATTERY AFTER THE METER)



Smart Grid

Battery with own
grid connection

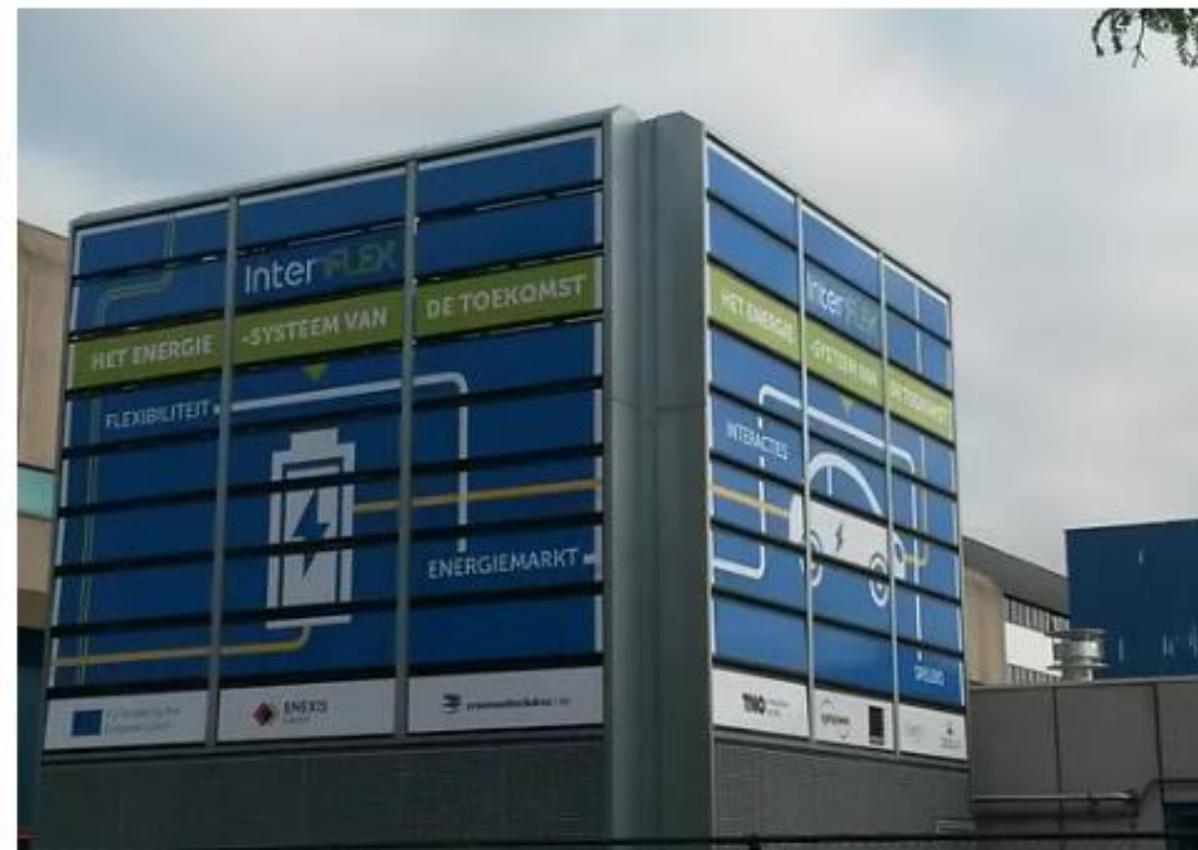
InterFLEX

Striip-S

Eindhoven



STELLA VIE



ENERGICO: TECHNICAL LEADERSHIP IN THE ENERGY TRANSITION

The world is in the midst of an energy transition and we are excited to be a part of it. We are Energico. We develop, supply and implement **energy management solutions** for smart energy systems. At Energico, we love complex technology. And you know what we like even more? **Converting complexity into simplicity.** That is why we have developed the following four propositions aimed at smart grids:

SAM

EMMA

Consulting
Services

Energico
Academy

Energico makes life easier (and more fun) for players in the energy sector.

SAM : ENERGICO'S SUBSTATION AUTOMATION MANAGER



Problem:

Sustainable electricity generation offers energy companies new opportunities, but also new types of challenges. There is a **lack of (technical) personnel**, but have to **manage more and more complex systems** (energy management, security, burglar alarm, fire detection, etc.). These systems also provide more and more data.

Solution:

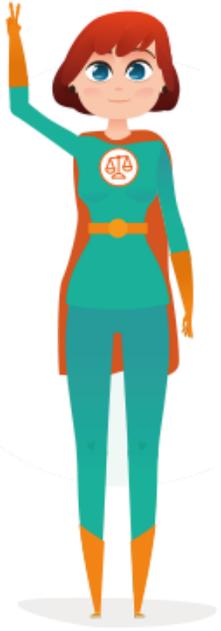
SAM makes managing complex systems **easily accessible** to those without training. Our Substation Automation Manager (SAM) provides you with **real-time** monitoring and control of your power generation processes, enabling remote and **device-independent** site management and troubleshooting.

Information from different systems from different suppliers is visualized in a unified and intuitive way, allowing for **remote analysis** and **error-free operation** of the system. This helps reduce response times and requires less skilled operators.

VATTENFALL HAS SELECTED SAM FOR THE MANAGEMENT OF ITS ON- AND OFFSHORE WIND FARMS.



EMMA: ENERGICO'S ENERGY MONITORING & MANAGEMENT ASSISTANT



Problem:

Are you planning a local smart grid for a neighbourhood, business park or campus – or for a smart building? How should you **combine energy from different sources**? Or how do you gain sufficient insight into **managing innovative technology** such as hydrogen stations, water electrolyzers and sea salt batteries?

Solution:

EMMA is a smart management system that allows you to **optimally allocate locally generated energy between consumption, storage, grid supply, trade and containment**.

EMMA connects and manages all assets and aspects related to energy generation, distribution and consumption, such as PV installations, batteries and, for example, EV charging stations. Clear dashboards and automatically generated reports provide you with relevant data and insights. And with the help of algorithms, we can tailor the system perfectly to your specific local situation.

ENEXIS HAS SELECTED EMMA FOR ENERGY MANAGEMENT OF ITS SMART CITY DISTRICT STRIJP-S IN EINDHOVEN.



ENERGY CONSULTANCY

Problem:

Our customers often have questions about an area-oriented approach. The scarcity on the electricity grid, now only for the return of energy, plays an important role in this. From the perspective of sustainability and sustainable energy generation, it is necessary to look at how to deal with energy flows in a different way. But how?

Solution:

Energico analyzes the opportunities for exchanging surpluses and shortages of local energy, designs an area vision and translates this into a feasible plan. Our approach is creative, we ask all stakeholders in the area that we consider promising, and we deliver our plan in an attractive, readable Vision.

THE MUNICIPALITY OF BREDA HAS SELECTED ENERGICO FOR CONSULTATION TO COMBINE SUSTAINABLE PROJECTS INTO ONE ENERGY VISION



ENERGICO ACADEMY

Problem:

There is a lack of (technical) personnel. There will be a new standard IEC-61850. How should companies deal with this technically and organisationally?

Solution:

Energico has developed **five training courses on IEC-61850:**

- Management training IEC-61850
- Theoretical training IEC-61850
- Multivendor systems and IEC-61850
- Top down engineering with IEC-61850
- Maintenance in IEC-61850 stations

Curious about IEC-61850; we advise you to follow the management training ;-)

TENNET HAS SELECTED ENERGICO AS PREFERRED PARTNER FOR IEC-61850 TRAINING COURSES



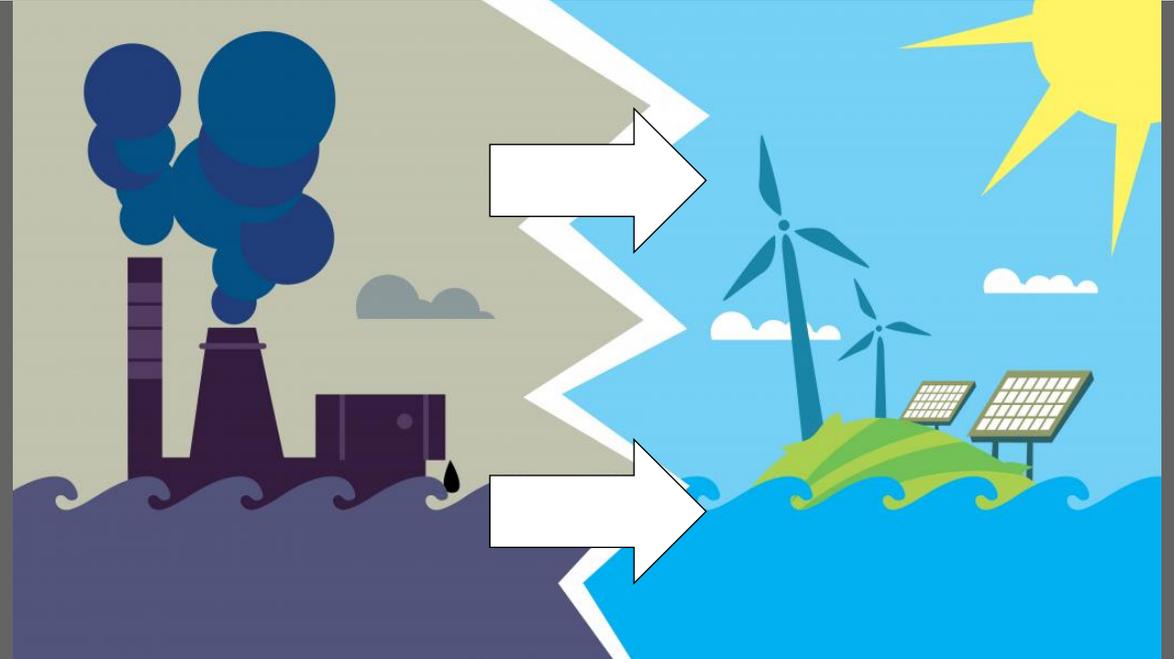


ENERGY TRANSITION → AMBITIONS & CHALLENGES

ENERGY TRANSITION



Major concerns about the effects of a changing climate...



... driving the energy transition with emission-free, sustainable generation



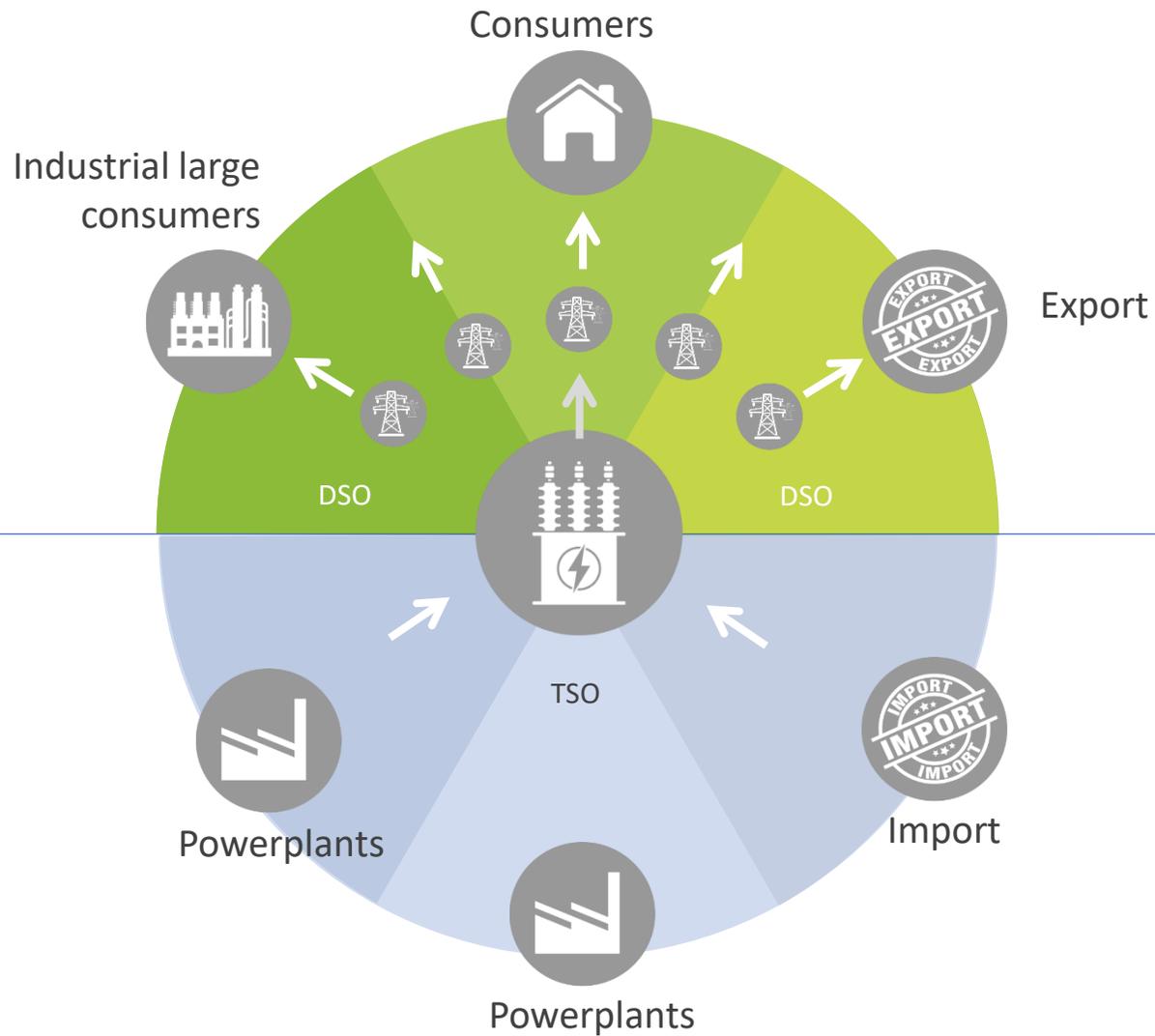
Consumers

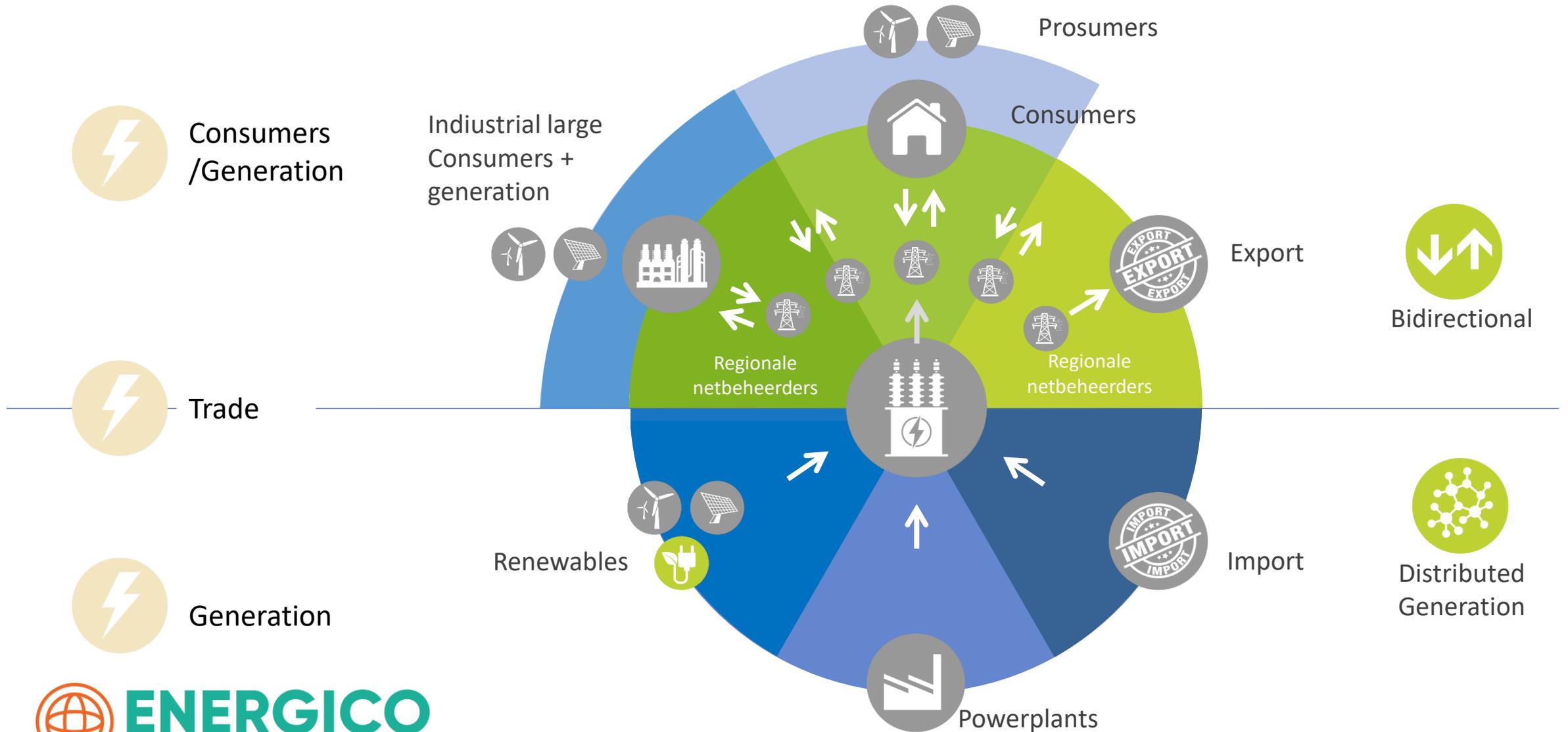


Trade



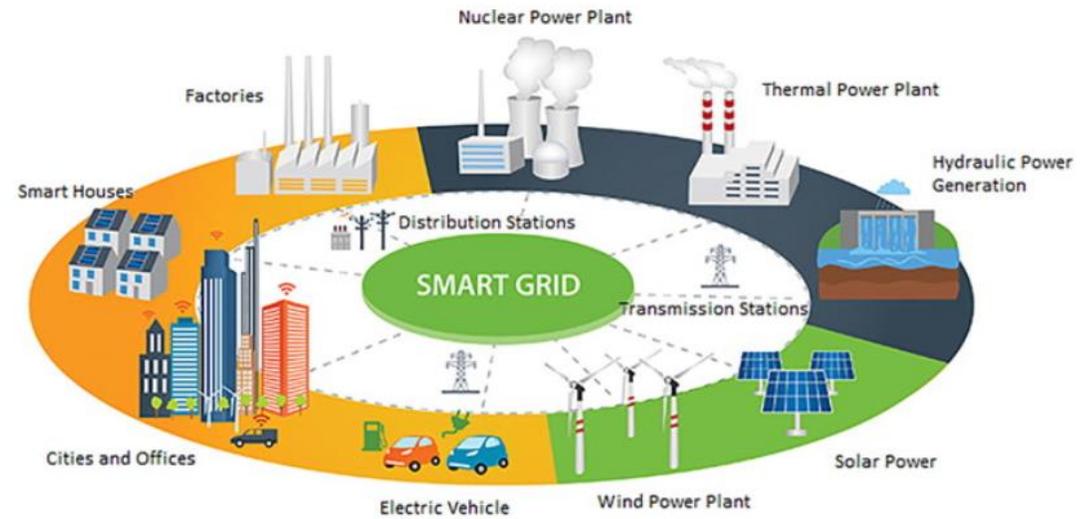
Generation





CHALLENGES

- CO2 reduction goals
- Limited grid capacity
- Sustainable business case
- Responding too late on current energy prices
- Lack of asset insights
- Asset issues caused by reactive maintenance
- No overview because of too much diversity in assets, locations, suppliers, versions, tooling.



CO2 REDUCTION GOALS

Key targets for 2030: (EU)

At least 40% cuts in greenhouse gas emissions (from 1990 levels)

At least 32% share for renewable energy

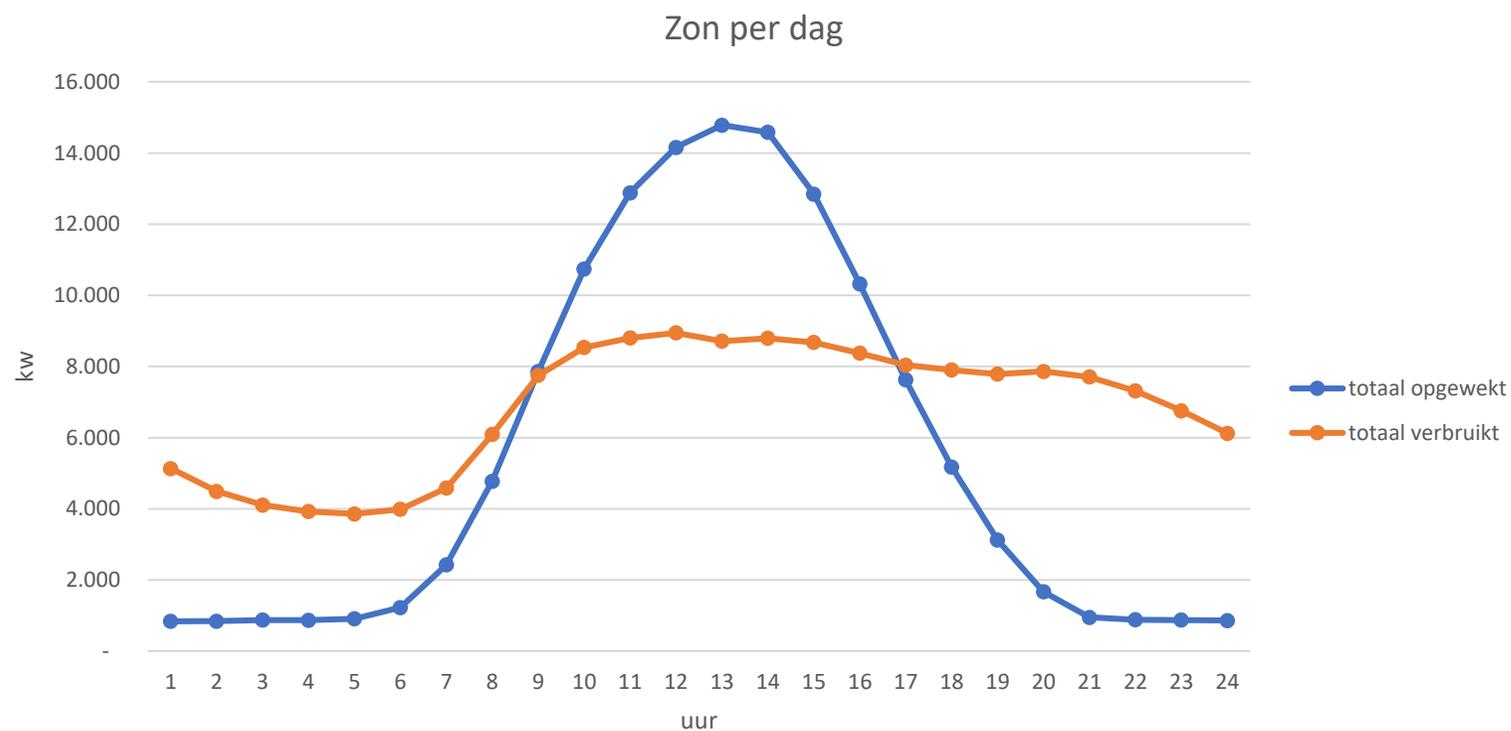
At least 32.5% improvement in energy efficiency



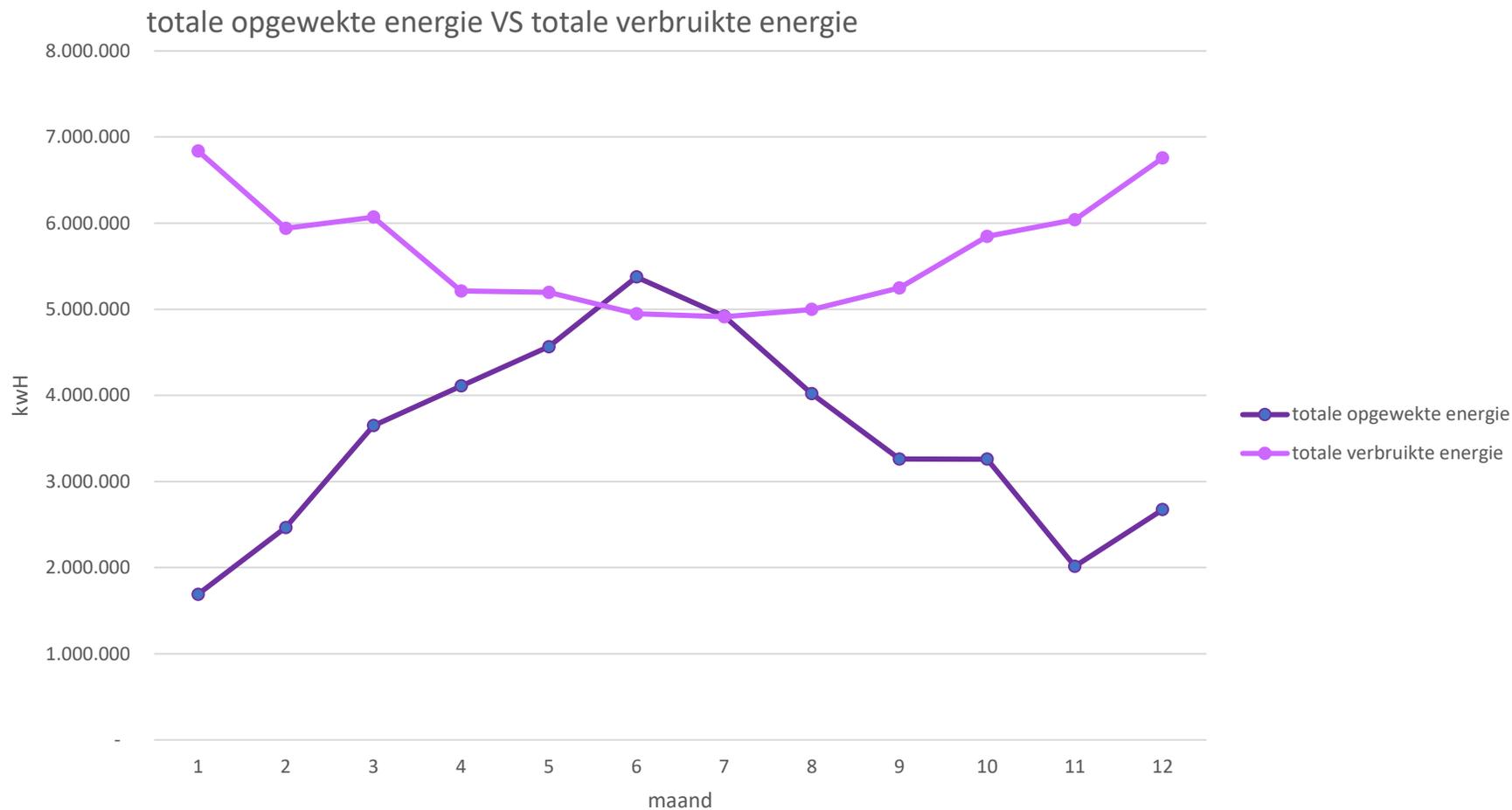
THE CHALLENGE



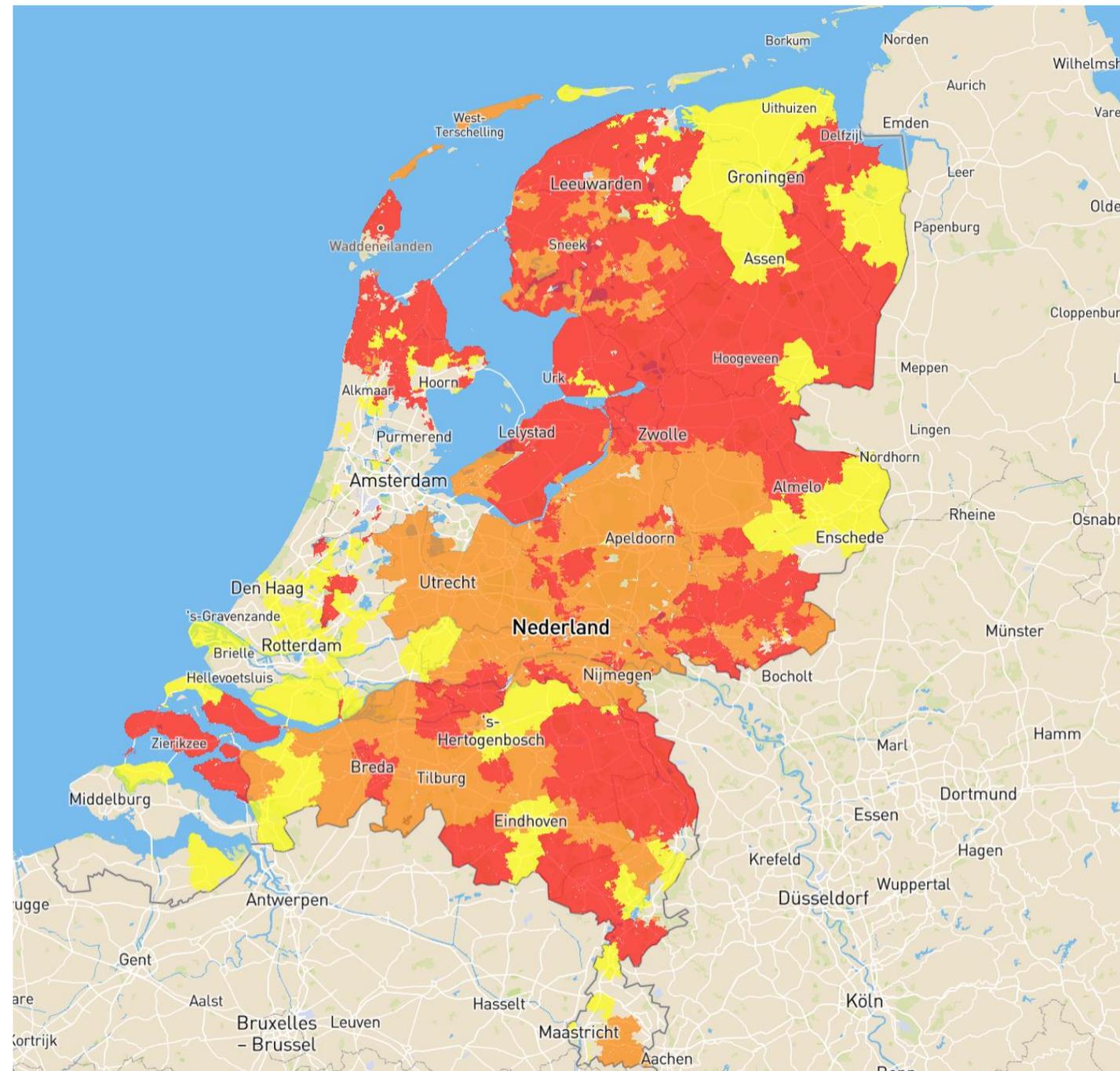
SUN PER DAY



SUN PER YEAR



CONGESTION EXAMPLE NETHERLANDS:





THE ROLE OF ENERGY MANAGEMENT

CONTROL: IMPROVING MATCH BETWEEN E-DEMAND AND E-SUPPLY



Supply and demand =
asynchronous:
highly fluctuating at different
times

**SUSTAINABLE OFFER:
DEPENDING ON WEATHER
CONDITIONS**



**NOT CONTROLLABLE,
DIFFICULT TO PREDICT**



**HOW DO WE KEEP THE
BALANCE?**





ELECTRICITY DEMAND: STRONG ELECTRIFICATION

- **ELECTRIC TRANSPORT**
- **GASLESS NEIGHBORHOODS**

**LARGE PEAKS IN ELECTRIC
ENERGY CONSUMPTION**



GOAL CONTROL: IMPROVING MATCH BETWEEN E-DEMAND AND E-SUPPLY



Supply and demand = asynchronous:
highly fluctuating at different times



Who is in charge of fluctuations in decentralized generation?



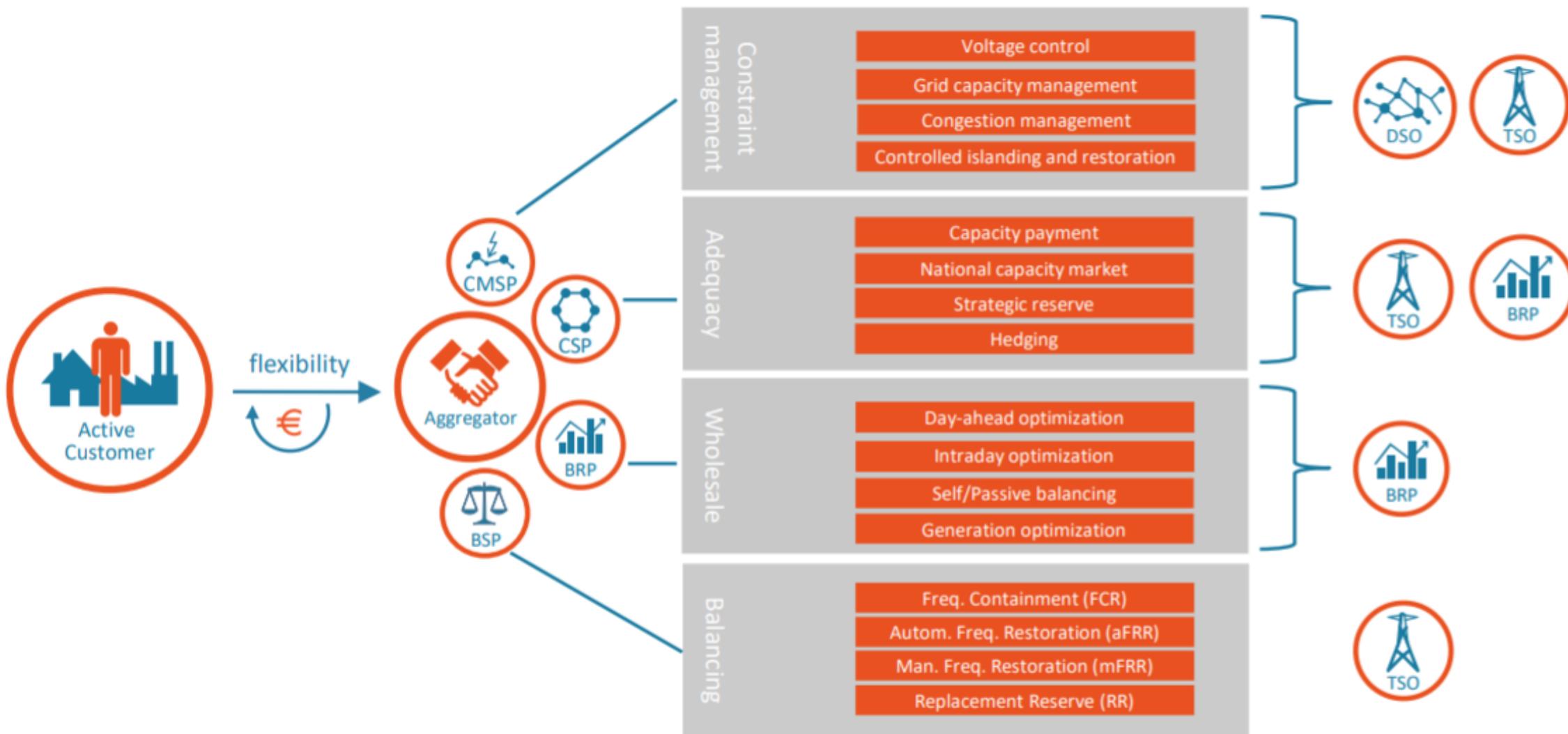
CENTRALIZED BRP GUARANTEEING THE BALANCE (NETWORK OPERATORS)



BETTER KEEP THE BALANCE TOGETHER (DECENTRALIZED) AGGREGATOR

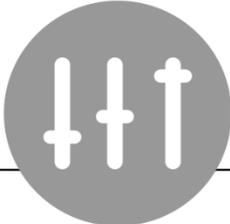


AGGREGATOR



CONTROL OPTIONS

CONTROL OPTIONS



Demand management



Energy Storage



Grid connection?



Curtailment:



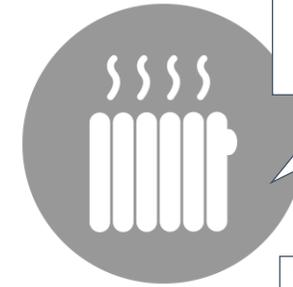
Conversion

DEMAND CONTROL

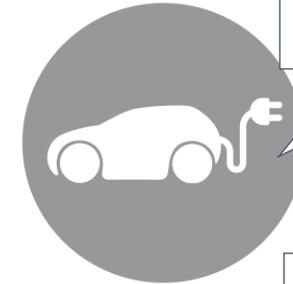
SMART CONTROL



- Cap peaks
- Choosing the smartest moments of use
- Time shifting
- Taking user-friendliness into account
- financial incentives
- working on awareness and/or support



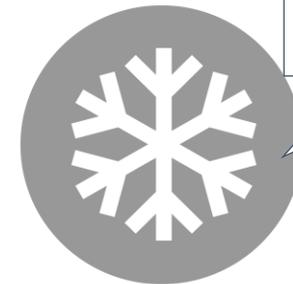
Control of temperature



EV-charging:
smart charging



Industrial process
Time shifting



Freezer,

GRID CONNECTION

TO DO OR NOT TO DO?



- **Not always possible**
- **Not always profitable (cable costs)**
- **Project delaying factor: cable extension sometimes has to be requested / realized first**





STORAGE IN LITHIUM-ION





STORAGE IN LITHIUM-ION



Life expectancy



Temperature dependant

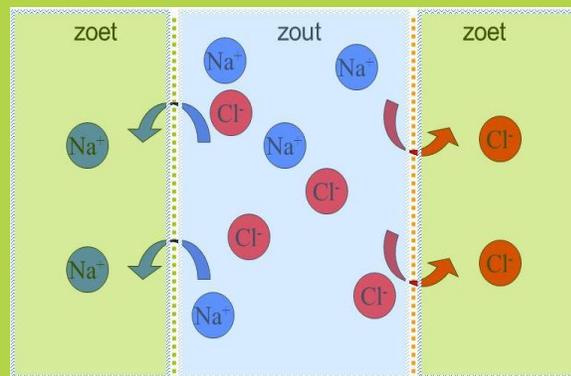


Cost



Not durable

MANY ALTERNATIVES SALT WATER BATTERY



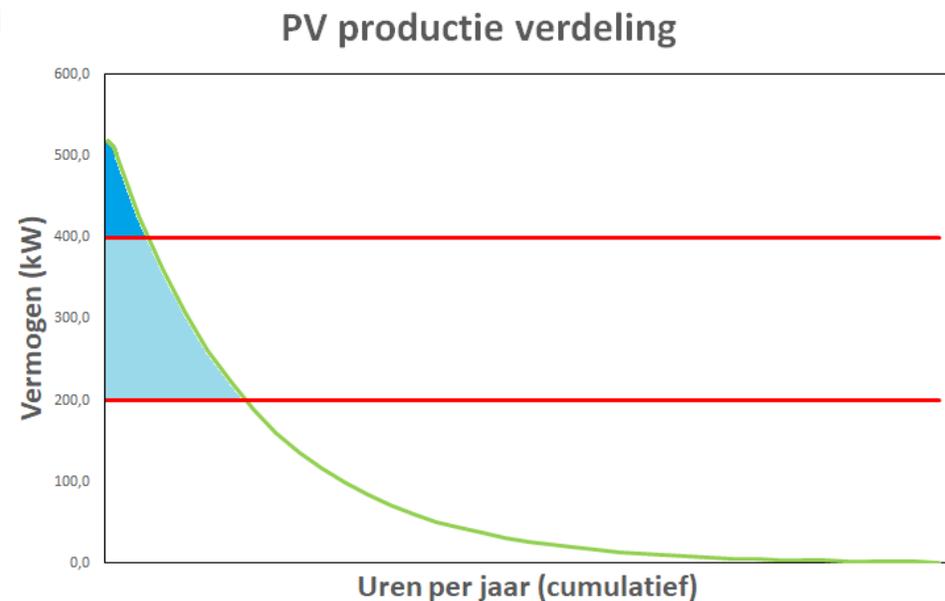
- Low energy density
- + Cheap
- + Very common available

CURTAILMENT

SOMETIMES THE BEST OPTION

Overproduction only a few ti
year

When other options are
expensive/unprofitable



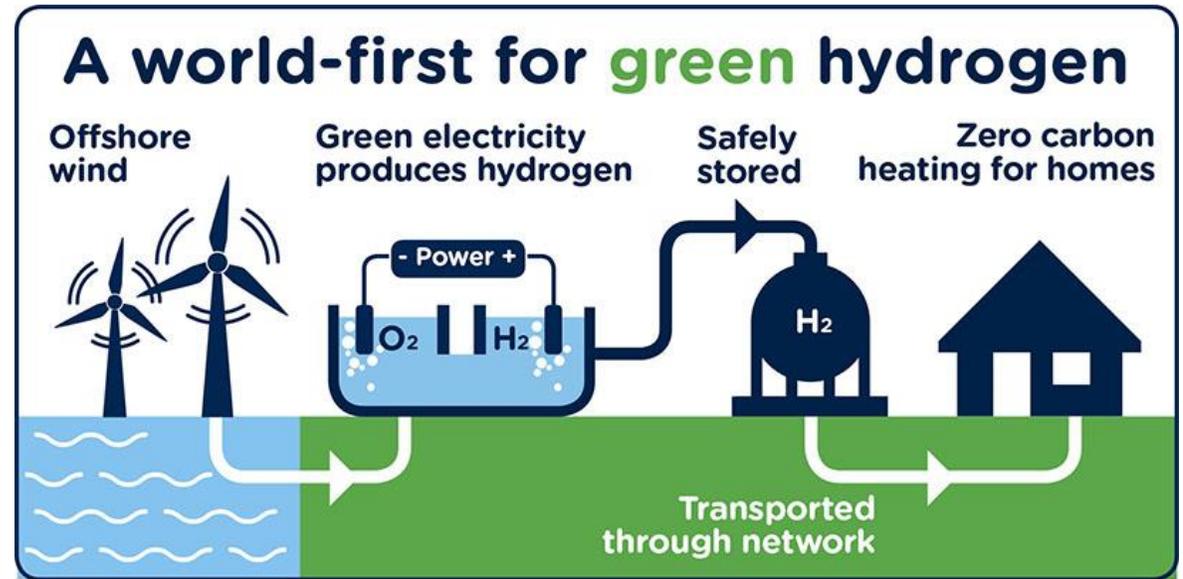
ENERGY CONVERSION

Power2Heat

Power2Hydrogen



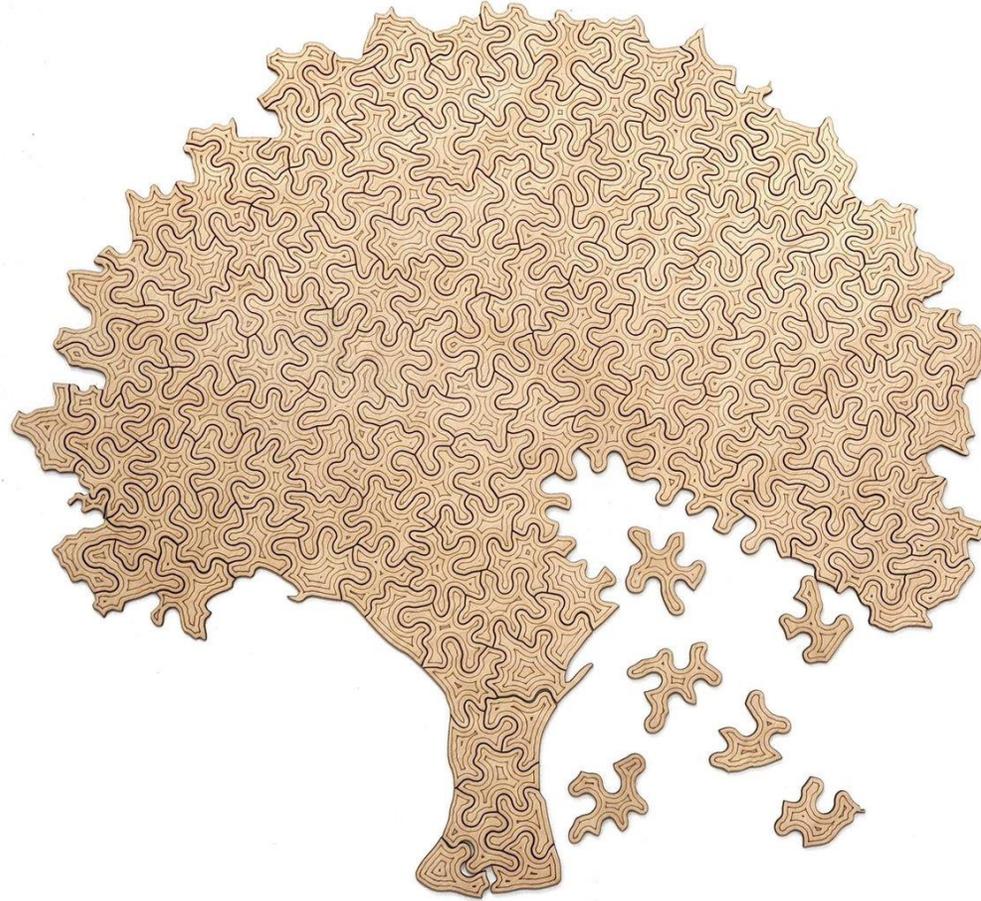
e-boiler leverancier Parat.



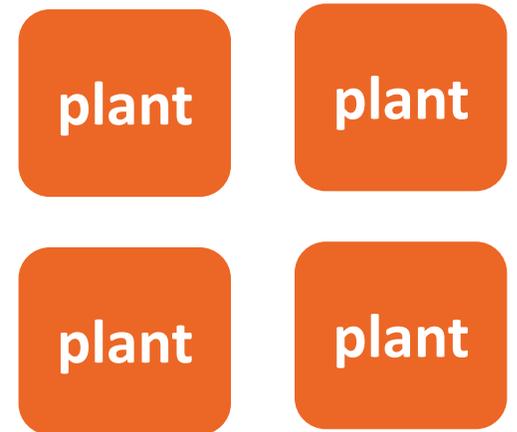
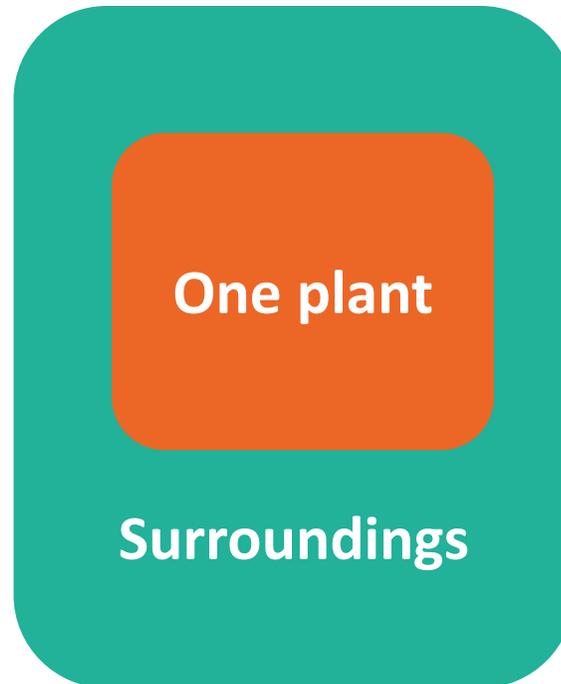
SMARTER SUSTAINABLE TOGETHER



CAN THIS PROBLEM BE SOLVED BY BEING SMARTER SUSTAINABLE TOGETHER?

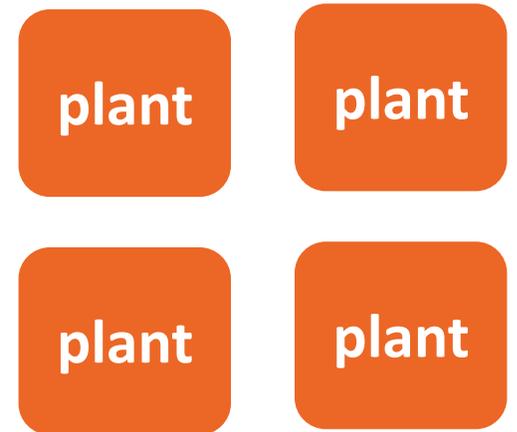
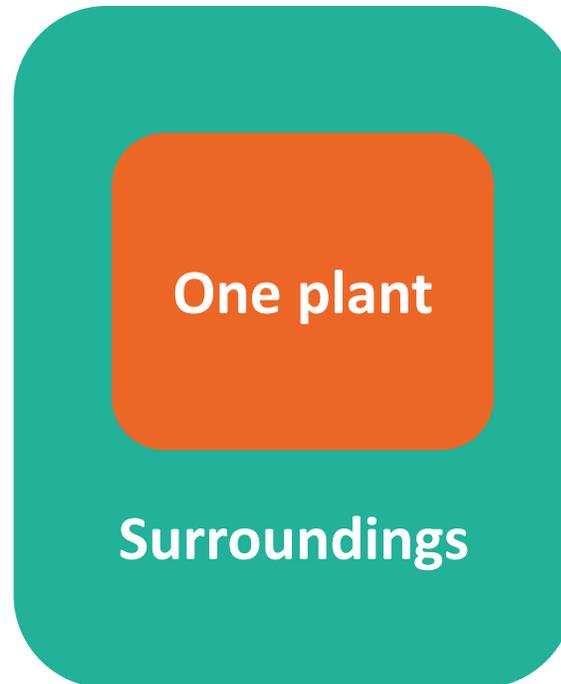


THREE VIEWS



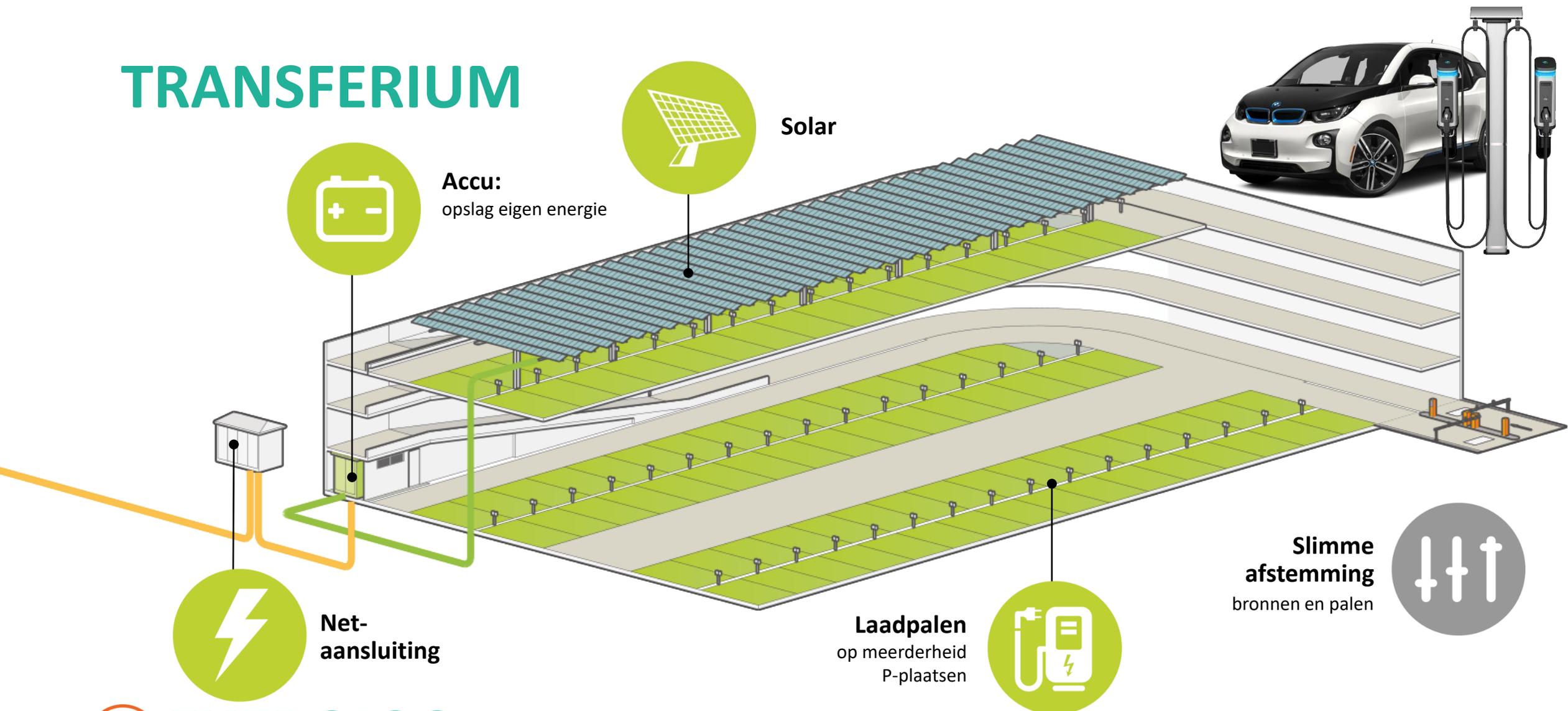
Portfolio

THREE VIEWS



Portfolio

TRANSFERIUM



Accu:
opslag eigen energie



Solar



Net-aansluiting



Laadpalen
op meerderheid
P-plaatsen

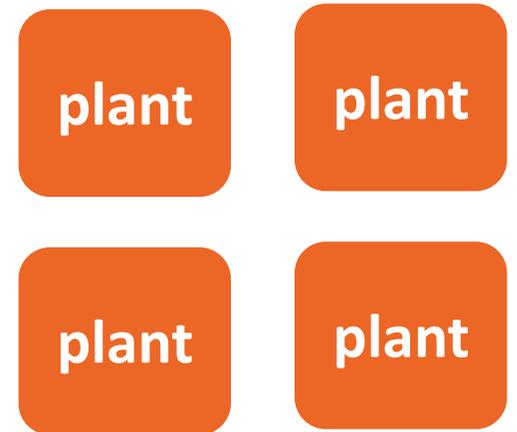
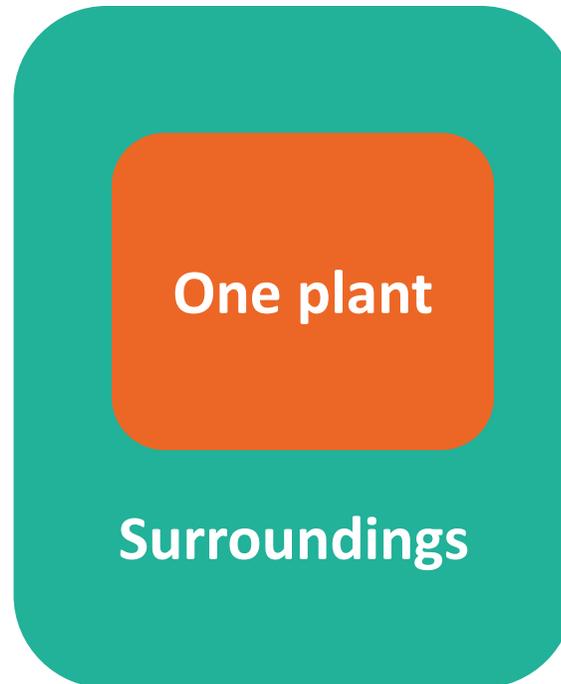


Slimme afstemming
bronnen en palen

HYBRID PARK



THREE VIEWS



Portfolio

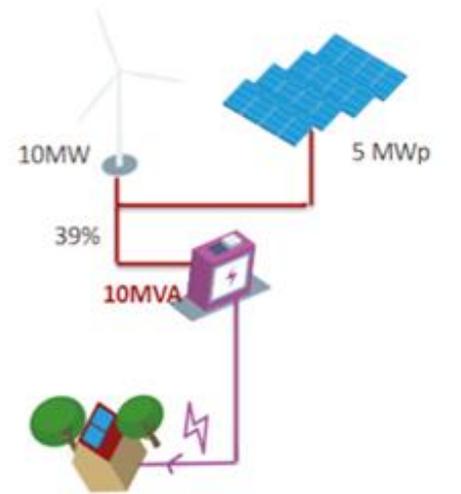
DE GRIFT CABLE POOLING



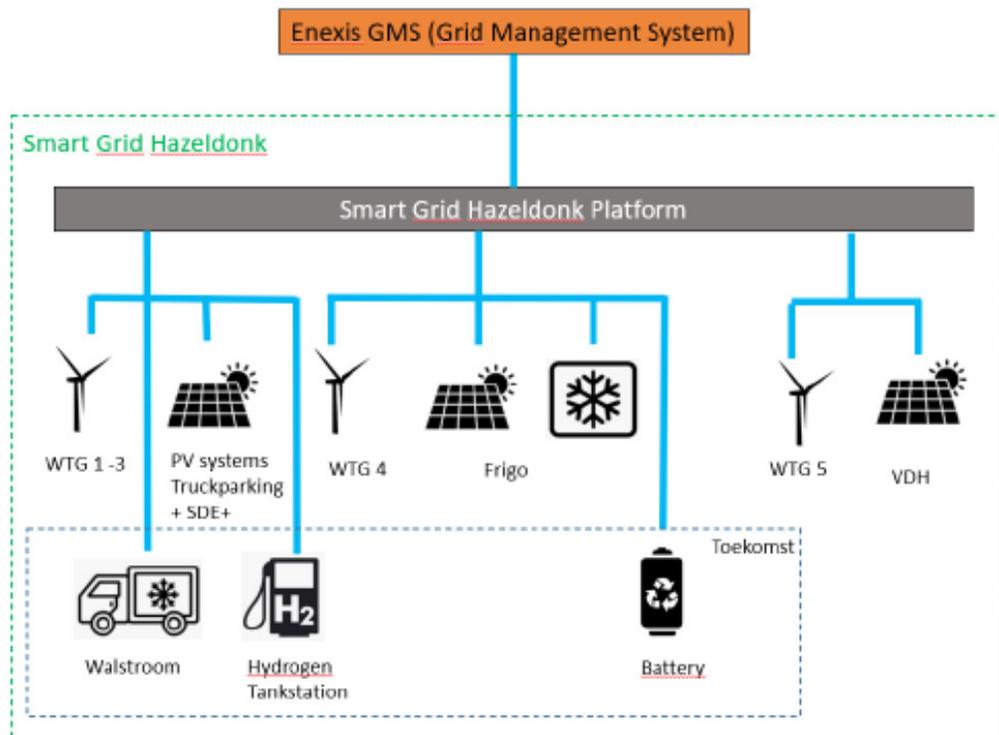
Classical



Cable pooling



HAZELDONK



OLD GASTEL

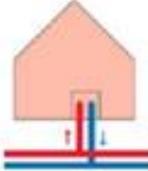
Congestion Management



TEC TERHEIJDEN



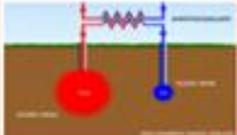
PHASE 1A

| | | | |
|---|--|--|--|
| <p>Windturbine 4 MW</p>  | <p>E-Boiler 5 MW</p>  | <p>Warmtebuffer 350 m3</p>  | <p>Warmte afname</p>  |
|---|--|--|--|

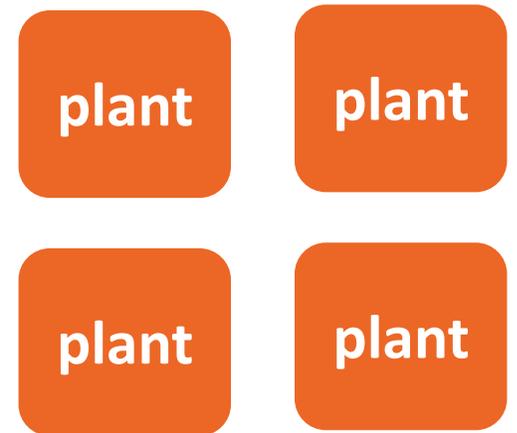
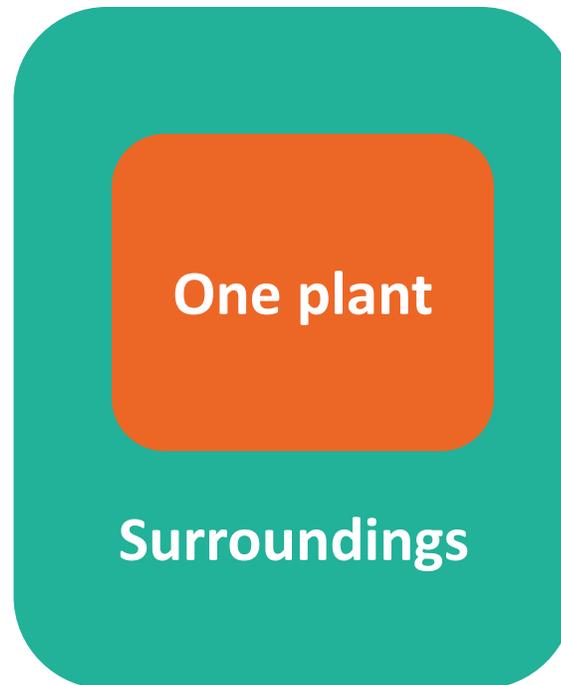
PHASE 1B

| |
|--|
| <p>Sonnepark</p>  |
|--|

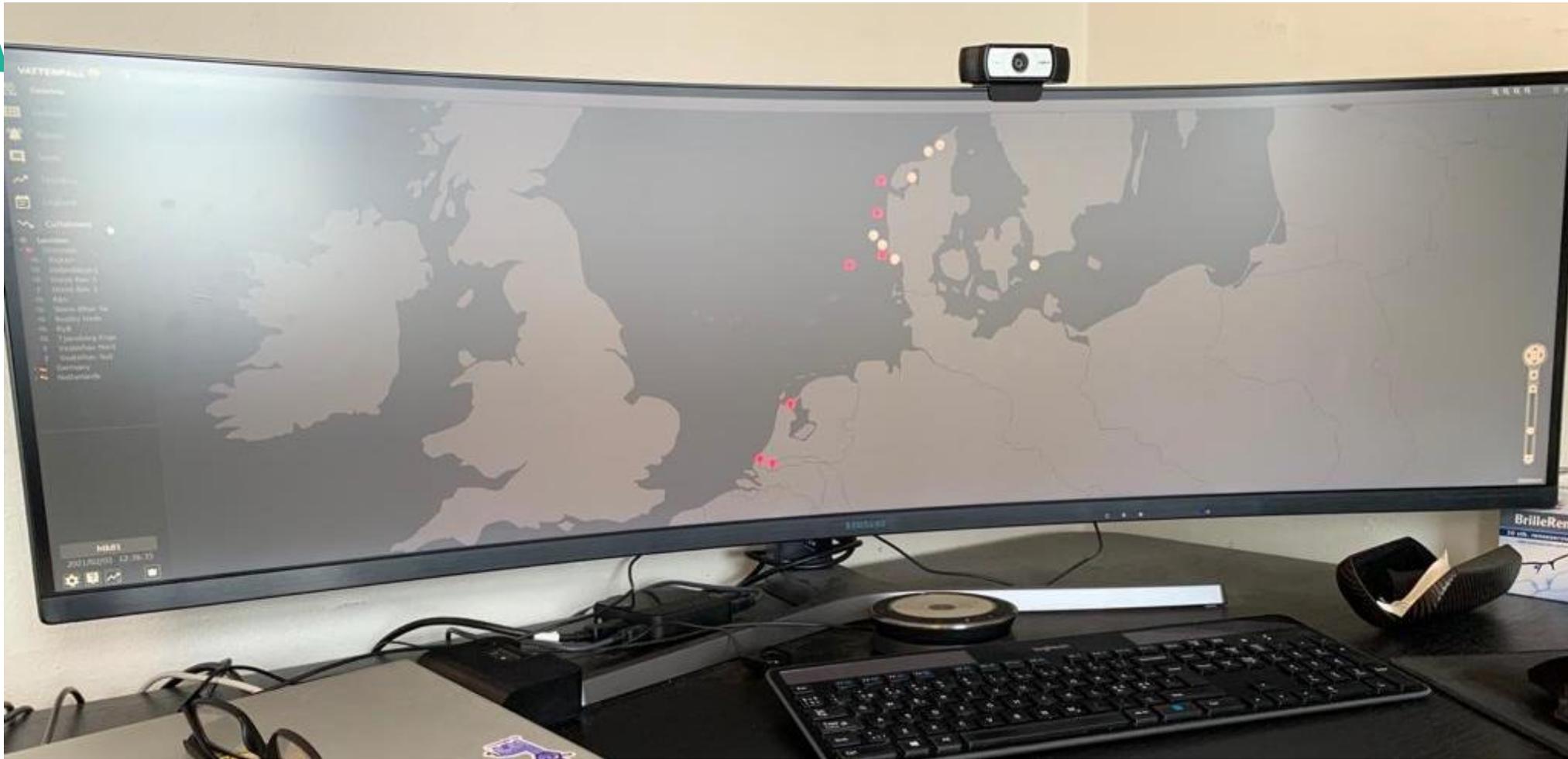
PHASE 2

| | | |
|---|---|--|
| <p>4 Warmtepompen</p>  | <p>WKO 3 warmtebronnen 3 koudebronnen</p>  | <p>EOW</p>  |
|---|---|--|

THREE VIEWS



Portfolio

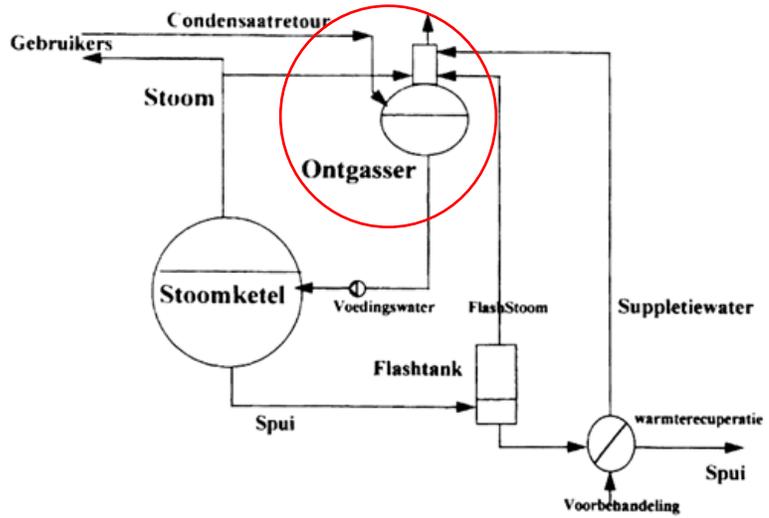




OPPORTUNITIES FOR INDUSTRY

**ENERGY
FLEXIBILITY
HAS VALUE**

HYBRID ENERGYSYSTEM - BOILER



HOW TO CREATE VALUE FROM FLEX

Support on the market for ancillary services during balancing problems, using:

- regulating reserve (aFRR),
- incident reserve (mFRRda)
- Frequency Control Reserve (FCR).

Sell its flexible capacity for a fixed fee to balance responsible parties (BRPs).

Making good use of price fluctuations on the spot markets by concentrating electricity consumption in time windows with cheap electricity, and by avoiding consumption when electricity prices are high.

Local / regional optimalization

PIONEERS

Far ahead:

metal producers, waste incinerators and horticulture entrepreneurs

But opportunities available in many more markets: chemical,
packaging, paper, food, glass

BOTTLENECKS

- Limited knowledge of opportunities for additional earning by offering demand response to the electricity market
- Limited insight into the investments required to unlock the available potential
- Limited 'sense of urgency' for developing the potential in the short run with policy makers and industries. For many companies energy management is not core business and energy makes up a minor proportion of operational costs. For highly electrified companies energy does make up a significant proportion of operational costs, and they may represent quick wins.

**CALL
TO
ACTION**

CALL TO ACTION

(1) understanding your
flexibility potential

(2) revenue model



ENERGICO
Grid Management Systems

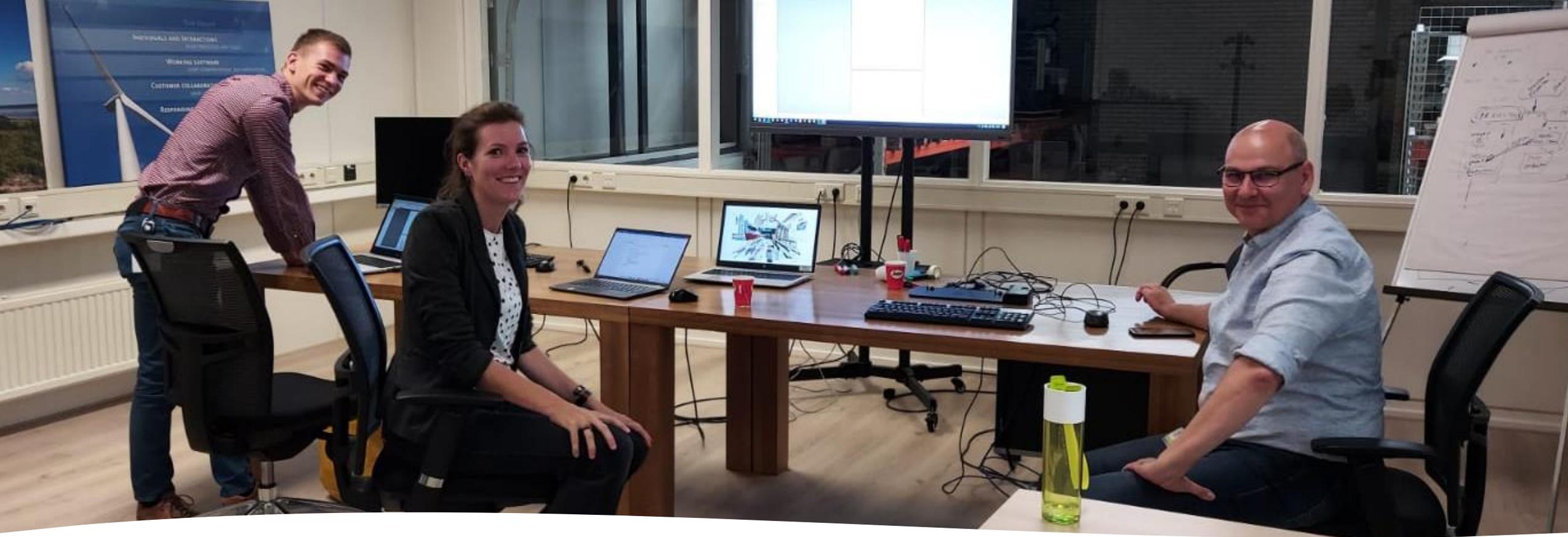
QUESTIONS? DISCUSSION!

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+31624511882



THANKS FOR THE ATTENTION