Welke waarde heeft flexibiliteit vanuit het standpunt van de hoogspanningsnetbeheerder?

Elia @ CoDE-masterclass

18th June 2026 | Sander Claeys

Agenda

1. Why does society need flexibility?
2. How does balancing work?
3. How can companies valorize their flexibility?
4. Use cases of flex valorization

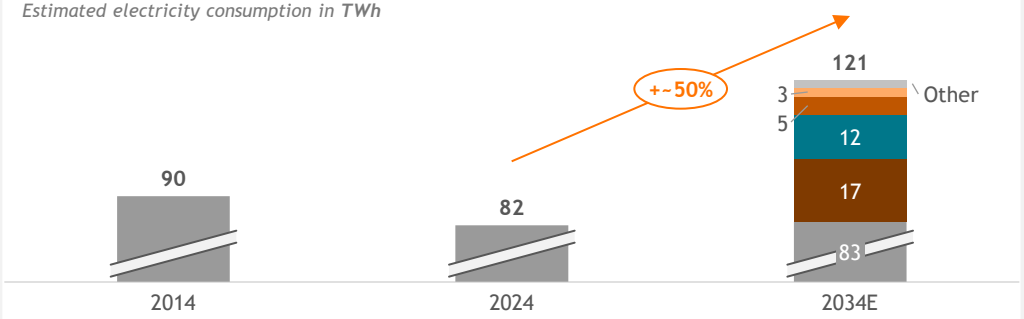
Energy transition will drive major changes for both consumption and generation in next 10 years

Consumption to increase ~50% in 10y due to electr. & new uses

Generation capacity by renewables to double in 10y

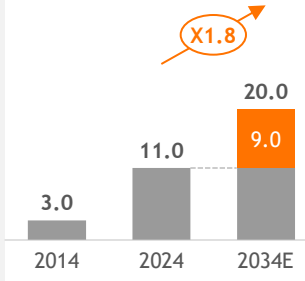
Industrial electr.	Electric vehicles	Data centers	Heat pumps
+17 TWh	+12 TWh	+5 TWh	+3 TWh

Estimated electricity consumption in TWh



Solar PV	Onshore wind	Offshore wind
X 1.8	X 2.1	X 1.9

Estimated capacity in GW



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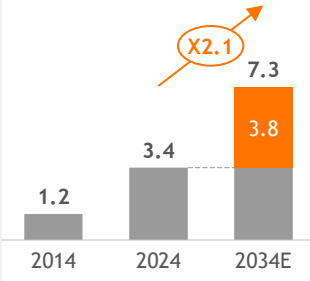
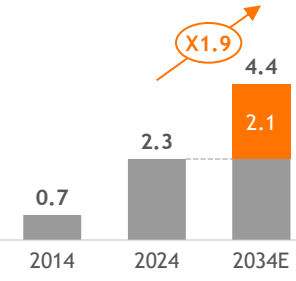


Estimated capacity in GW



Source: AdeqFlex 2025, Current Commitments scenario

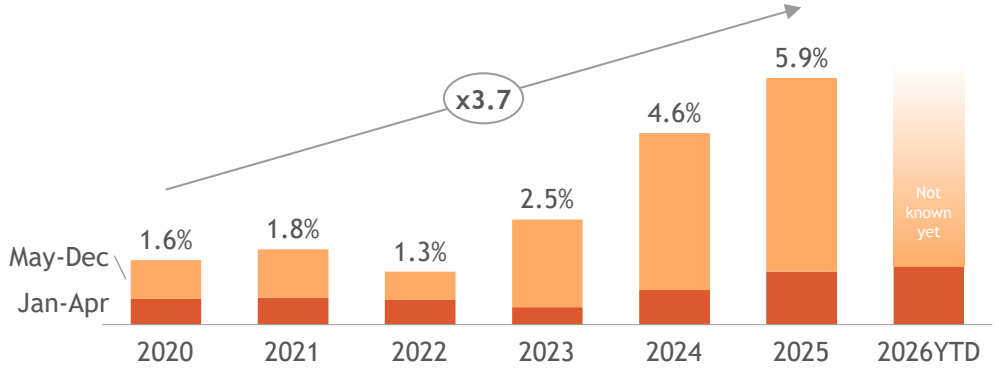
This growth is unprecedented in recent history, and we start to see the challenges this poses for the grid

Incompressibility poses risk for stability

Though more solar PV is good news for climate goals, it does often not (yet) react to market signals. This can lead to situations where there is more generation than the system can handle, and all existing means of flexibility to absorb it have been exhausted.

In 2025, ~6% of the time prices were negative in the DA wholesale market, about 4 times more often than in 2020, indicating increasing constraints on ramping down generation

Share of QHs with negative prices in Belgian day-ahead market

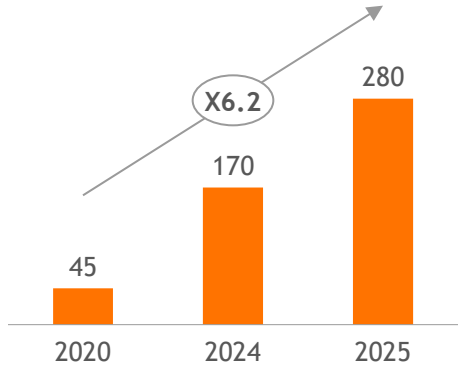


Surge in connection requests

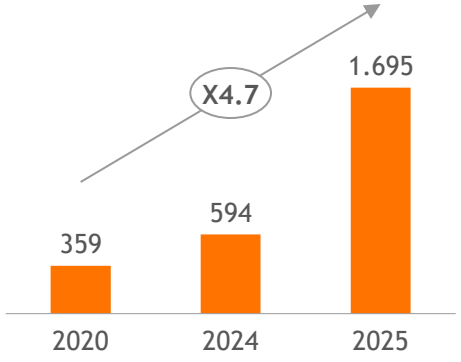
We are experiencing a surge in connection requests in recent years, driven by new assets (especially batteries & data centers) and electrification. This challenges the existing mechanisms for queue management and allocation of capacity.

In 2025, the connection requests had already increased by a factor of x4-6 compared to 2020

Requests from TSO-connected users



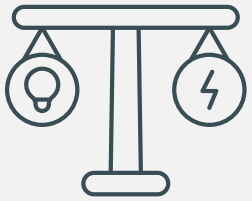
Requests transferred from DSOs



Flexibility is key for managing efficiently most challenges in transforming our power system

Keep the **balance**

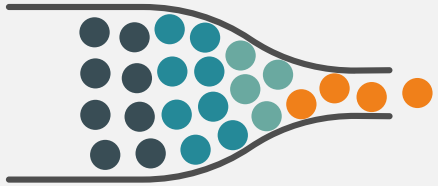
Supply = demand



Flexibility absorb
fast deviations and forecast errors

Manage congestion

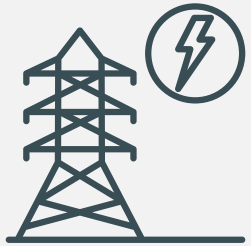
Network limits not to be exceeded



Flexibility relieves
local peaks where needed

Optimize infrastructure

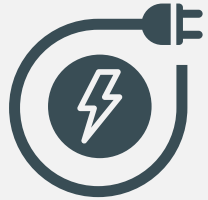
Grid sized for peaks, used only part of the time



Flexibility optimizes
costs via a TotEx approach

Ensure adequacy

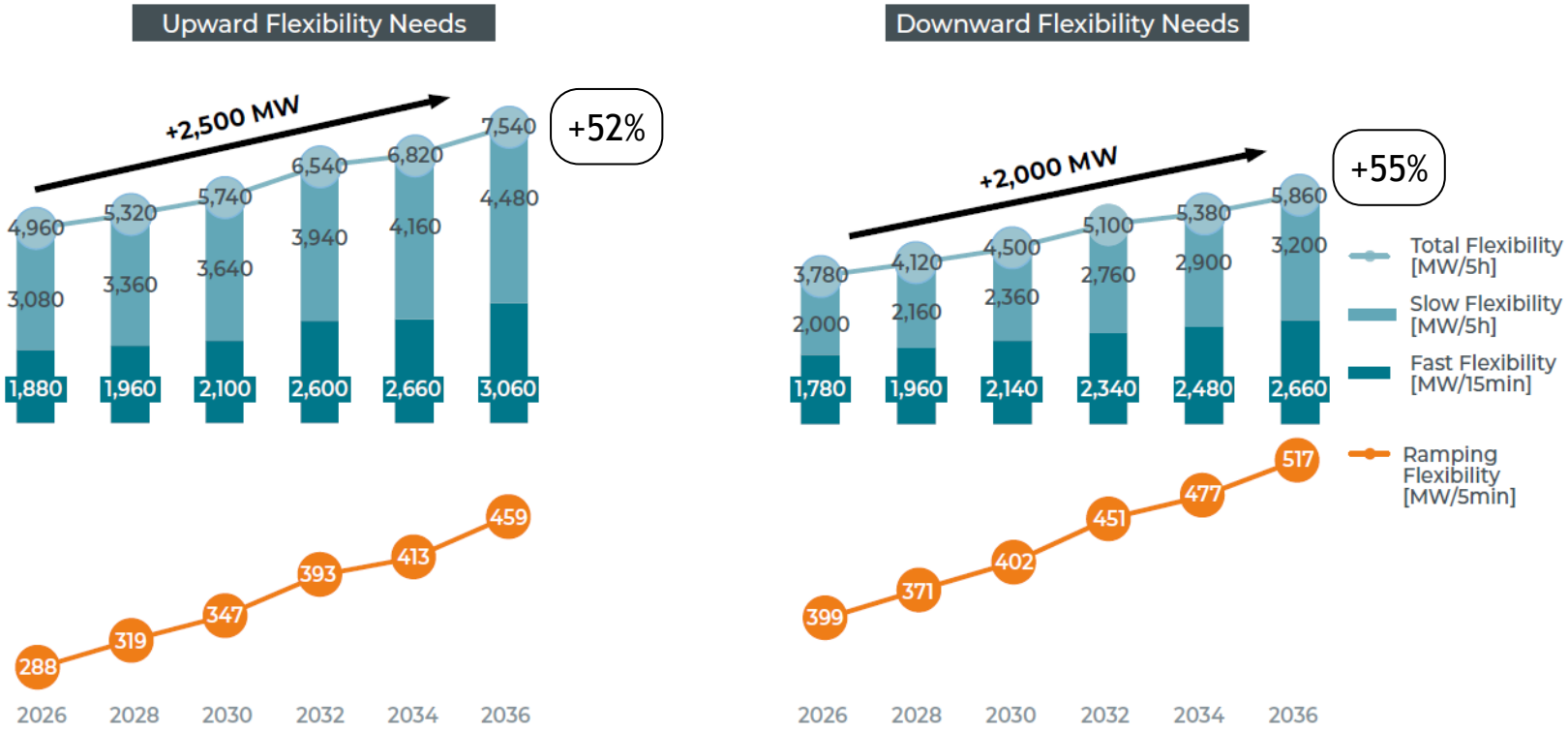
Enough capacity in critical



Flexibility reduces
peak capacity needs

Our flexibility needs for balancing will increase more than 50% over the next decade

The flexibility needs of the system over the coming decade



WHAT DOES THIS MEAN IN PRACTICE?

- Flexibility needs are projected to increase with 2 to 2.5 GW in addition to today's total flexibility needs due to the growth in renewables.
  - **Slow flexibility:** the importance of intraday markets will increase with regard to managing forecasting updates a few hours ahead of real time, with required volumes exceeding 4 GW in 2036.
  - **Fast flexibility:** the need for flexibility that can react within 15 minutes of real time – to cover prediction errors or generation and transmission (HVDC) asset outages – is expected to double, exceeding 3 GW in 2036.
  - **Ramping flexibility:** the ability to react within 5 minutes of real time to manage up- and downwards variations is expected to reach about 0.5 GW by 2036.
- These flexibility needs will need to be covered via sufficient liquidity in intraday markets and balancing markets.

You can find full report here ↷

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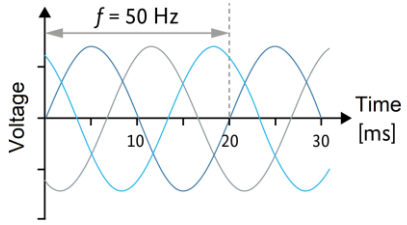
Why do we need to balance the grid?

- The power system is designed to operate at a very specific frequency (50 Hz)



- As soon as an imbalance occurs, the frequency starts to change
  - An oversupply will increase the frequency
  - An undersupply will reduce the frequency
- Such frequency deviations need to be managed very carefully; a deviation of 0.4% (200 mHz) is already considered as a major event!
- If frequency deviates too far or too long, automatic disconnections cascade, potentially leading to blackouts

Balancing the grid is the joint responsibility of BRPs & Elia with the help of BSPs

BRPs - Balancing Responsible Parties

- Every offtake/injection point on the grid is assigned to the portfolio of a BRP
- The BRP is responsible to balance offtake and injection within its portfolio. They can do this by
  - Steering generation assets in their portfolio
  - Steering consumption in their portfolio
  - Trading with other BRPs or on exchanges
- BRPs act without direct coordination by Elia (indirect coordination happens through real-time publications)

Elia with the help of BSPs - Balancing Service Providers

- Elia relies on three 'explicit balancing' products to resolve any imbalances that remain after adding together all individual BRP portfolios
- Since Elia does not have any own generation or consumption assets, it contracts BSPs to implement these explicit balancing products
- The BSP is responsible to deliver these services correctly when they are selected by Elia

How does my supplier fit into this? You can see these as different 'roles', where the supplier role entails managing the retail relationship with the end customer. Most traditional 'suppliers' (E.g., ENGIE, Luminus) take up all these roles (supplier, BRP, BSP and more), whilst other suppliers might work with another BRP behind the scenes.

Elia's balancing philosophy relies both on implicit reaction by BRP and explicit activation of BSPs

Elia relies on two types of flexibility to always maintain the balance between supply and demand:

BRPs & Implicit flexibility: Balance Responsible Parties (BRPs) are responsible for maintaining the balance in their portfolio, **and are incentivized to help the system** under certain conditions (e.g., real-time balancing obligation)

+

BSPs & Explicit flexibility: Elia procures and activates frequency containment reserves (FCR) and frequency restoration reserves (aFRR & mFRR) to deal with the residual system imbalances

Why a decentralized balancing model?

It has the potential to unlock broader system flexibility by leveraging implicit reactions, though care must be taken in how it is designed. For a more detailed discussion, see the report below:

Elia relies on three distinct BSP products to tackle imbalances in real-time: FCR, aFRR, mFRR

Imbalance makes frequency deviate

Imbalances occur in real-time for many different reasons:

- Forecasting errors for renewables
- Forecasting errors for consumption
- Unexpected outages
- Etc.

The net effect of all individual BRP imbalances (in the synchronous zone) will then affect the frequency

- Surplus will increase the frequency
- Shortage will decrease it

FCR contains the freq. deviation

= Frequency Containment Reserves

- FCR will automatically react to changes in frequency, without an explicit activation by Elia
- This 'contains' the frequency i.e., it stops the deviation from becoming larger but does not restore it to 50 Hz
- Full activation needs to be reached within 30 seconds

FRR (Frequency Restoration Reserves) restore frequency to 50 Hz

Two products exist to restore the frequency back to 50 Hertz. Their relative use depends on their relative characteristics but also cost

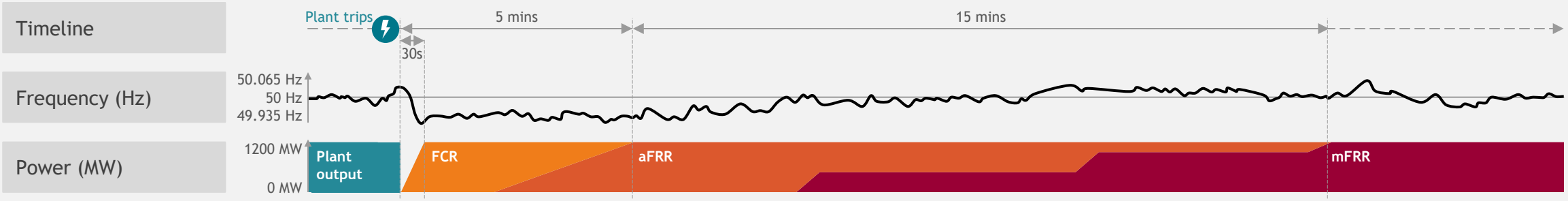
aFRR – automatic FRR

- aFRR allows Elia to activate BSPs with a granular control signal (every 4 seconds)
- Full activation required in 5 mins

mFRR – manual FRR

- mFRR allows Elia to activate BSPs for a full quarter hour at once
- Full activation required in 12.5 mins
- Especially useful for large deviations

Illustrative example of how the balancing products contribute to restoring the frequency after a plant failure



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There are multiple ways to valorize your flex

… some of which can conflict, so it is important to optimize across these (e.g., minimizing sourcing costs could increase grid tariffs)

Lower your electricity bill, consisting of two key components:

Energy (sourcing cost)

The cost of energy varies based on how much ahead you buy it, and moment of delivery.

Pick a suitable supplier contract

Fixed / variable contracts: This does not allow you to valorize your flex, as the price you are exposed to is flat in the short-term

Dynamic contracts: This exposes you to the day-ahead market price in real-time

Pass-through contracts: You decide day-ahead what you buy at day-ahead prices, whilst real-time deviations are exposed to imbalance price (plus a premium for the supplier)

Become your own BRP

This gives you full flexibility to trade on all markets (DA, ID, IMB) but also comes with significant complexity. Only the very largest industrial players opt for this today.

Grid tariffs

You also pay tariffs for your usage of the network. These tariffs are designed to incentivize behavior that lowers the need for network investments. Details vary by network operator, but roughly there are three components:

Energy tariffs:
proportional to the energy / MWh consumed, can be lowered by lowering consumption (e.g., with onsite generation)

Capacity tariffs:
proportional to the highest quarter-hour peak in a certain period, which can be lowered through peak shaving (e.g., with a BESS)

PPAD (power-put-at-disposal) tariffs:
an upper limit on your peak power agreed in advance, which helps the SO to plan the network. If you exceed the PPAD, this results in penalties

Get additional revenues w. explicit flex

Explicit balancing (FCR, aFRR, mFRR)

Help Elia manage imbalances in real-time and be rewarded for it. You can participate through an existing BSP, which can manage the significant complexity of participation for you (IT and comms towards Elia etc.). Be aware that if your BSP is not your supplier, they might only work with certain suppliers (as they need an agreement)

Local flexibility markets

DSOs have launched initiatives and pilots to procure flexibility in a market-based way, to deal with local congestion on their networks. Under such a market, DSOs would buy and activate flexibility when certain regions within their network are congested (examples: ORES' Pic@u project, Fluvius through NODES)

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You can find uses cases and more on Watts.Happening, our dedicated website to promote flexibility and its valorization:

wattshappening.be

Overview of use cases included today:

Shurgard

Real estate | Solar energy | Battery

Shurgard is installing PV and batteries across 15 Belgian sites to cut emissions and unlock flexibility across multiple energy markets.

Ranson

Food industry | Cooling | Solar energy

Ranson, active in the B2B food industry, valorizes the flexibility of its industrial cooling installation on the Day-Ahead market and imbalance market, and increases its solar self-consumption.

VPK

Paper and pulp | Cogeneration

A major packaging company maximizes the value of its CHP in Belgium by combining Day-Ahead and ancillary markets optimization.

How Much Can You Save on EV Charging?

Other | Electric vehicles

Unlock up to 25% in annual savings on EV charging by using smart charging and time-based electricity tariffs. Estimate your potential savings for home or office charging

L'Arsenal in Etterbeek

Real estate | Solar energy

With solar installations facing increasing revenue challenges, the operator at l'Arsenal significantly increased profitability by implementing smart control of solar injections.

Kwekerij Dirk Mermans

Agriculture | Cogeneration | E-boiler

Kwekerij Dirk Mermans, a leading European greenhouse, delivered 1.5MW of flexibility on DA and imbalance markets by decoupling heat production and demand.

Aquafin

Wastewater treatment | Cogeneration | Heat pump

Aquafin leads wastewater treatment in Flanders, using biogas from sludge for power. With CHP engines, they harness day-ahead pricing, delivering flexibility and additional revenue.

Alpro

Food industry | E-boiler | Cooling | +2

Alpro, a pioneer in plant-based alternatives to dairy products, built an advanced energy system with flexibility and sustainability at its center.

Thank you.