Session 3.5 A TSO's View on the Grid

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Global Conference
Brussels, 14-16 October 2025

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elia group

Viewpoint on Energy Storage

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How can storage contribute to a sustainable, affordable and secure energy system?

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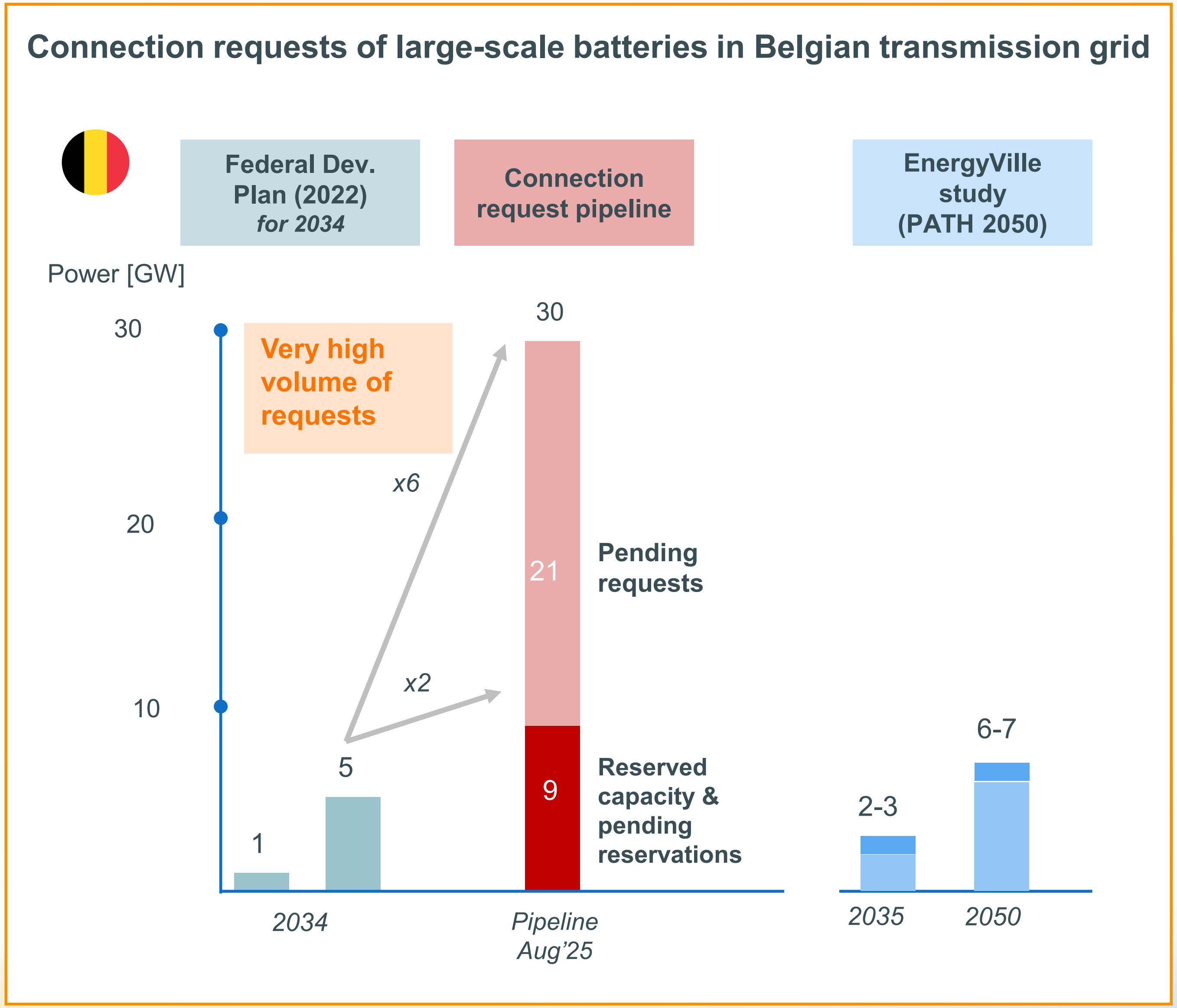
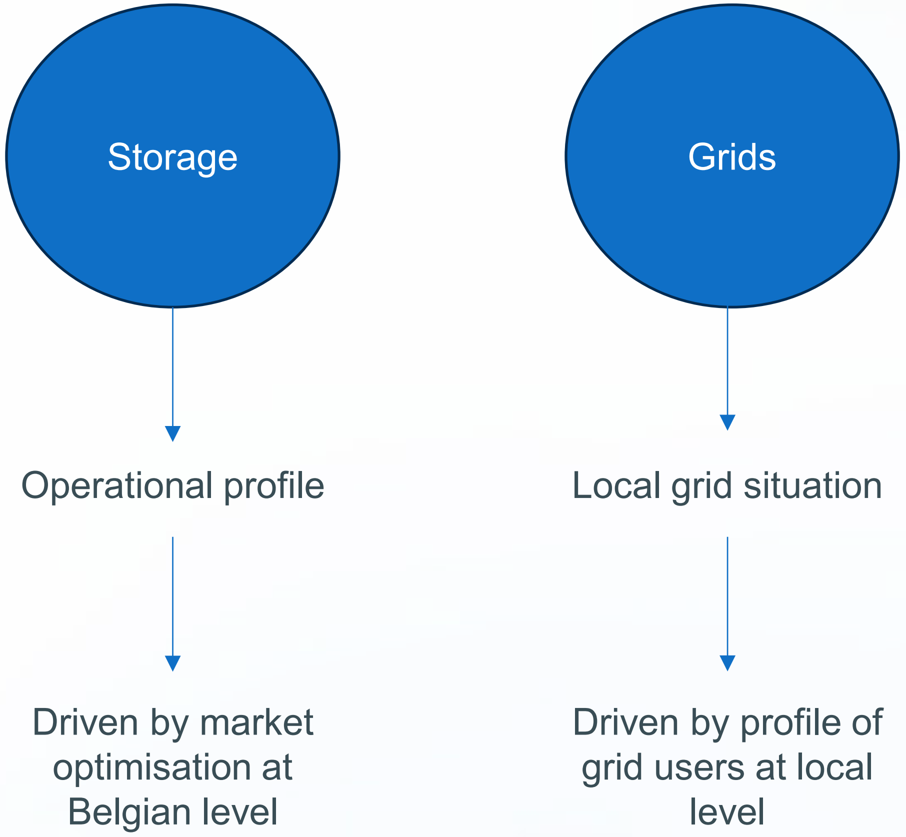
Current situation for storage in the Elia transmission system



Storage's impact on the grid depends on their operations & local grid situation



Storage effectively integrate different markets their operational profile but the diverse strategies and value stacking make their profile unpredictable

Market-optimised operation

Profit maximisation in energy, capacity and other ancillary service markets

e.g.: DA, ID, FCR, aFRR …

On-site optimised operation

Local energy management optimisation

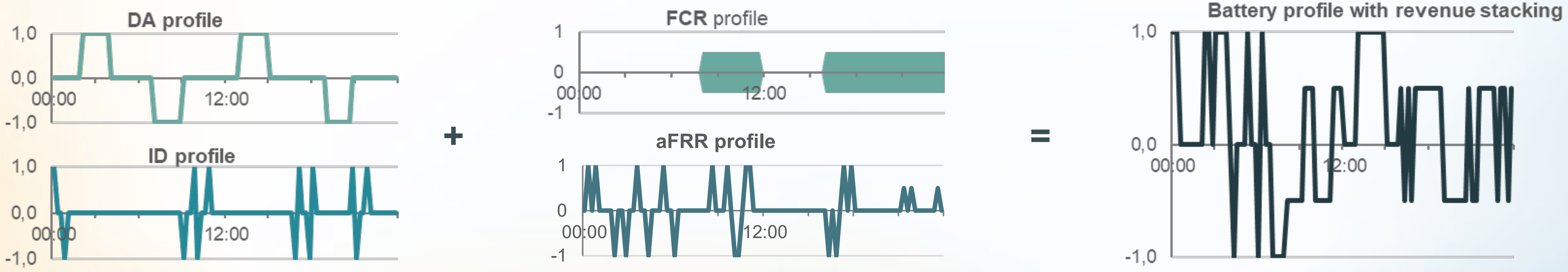
e.g. Optimisation of Self-consumption, energy bill (energy + tariffs)

Regulated operation

Regulated services procured or operated by grid operators

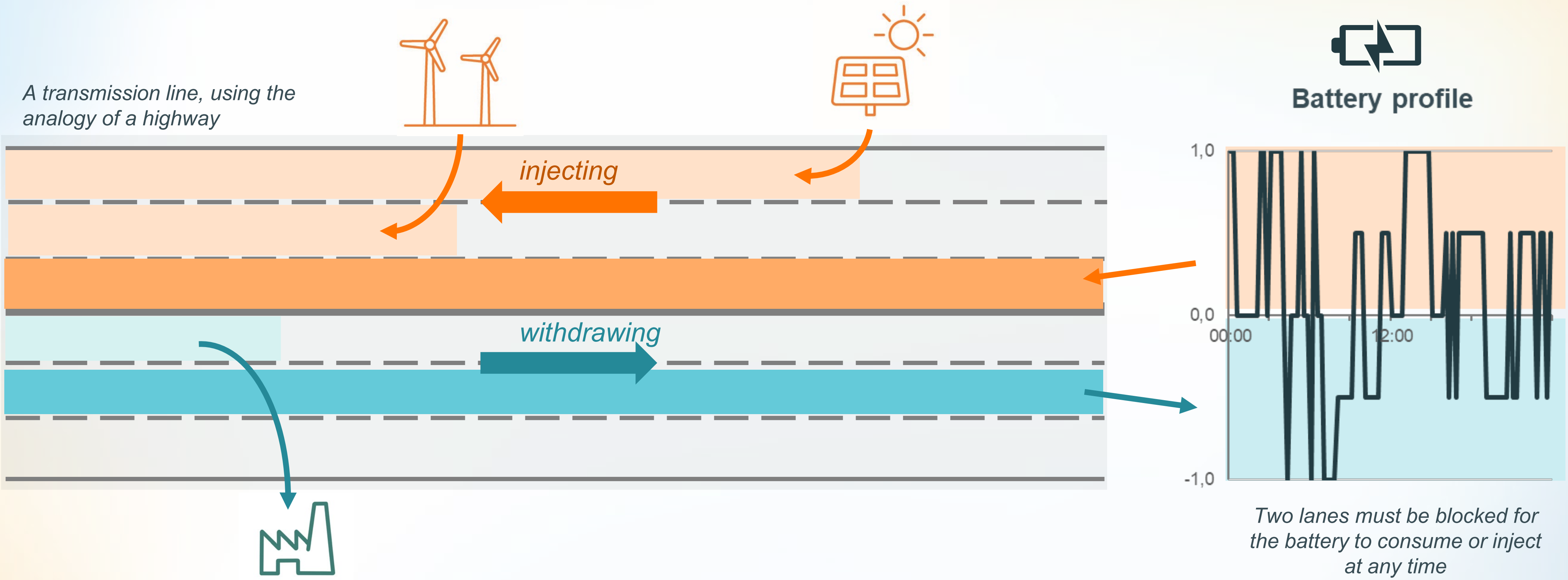
Revenue stacking : combining different revenue streams from providing multiple services

Example – Snapshot of a day – Market-optimised operation



Markets are designed to ensure system balance at a national level.

From a grid perspective – the unpredictable profile of storage requires high grid availability



Unlike traditional assets, batteries need a very high grid availability, so they can consume and inject electricity at any time – in function of their operational strategy.
This would result in high grid build-out.

The impact on the grid depends how they operate.

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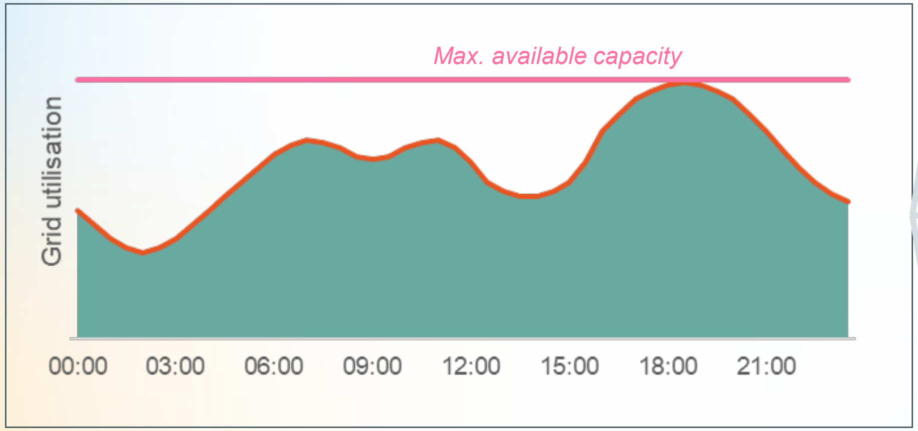
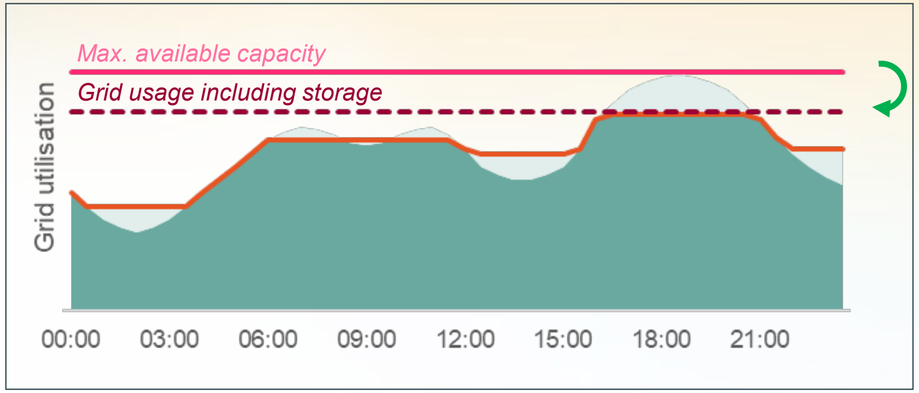
Grid profile without storage

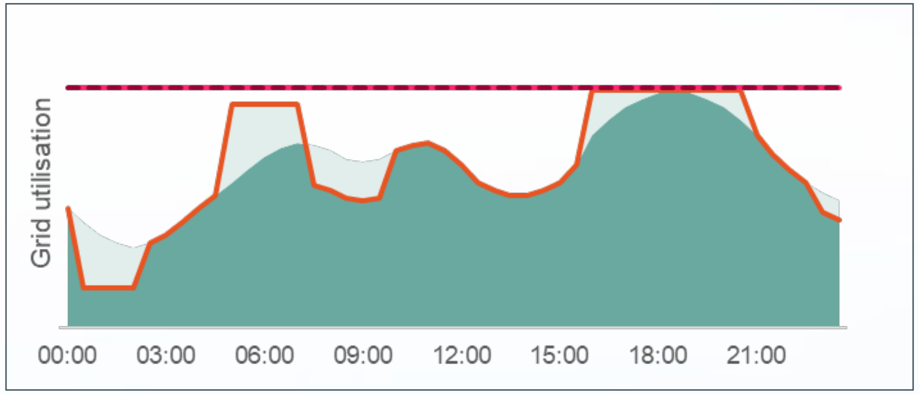


Grid-beneficial storage



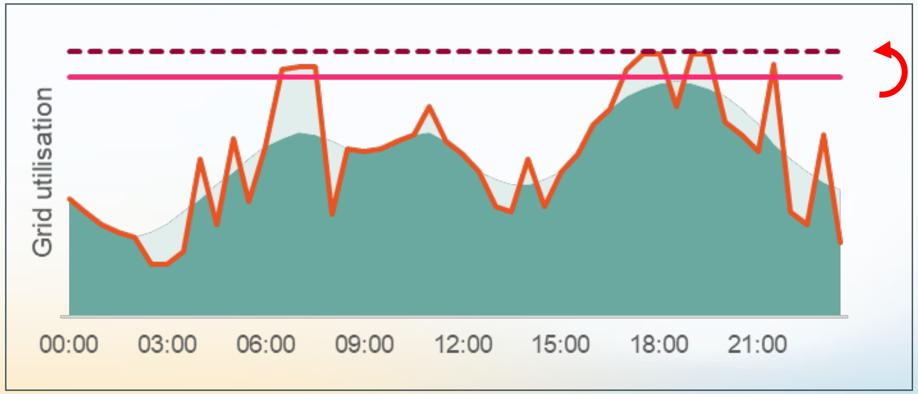
Battery creates capacity availability by reducing peaks & shifting it to valleys
→ Freeing up additional capacity

Grid-neutral storage



Battery operates within cu→ No impact on the current situation rrent grid limits

Grid-straining storage

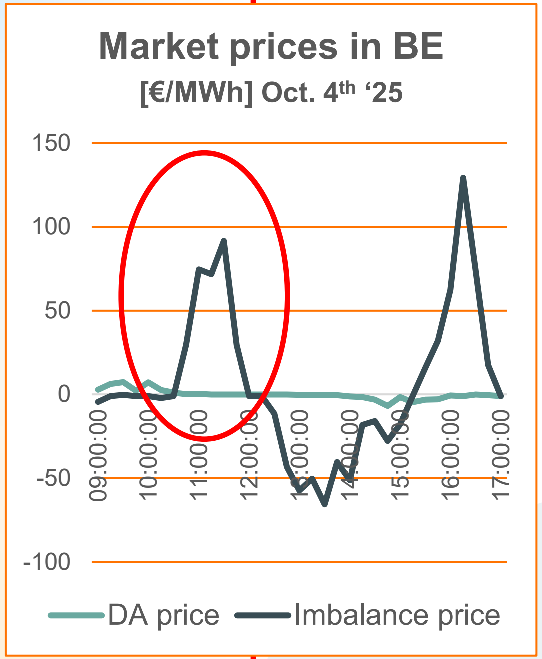


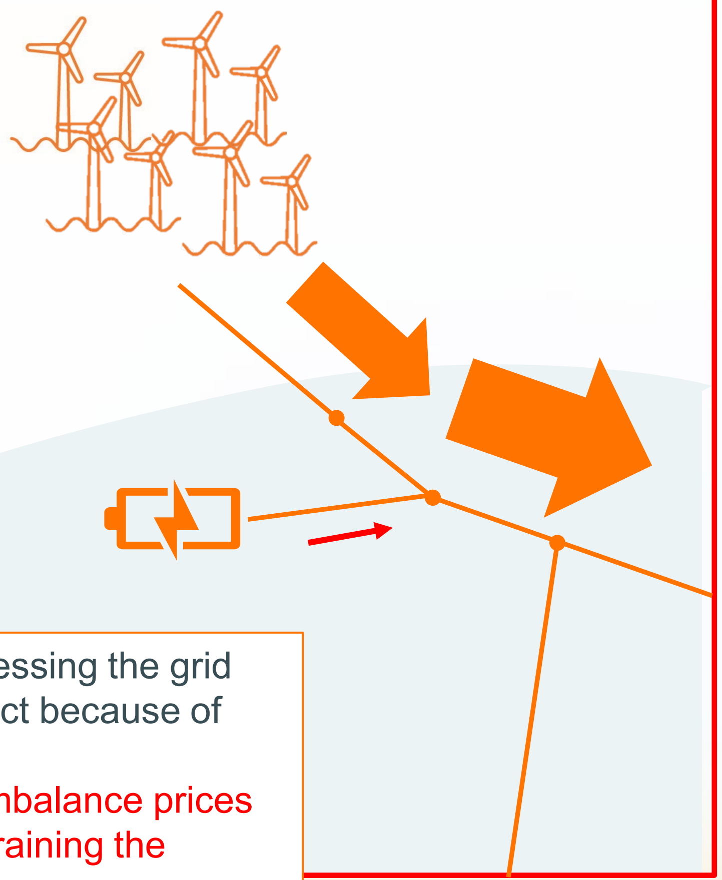
Battery worsens strained situations, increasing redispatching needs or requiring additional grid reinforcements.

- Grid utilisation without storage
- Impact of storage operations on grid utilisation
- Resulting grid utilisation
- Max. available capacity
- Grid usage including storage

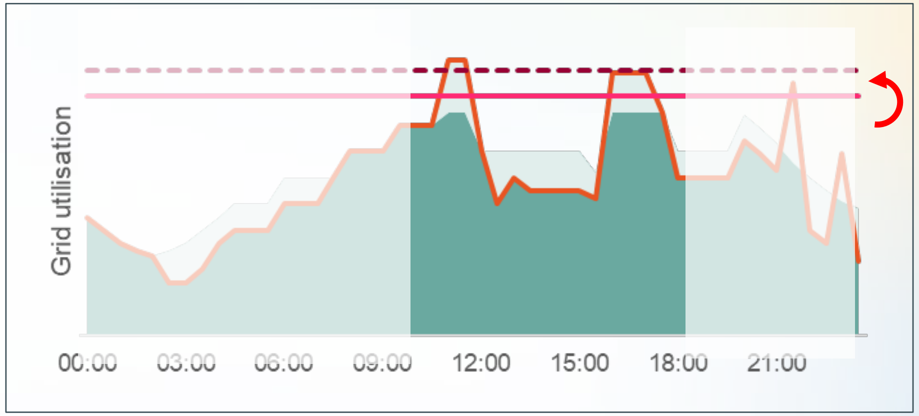
Zoom in on an example of grid-straining storage behaviour reacting to market signals

Example situation with BE market prices of Oct. 4th '25





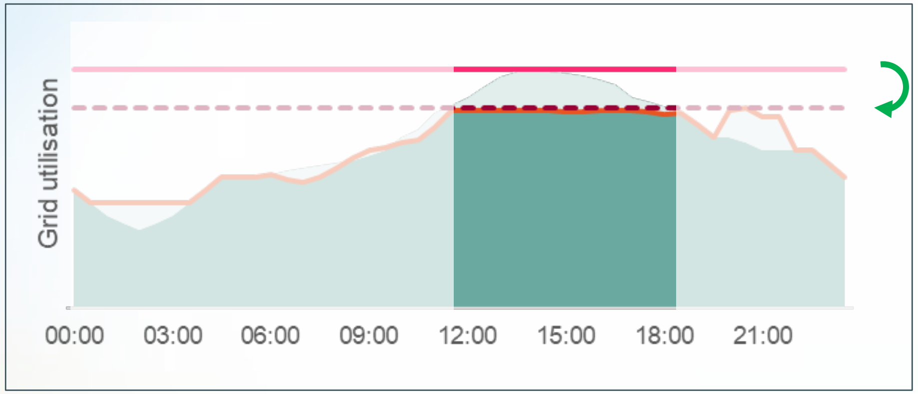
1. High amounts of wind – stressing the grid
2. Battery not expected to inject because of low DA price
3. A battery reacting to high imbalance prices start injecting in the grid, straining the already stressed grid



- The imbalance support is system beneficial but in an already strained area, this worsens the situation.
- The imbalance support could also be provided at another – not strained location in the grid.

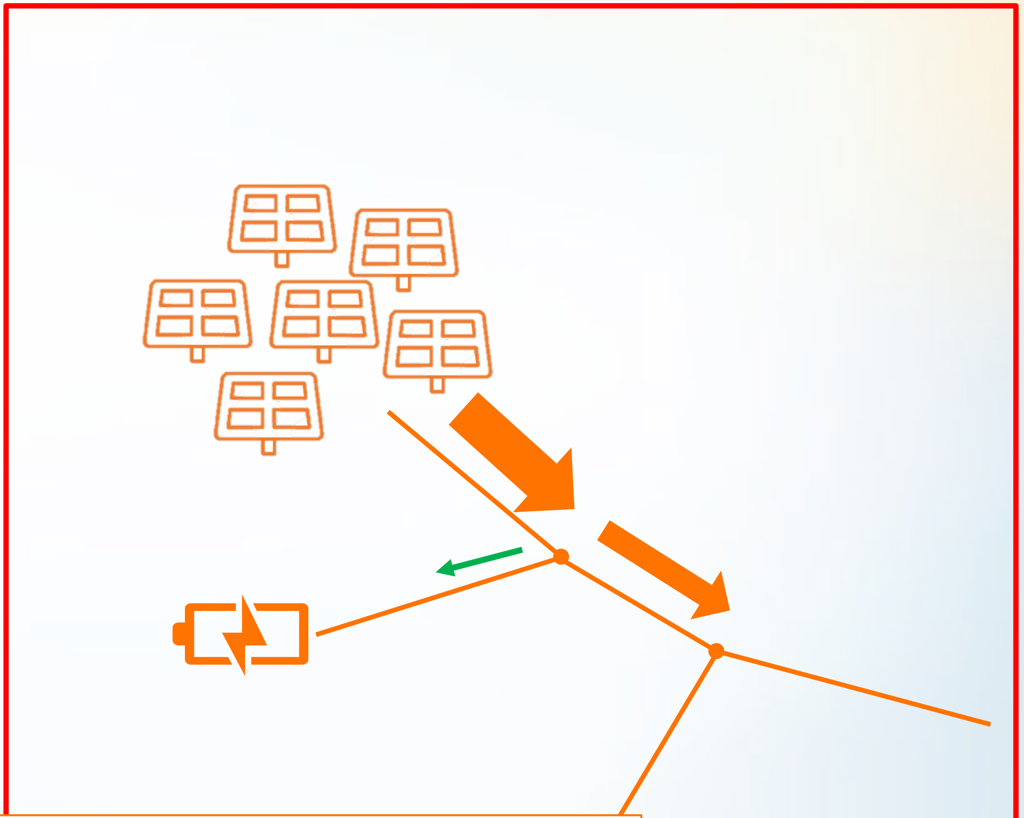
Today there is no grid signal in the markets. The batteries are operating grid-unaware.
→ There is a need for grid signals to ensure the grid is used efficiently.

Zoom in on an example of grid-beneficial storage behaviour reacting to market signals



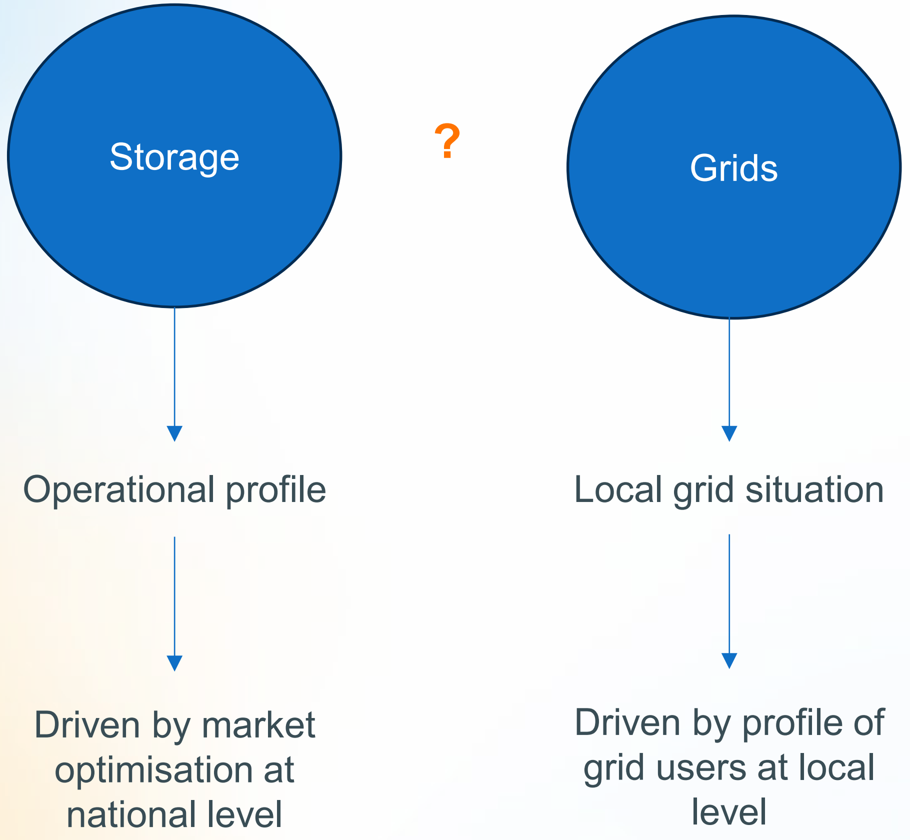
Batteries increase capacity availability on the grid by absorbing during generation peaks and injecting during valleys. This behaviour optimised grid utilisation, increases grid efficiency and allows for more users to be connected to the grid.

Example situation



1. High amounts of solar – stressing the grid
2. **Battery is absorbing because of low DA prices, shaving the solar peak**

A mix of instruments is needed to unlock grid-neutral & grid-beneficial storage behaviour to avoid excessive grid buildout



Storage is currently **operating grid-unaware**

- Need for grid signals to unlock the full potential storage can bring to the system and grid - to avoid excessive grid build-out needs.

Mix between direct & implicit control measures will help to ensure grid reliability and system efficiency. Examples are :

- Flexible connection agreements
- Local flexibility markets
- Redispatch
- Locational & temporal incentives in market & grid tariffs

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THANK YOU!

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Session 3.5 The Dutch large scale BESS market

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Business Developer Flexibility, Strategy & Partnerships

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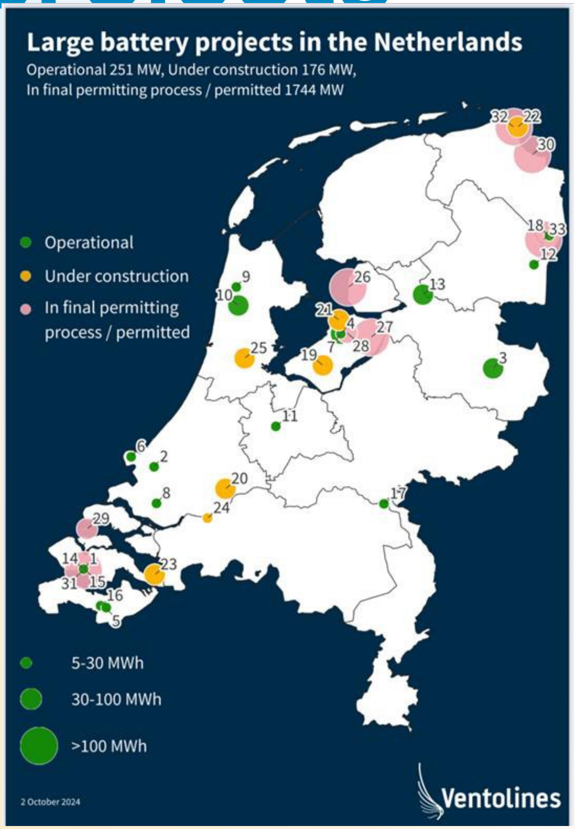
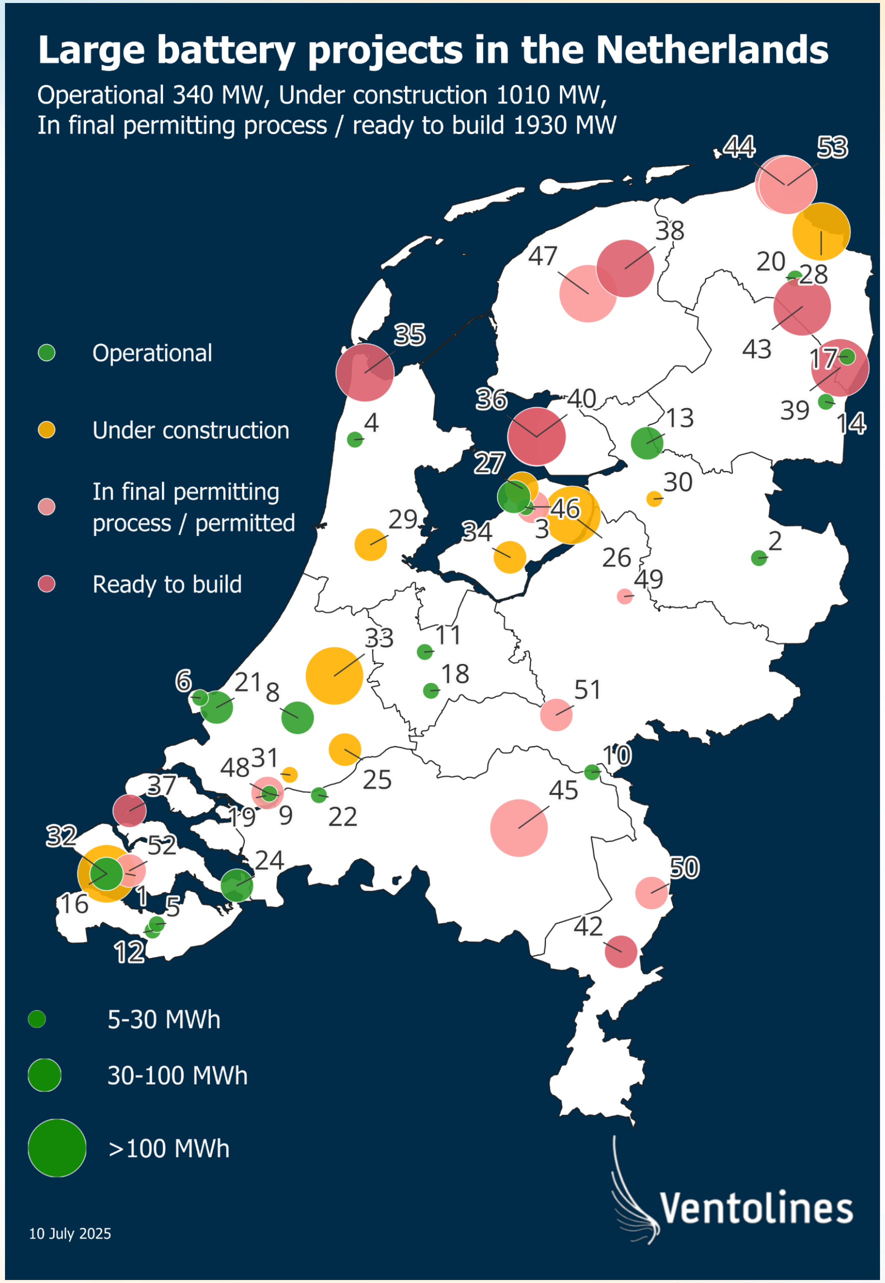
Dutch landscape of BESS projects



Oct 2024



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Let's connect!

Rens Savenije

Commercial Director at Ventolines

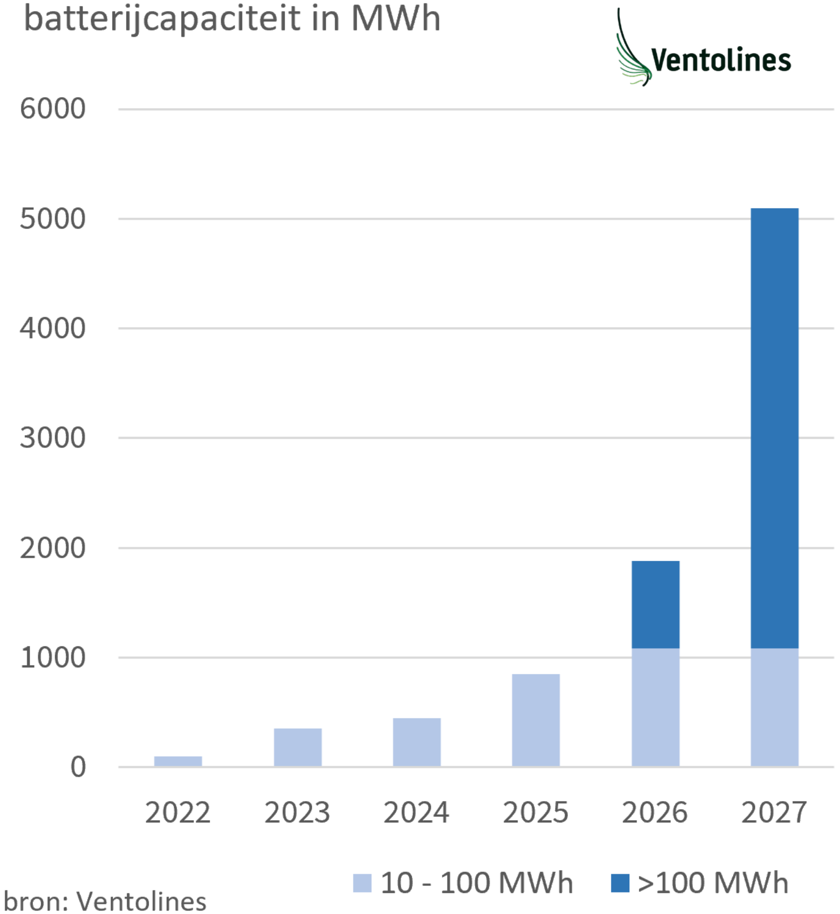
Dutch BESS specifics

- No national target for BESS
- No capacity mechanism
- No subsidies for BESS
- Highly congested grid
- High grid tariffs
- No exemption of grid tariffs for BESS
- Introduction of TDTR (time-based transport rights)
- ~1GW operational and 66 GW grid connection requests

Dutch BESS landscape

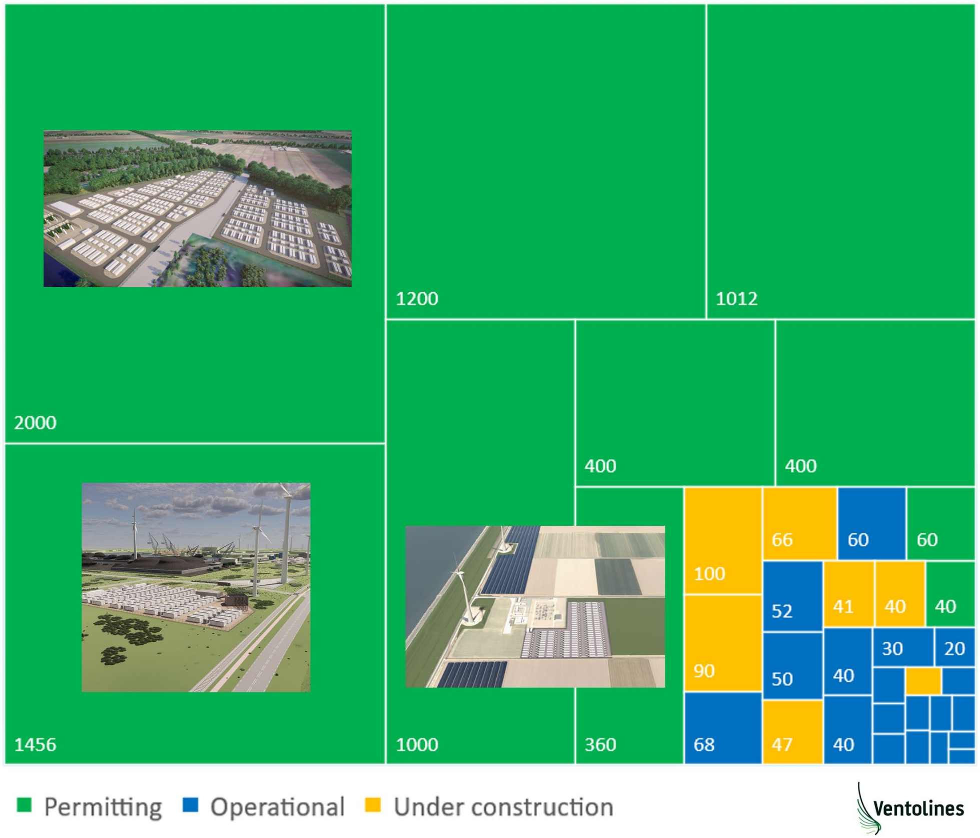
Groei van grote batterijen in Nederland

batterijcapaciteit in MWh



bron: Ventolines

Upcoming large **battery** projects crush existent **Dutch** portfolio (MWh)



Grid tariffs important driver for BC

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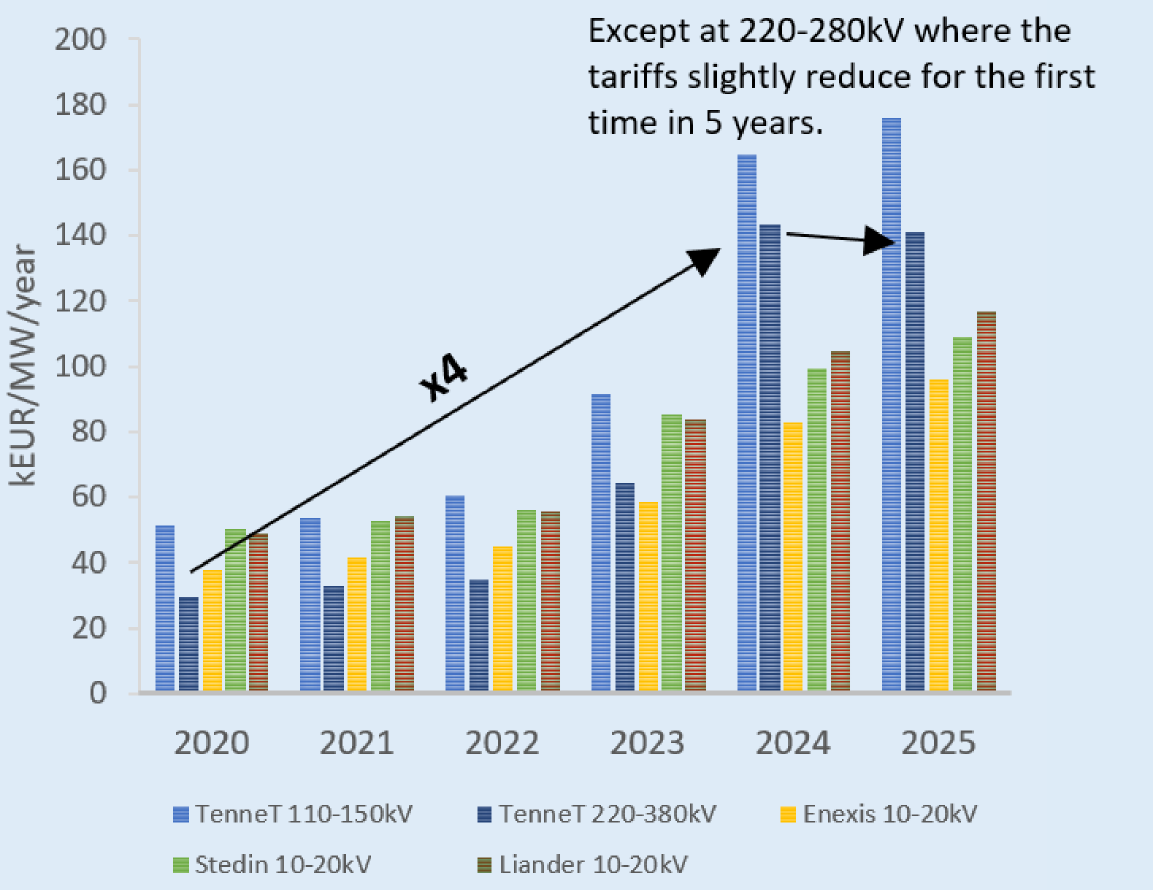
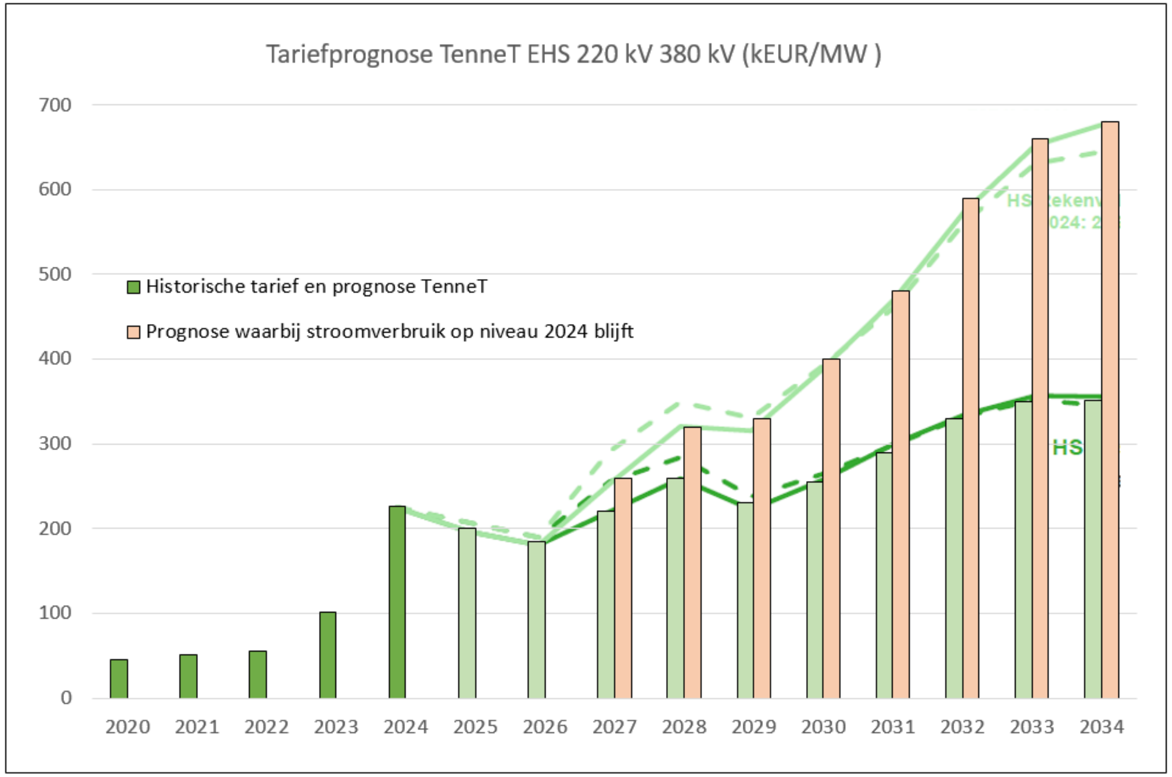
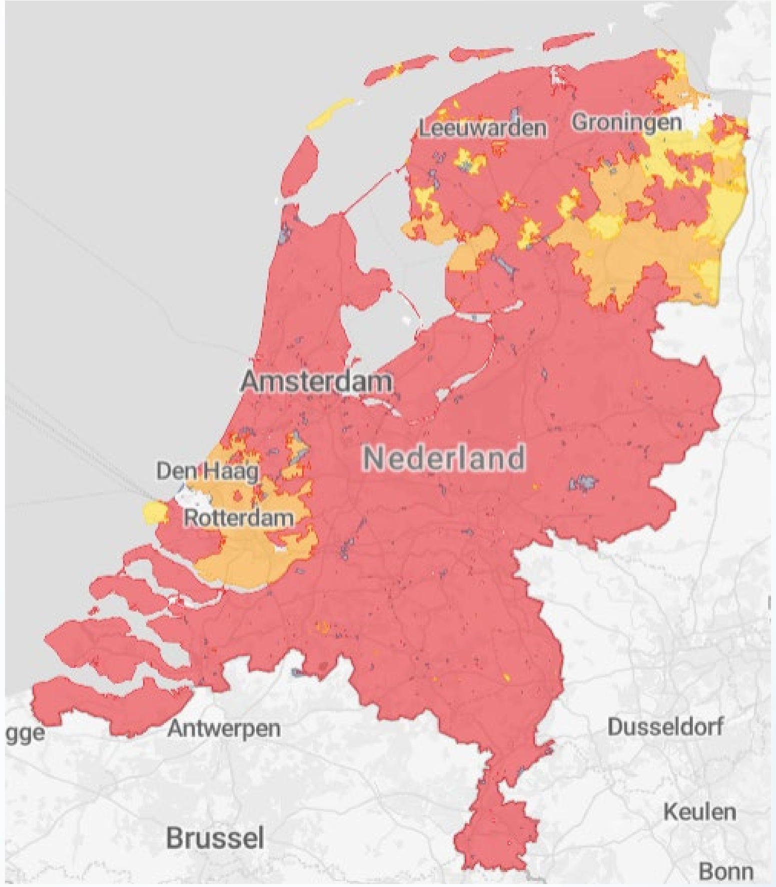
Operational **grid costs** Netherlands continue to rise in 2025





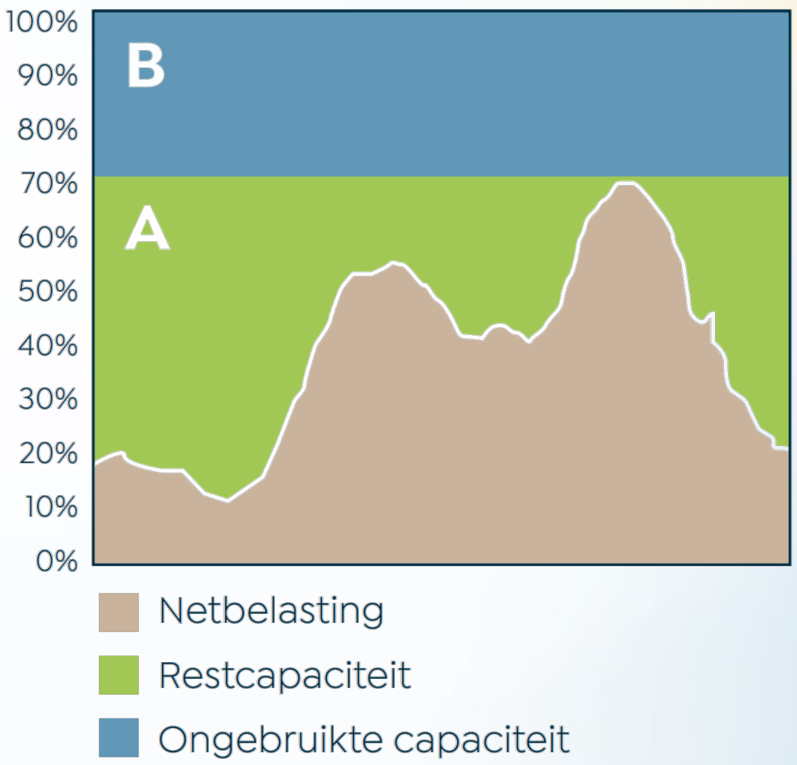
Connecting BESS to a congested grid

- 60 GW BESS in Queue
- Peak load ~20 GW
- TenneT estimates 5-7 GW Economically feasible in 2030
- Scenarios 2050: 14 to 27 GW TSO connected BESS



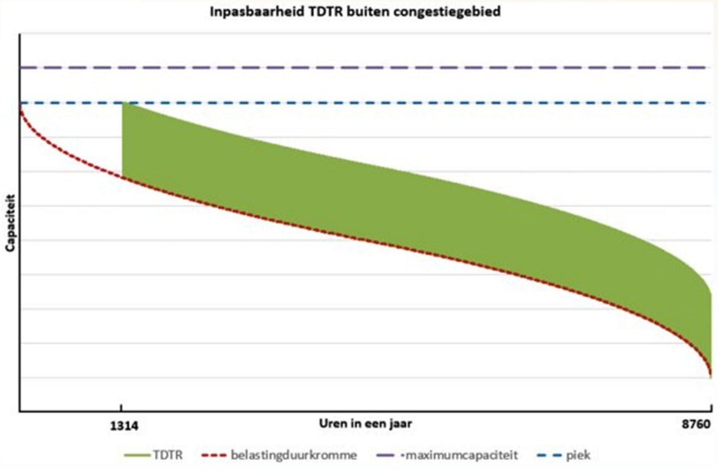
Non-firm transport capacity product (TDTR)

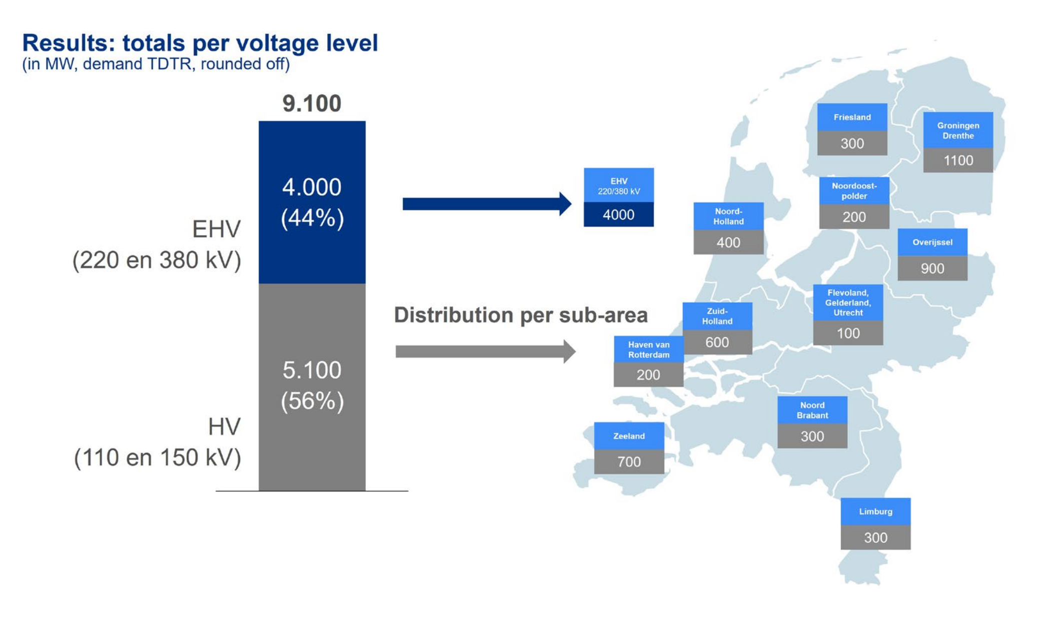
- The transmission grid is full in many areas, based on peak capacity.
- Optimize the remaining capacity on the power grid outside peak hours by using a TDTR contract.
- New contract type that offers many advantages for the connected party and the grid operator.
  - **Clarity**: Guaranteed electricity consumption or feed-in at least 85% of the time.
  - **Flexibility**: No increase in congestion and no expansion of the electricity grid required; facilitates flexible integration.
  - **Rates**: A discount of almost 50% on transmission rates due to flexibility (up to 65% for flexible use).



Residual capacity for TDTR

- **Calculations**
  - Interactions/limitations between stations
  - New method developed
  - Divided NL into grid segments
- **Results**
  - 9,1 GW residual capacity
  - About 2/3 of the total available capacity is (or is in the process) to be offered to BESS
- **Challenges**
  - Limited availability of residual capacity
  - More than ½ of the offered TDTR capacity requests is < than requested capacity





Batteries @ TenneT

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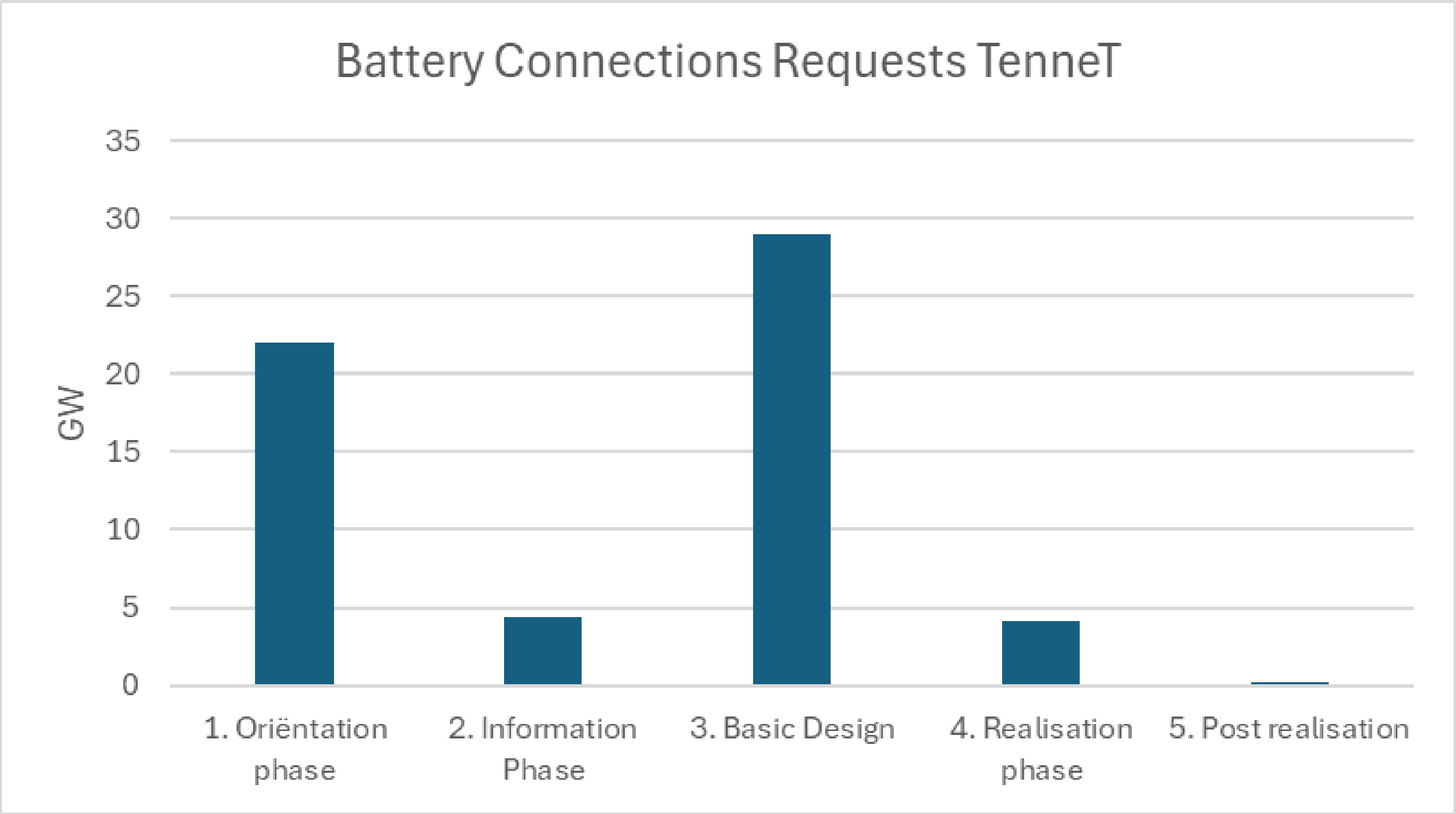
- BESS connection request in process (1 sept 2025)
  - 4.1 GW is in realization phase
  - 29 GW is in basic design



Operational aspects of TDTR

- **Communication**
  - Implementation ready since 1 October
  - GOPACS platform, similar message as CBC (Capacity Limiting Contract)
- **At what time do we call a limitation**
  - Current grid code 08:30 D-1
  - TenneT proposed a code change to the regulator: 07:00 D-1
- **Limitations**
  - Connections are limited for the duration and capacity of a transport problem
  - Limitations are communicated in 15 minutes time blocks
  - If more limitations are necessary during the year CBCs & Redispatch can be used, or CSC