ENERGY THAT MOVES YOU

Luzern, 5 July 2018
ENEXIS GROEP; Fons Jansen

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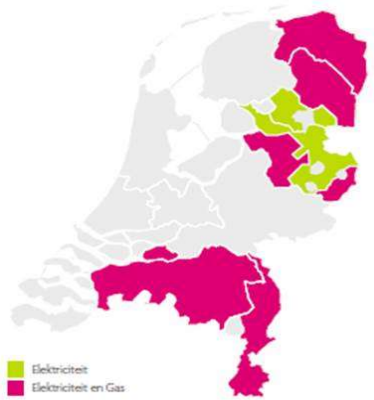
ENEXIS: CORPORATE PROFILE



Distribution System Operator (DSO)

- 2.8 million electricity connections
- 2.3 million gas connections

Unbundled, regulated.
Public shareholders.
Leading principle for DSOs:
serving society, not maximizing profit

Our decisions follow these priorities:

1. Society
2. Customers
3. Shareholders

Focus on reliability, affordability, customer satisfaction and sustainability.

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AMBITIOUS GOALS

MISSION
We are achieving sustainable energy supply through state-of-the-art services and networks and by being in the driving seat of innovative solutions

STRATEGIC GOALS

EXCELLENT DISTRIBUTION SYSTEM MANAGEMENT	ACCELERATING ENERGY TRANSITION
▪ Our grids and services are ready in time for the changes in the energy world. ▪ Our energy supply is reliable. ▪ Our services are excellent, resulting in high levels of customer satisfaction and a reduction in costs.	▪ Together with local partners, we are attaining the Dutch targets regarding sustainable generation and energy saving. ▪ We are delivering innovative and scalable solutions that accelerate the transition to a sustainable energy supply.

ACCELERATING ENERGY TRANSITION

SUSTAINABLE REGIONAL DEVELOPMENT

- Optimal local mix of energy sources
- Energy plans in partnerschip
- Hands-on projects

FLEXIBILITEIT

Smarter use of existing grids and use sustainable generation

ENERGY SAVING

- Important for CO_2-reduction
- Stimulate the use of smart meters
- Raising awareness and creating urgency for taking energy saving measures

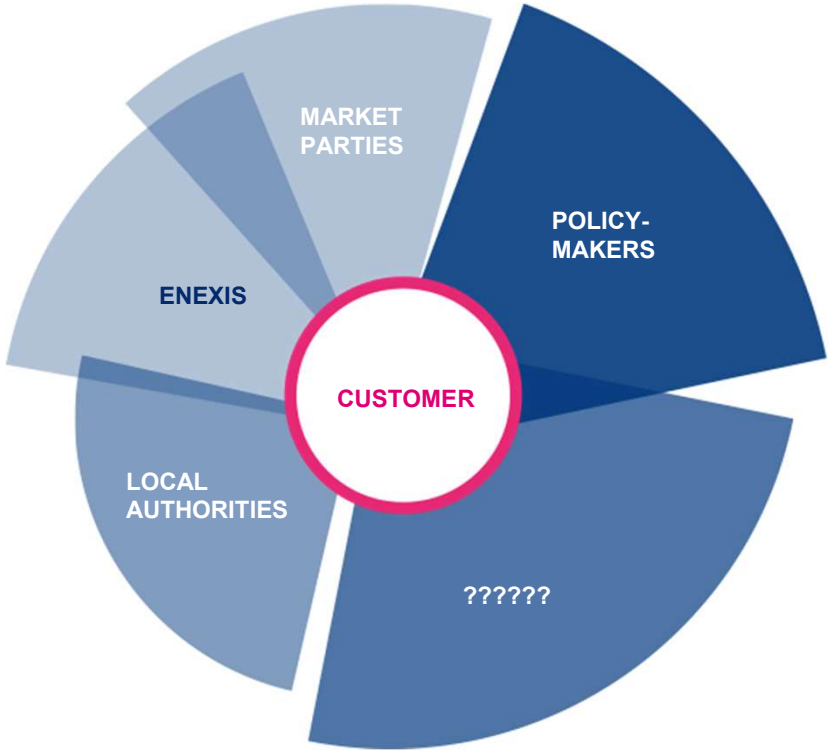
SUSTAINABLE MOBILITY

- Smart public charging infrastructure
- Use of flexibility
- Smart charging services

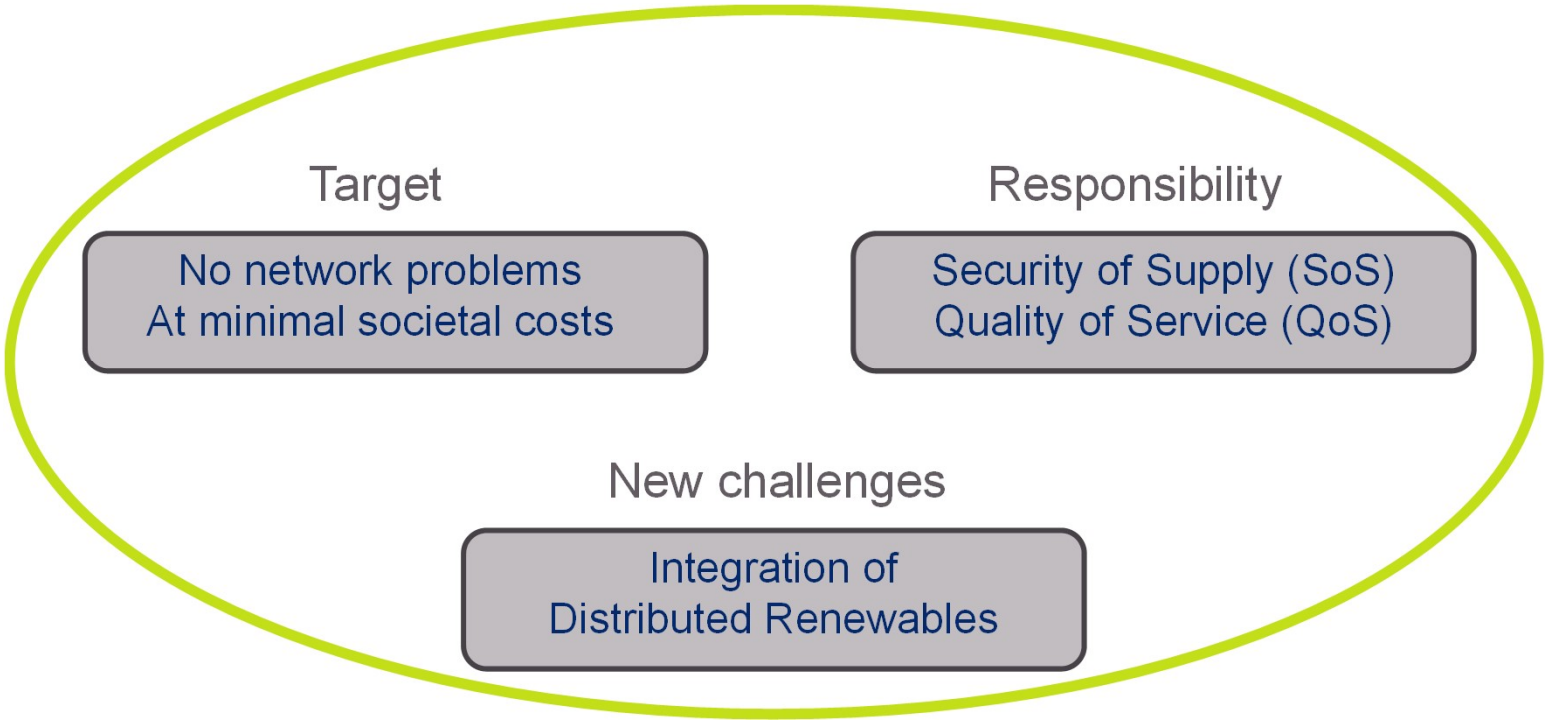
IN ORDER TO REALIZE DUTCH CLIMATE GOALS AND KEEPING THE GRID RELIABLE AND AFFORDABLE

MOVING TOGETHER

We don’t know where we are heading. Technical possibilities are growing. But that’s not the point. It’s important to stay in dialogue with our stakeholders and reinforce each other to build a reliable and sustainable energy system.



EXCELLENT DISTRIBUTION SYSTEM MANAGEMENT



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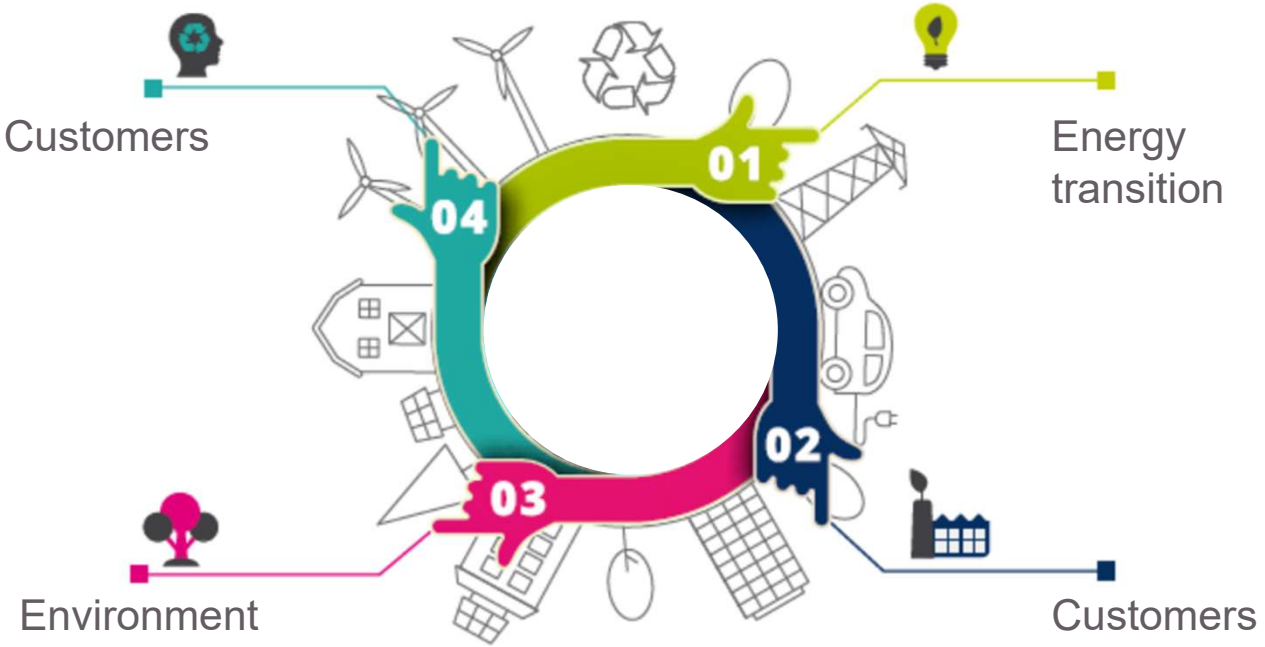
AN ENERGY WORLD IN TRANSITION



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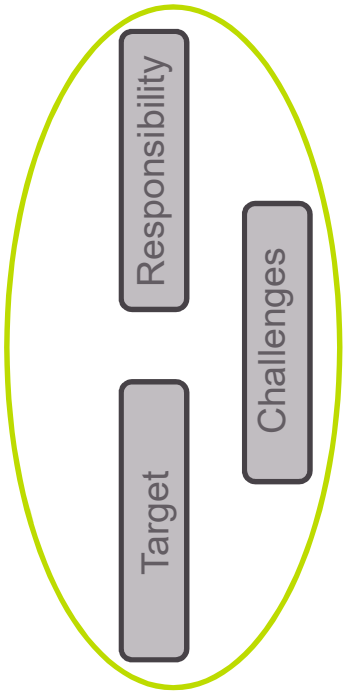
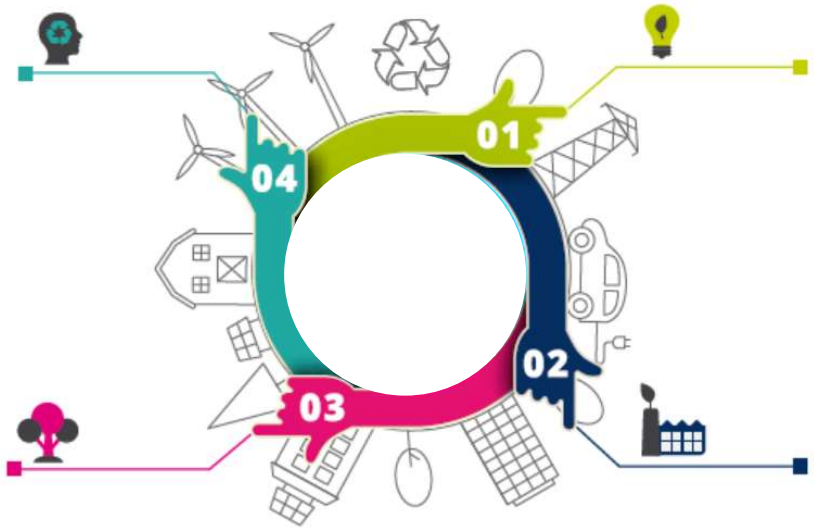
DSOs NEED ACCESS TO FLEXIBILITY

In this new reality:





DSOs need access to flexibility services and technologies.

DSOs should be able to purchase them on the market.

To deliver the same distribution services and quality as allways.

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Batteries can help Market Parties and DSOs

Market parties: to make profit

- Domestic: PV-batteries
- Domestic: EV's batteries
- Aggregators: can offer aggregated PV- or EV-battery's flexibility
- Traders can employ the flexibility to optimise their portfolio
- Commercial parties can offer flexibility to DSOs or other customers

DSOs: to prevent local problems

- No reversed flows and no unnecessary distribution losses
- Decreased loads at peak hours, can defer or even prevent classical network reinforcements/investments
- This can also prevent congestion and instability. So more distributed renewables can be integrated

But of course: only when the business case is feasible!

Two Smart Storage Unit - projects

Enexis Smart Storage Unit

SSU as a Distribution Battery

- Just a distribution asset in LV-grid, integrated in substation.
- No connection to customers or other market parties.
- Does it work? Expected benefits realised?
- Learning about possibilities, impossibilities, ….

Interflex, a Horizon 20202 Project

SSU as Market Based Solution

- What services could be offered to DSOs.
- How to stack benefits, to make a business case?
- How to unleash EV flexibility (also V2G) and to unlock available local flex.
- Issues? Technical, economical, contractual, …

Enexis Smart Storage Unit (SSU), a distribution battery

In small Dutch municipality called Etten-Leur

- Li-Ion Battery
  232 kWh
- Charge
  100 kW
- Discharge
  400 kW

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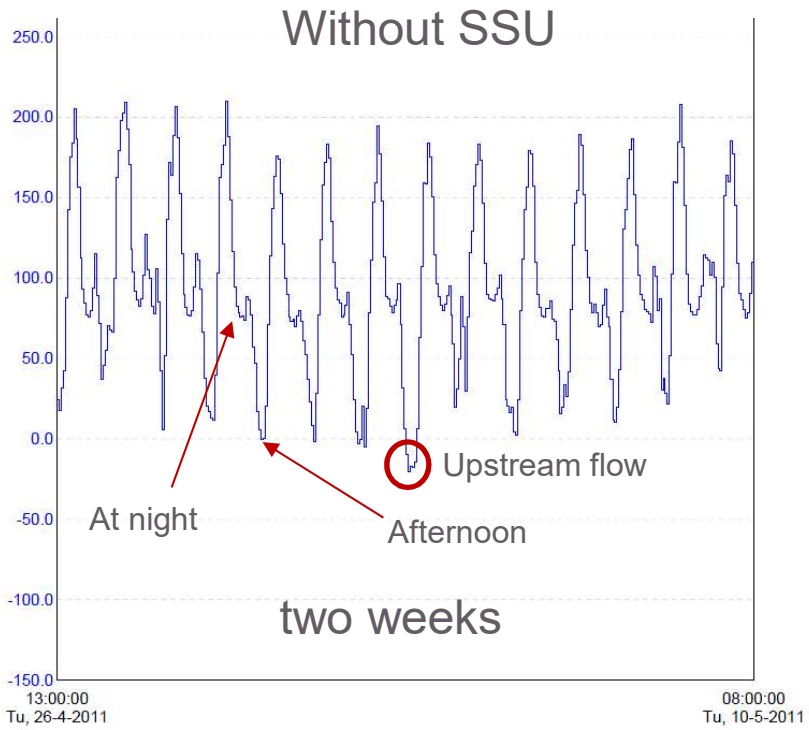
Grid load effect with some solar panels

Figuur 2 – Lokatie Smart Storage systeem de Keen, Etten-Leur



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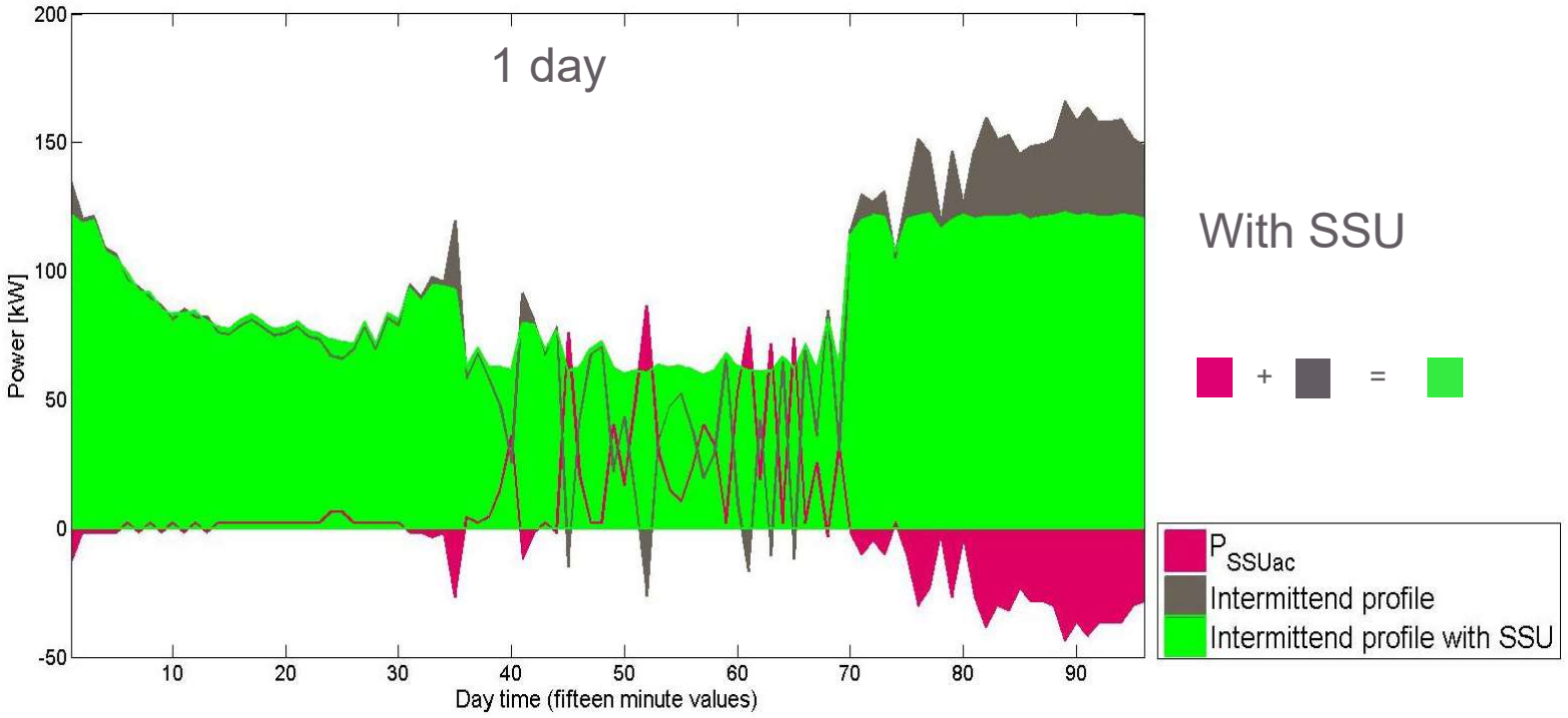
Intermittend day profile, with solar panels



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INTERactions between
automated energy systems and
FLEXibilities brought by energy market players

A major European Horizon-2020 Smart Grid project

3-years project duration

2017
2019

with a total budget of

22,8M€

fostering collaboration among

5 major European DSOs

Co-funded by the Horizon 2020 Framework Programme of the European Union

Technical Director

DISTRIBUCE

Project Coordinator

ENEDIS
L'ELECTRICITE EN RESEAU

Chairman of the General Assembly

e·on

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avacon

Strijp-S neighbourhood in Eindhoven: converted from factories into business and residential area

PV installation in the area

Electric Vehicle charging stations

Smart storage unit (SSU): integration of neighbourhood battery

Strijp-S area in Eindhoven

- Our battery will mainly be used for load congestion management
- Local voltage support will be provided by battery to some extent
- Short-term power quality issue such as voltage dip support is expected
- Some reactive power support is also expected
- Battery loading information can be obtained via aggregator & Enexis’s own data science team

- Movable 20 foot reefer container with sound suppresion)
- Capacity: 315kWh, Inverter power: 255kW (bi-directional)
- Each Li-NMC battery module @2,5kW, 48V: 126 modules
- System efficiency 93%, availability >99%, protection class IP65
- Continuous discharge current 75A, charging current 25A
- Every rack has its own Battery Management System
- Master controller collects all data and interfaces energy trading
- Equipment will be installed in Aug 2018.

O&O: DSOs to Own and Operate Batteries?

If DSOs can buy storage services on the market, they will buy the service

- **if available at fair price**
- **if offerings fully meet DSO's hard requirements (quantity, quality, capacity, priority, availability, etc.)**

In the end, the DSO is responsible for Security of Supply / Quality of Service.

Therefore these hard requirements have to be enforceable:

- The DSO should not be forced to buy storage services on the market.
- The DSO should also be able to employ a battery itself and to own and operate it, as a regular network asset.

Refering to storage services, the DSO is customer, not supplier.
Customers are always free to choose between:

- buying the service or
- not buying the service, but filling his need himself.

So the DSO as well should have a choice to do it itself.

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Distribution Battery: boundary conditions

Decisions based on lowest societal costs

(Distribat or alternative, O&O or buy)
If market offerings are okay (quality, price, etc.), buying the service is the primary option.
And DSOs are accountable to the regulators (and to markets and society).

Only for network management purposes

to prevent network problems.

No service-offerings to customers.

We leave that to the market.

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Some Q&A

Question:

But, with such a distribution battery you simply exchange kWhs with the market.

You are trading!

Answer:

No, we do not exchange kWhs with anyone.

It isn't even necessary to measure the kWh-flows into and out of the battery.

Charging and discharging only have some effects on our distribution losses.

They are just slightly shifted in time, from discharging hours to charging hours.

Charging increases these losses, but discharging has the opposite effect, it decreases them.

Some Q&A

Question:

By shifting network losses you are making money.

Buying more at cheap night hours or when sun and wind are producing and buying less at expensive peak hours.

Answer:

That's right, the difference is 1 à 2 ct/kWh. So our expenses for network losses will decrease.

That's fine but the effect is small. For our pilot battery less than 5 euro/day.

Some Q&A

Question:

When peaks are shaved and valleys are filled, price levelling is to be expected.

So you are disturbing the market.

Answer:

Some price levelling may be expected.

This is the result of this solution, a solution good for society, to the problem of integrating distributed renewables.
We don't create a problem.

And yes, some traders who are using price differences to make money maybe don't like the idea. But you can't blame us for reducing our and society's problems.

Besides that, the effect is the same for all traders and even trading itself will normally lead to price levelling.

So, no market disturbance.

Some Q&A

Question:

Okay, a distribat.

But then only
(or at least first)
with storage capacity provided by the market.

Answer:

That would not be logical.

If we would go for the classical solutions, this restriction would not be applied, even if it would have worse economics.

Grid management is a regulated activity, not subject to market forces, and that is a conscious choice.

Dutch legislation even states that all strategic network management activities should be performed by the DSO itself (and all network assets should be owned by the DSO).

And legislation should be technology agnostic.

Some Q&A

Question:

But a distribat is a single-purpose device, while a commercially owned battery can be a multiple-purpose device.

That means that the latter should have better economics.

Answer:

Yes, it is to be expected that offering storage services to DSOs will be attractive.

And for DSOs, buying should be attractive too.

But, as said, the DSO should not be forced to buy.

Some Q&A

Question:

But, if a DSO as a regulated entity is allowed to O&O batteries, we (the market) will never take it up.
No level playing field!

And we all know that competition is the best way to fulfil customer's needs.

Answer:

Yes, but with a distribat we don't fulfil customer's flexibility needs, we don't offer any storage services to anyone.

So, we don't operate within the competitive demand side services market.

A distribat doesn't play any role in the commercial trading of flexibility.

Some Q&A

Question:

Okay, but what if an LSEC (local sustainable energy community) would ask the DSO to install and operate a battery and to offer it's storage capacity to the LSEC?

Answer:

Even then: not a task for the DSO.

Question:

Even not if the distribat already exists and the LSEC would have a similar request?

Answer:

It will be hard to say, but even then: No, sorry.

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Thank you very much!

Fons Jansen

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ARE BUILDING **RELIABLE**
AND SUSTAINABLE ENERGY
FOR TODAY AND FOR
THE FUTURE
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