A market perspective on measures aimed at easing grid bottlenecks

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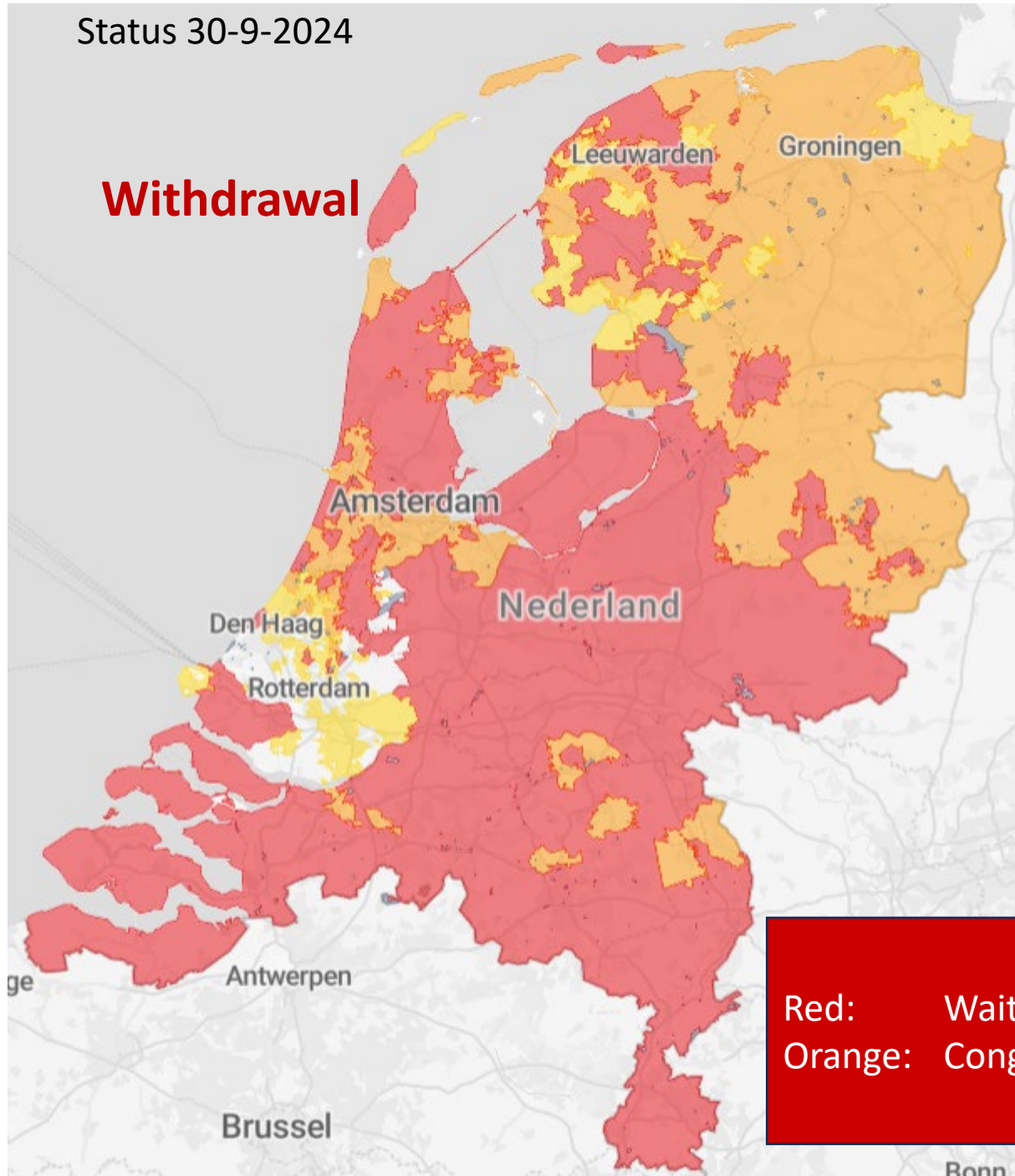
10-10-2024
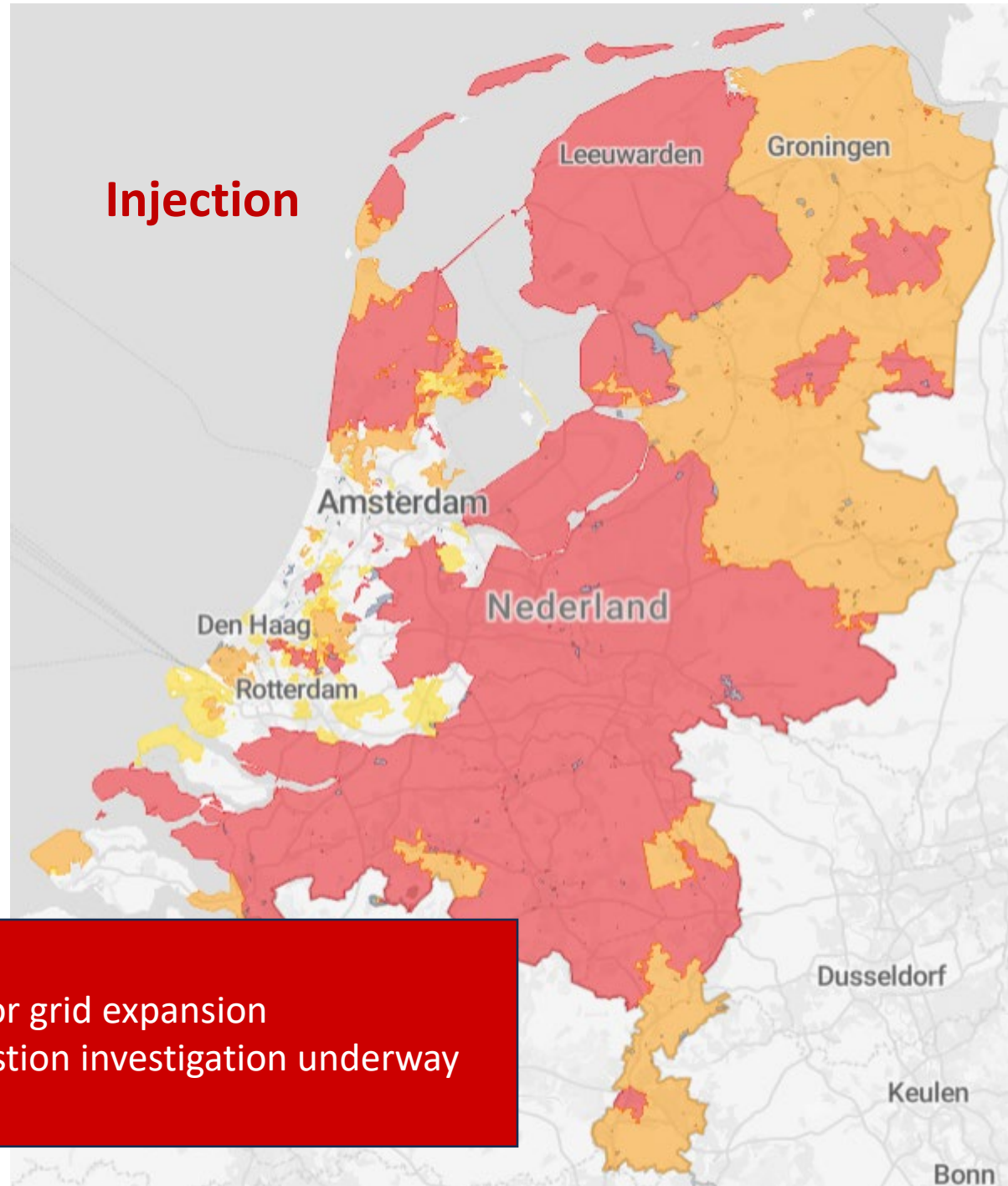
TrinSights

balancing the energy trinity

Contents

- Grid congestion & congestion management
- Flexibility for the market and flexibility for the grid
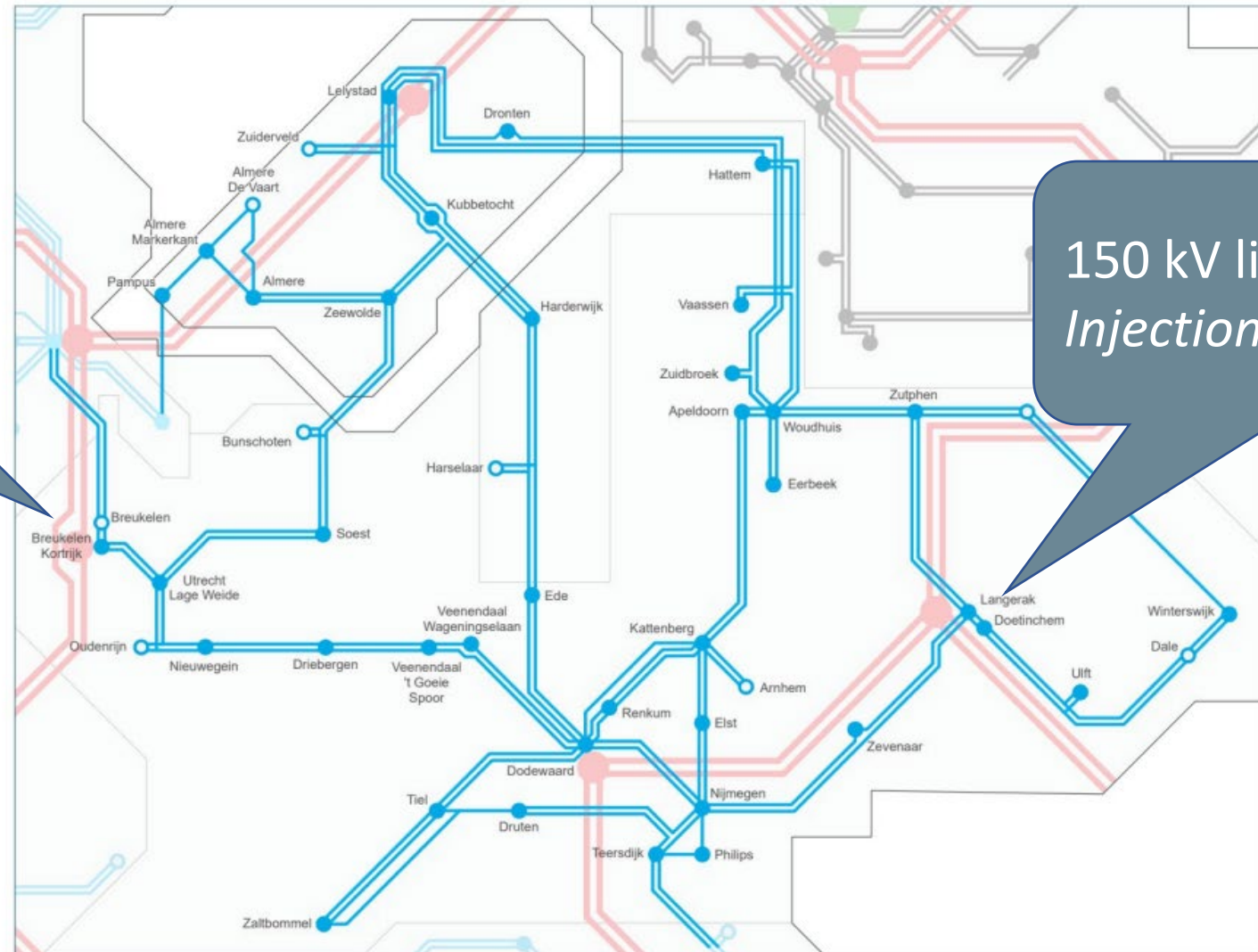- Off-shore bidding zones

Status 30-9-2024

Withdrawal

Injection

Red: Wait for grid expansion
Orange: Congestion investigation underway

Congestiemanagement in NL
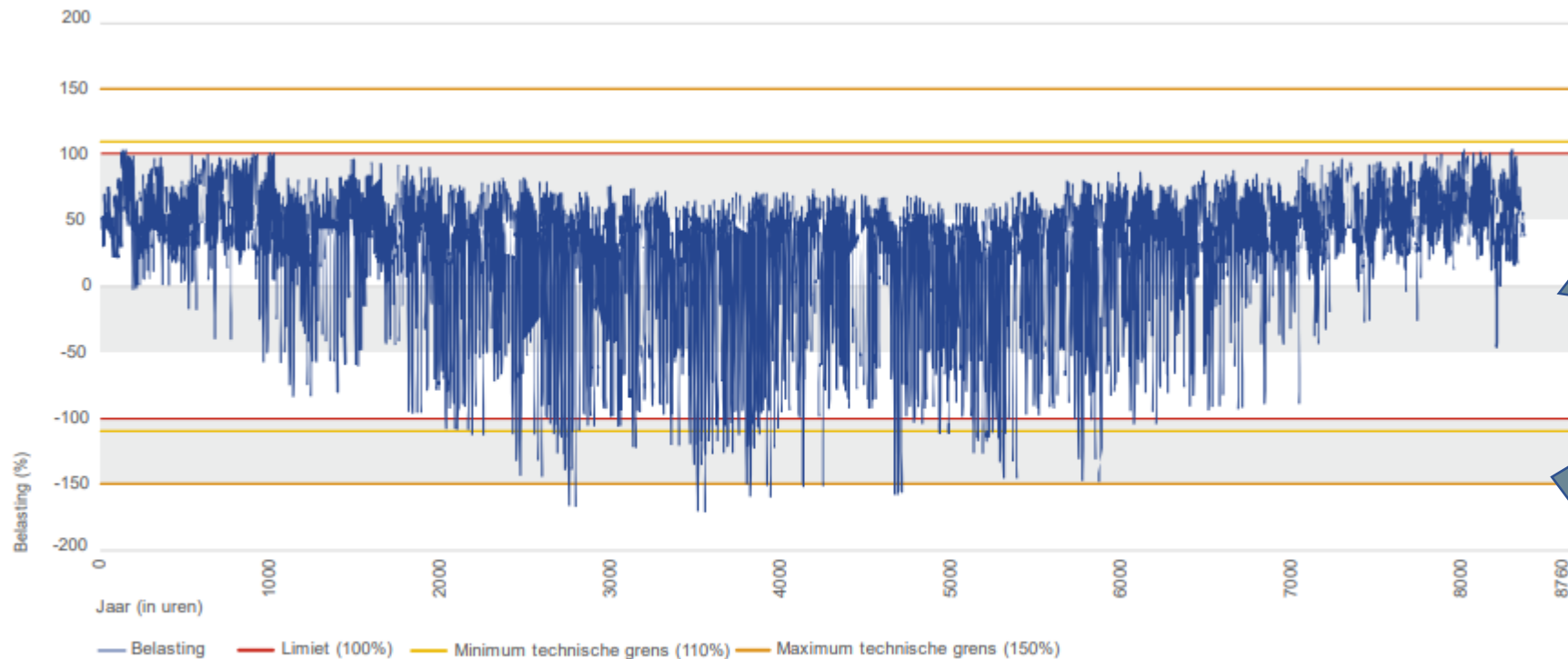# 150 kV grid Flevoland Gelderland Utrecht

Congestion management in NL; injection congestion
150 kV line, one year, if all requests are accomodated, no congestion management

Belasting verbinding Doetinchem-Langerak (N-1)

Congestions don't always occur

150% limit is exceeded, increasing the 150% limit would shorten the queue

Figuur 3-3: Verwachte belasting verbinding Doetinchem-Langerak in de situatie waarin geen congestiemanagement wordt toegepast en de volledige gevraagde transportcapaciteit wordt gefaciliteerd. Positief/negatieve getallen representeren de richting van de vermogensstroom.

Congestion management in NL: withdrawal congestion
150/380 kV transformer, one year (2029)
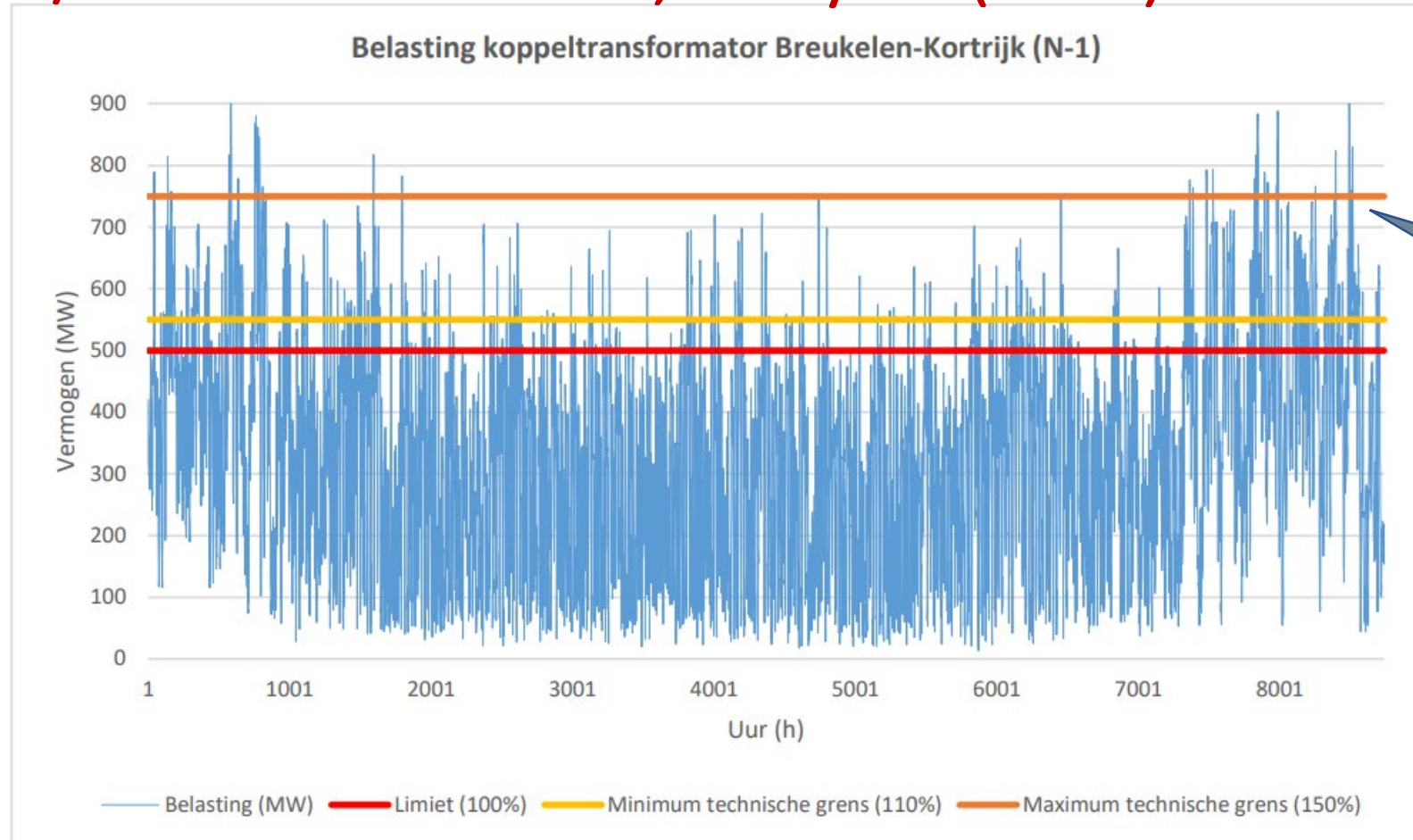
Figuur 3-1: Verwachte belasting koppeltransformator te Breukelen Kortrijk bij faciliteren van de benodigde transportcapaciteit (2029)

Source: Congestieonderzoek Flevopolder, Utrecht en Gelderland - afname, TenneT, Okt 2023

Congestion volume NL decreased in 2023

Transport market volumes in 2023 decreased with 39% compared to 2022
Most redispatch required on critical branches

Redispatch power upwards and downwards volumes in the Netherlands

-25%   -39%

Mainly on "critical branches"

Critical branches   Other network elements   Yearly average

Note that these are only the volumes for Redispatch, not for restriction contracts and Reactive Power

- Critical branches are lines that are included in CORE flow-based market coupling, as they significantly impact and are impacted by CORE cross-border exchanges. Redispatch takes place to ensure that grid operation remains within operational security limits.
- Redispatch volumes decreased from an average of 81 GWh/month in 2022 towards 50 GWh/month in 2023. The total redispatch power volume in 2023 was 599 GWh.

Congestion volume DE increasing

Higher Redispatch Volumes in the first three Quarters of 2023

Redispatch Volumes in Germany

Legend:
- Redispatch + countertrade
- Netzreserve
- EinsMan**
- Yearly average

* For 2023 only volumes for the first three quarters were available. ** EinsMan volumes exist only of downward adjustments.

- Conventional redispatch (conventional power plants > 10 MW) in combination with countertrade remained the most common process used for solving congestion in the German grid. RES curtailment (EinsMan) related redispatch in creased in the first three quarters of 2023, especially in Q1 and Q3.

- The contracted Netzreserve plants are called upon when redispatch availability is insufficient. In 2023 less netzreserve was dispatched, mainly in Q1 there was some need for Netzreserve.

What is congestion management?

What is congestion management?

injection

withdrawal

Transport

injection

withdrawal
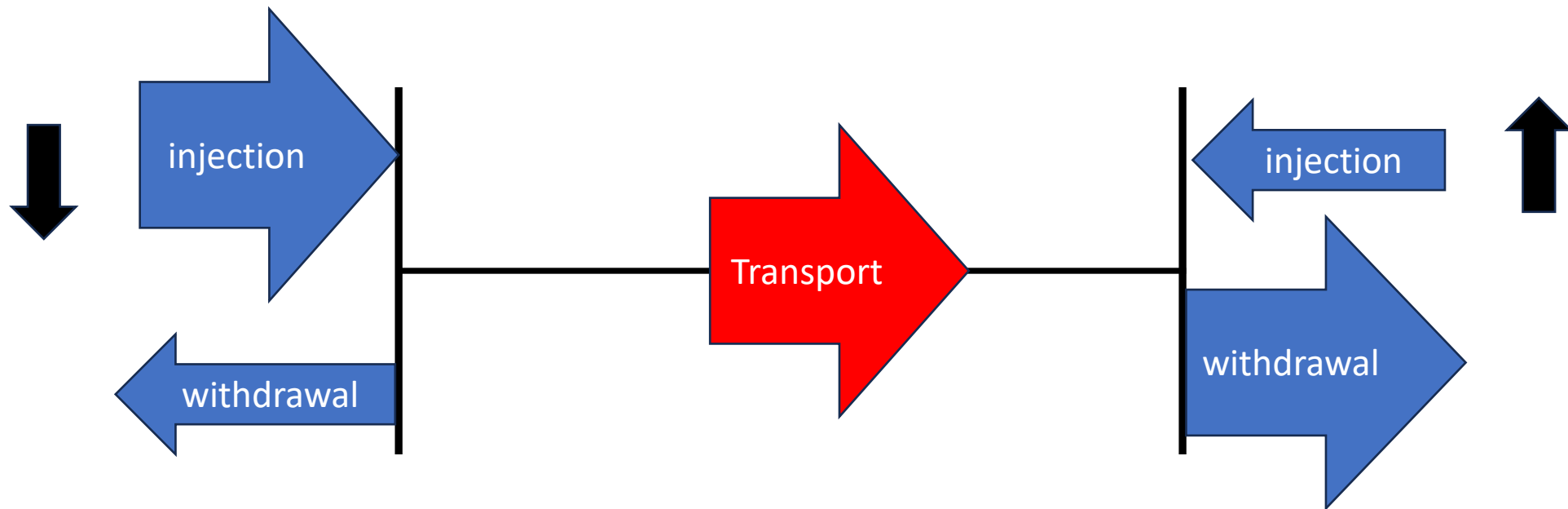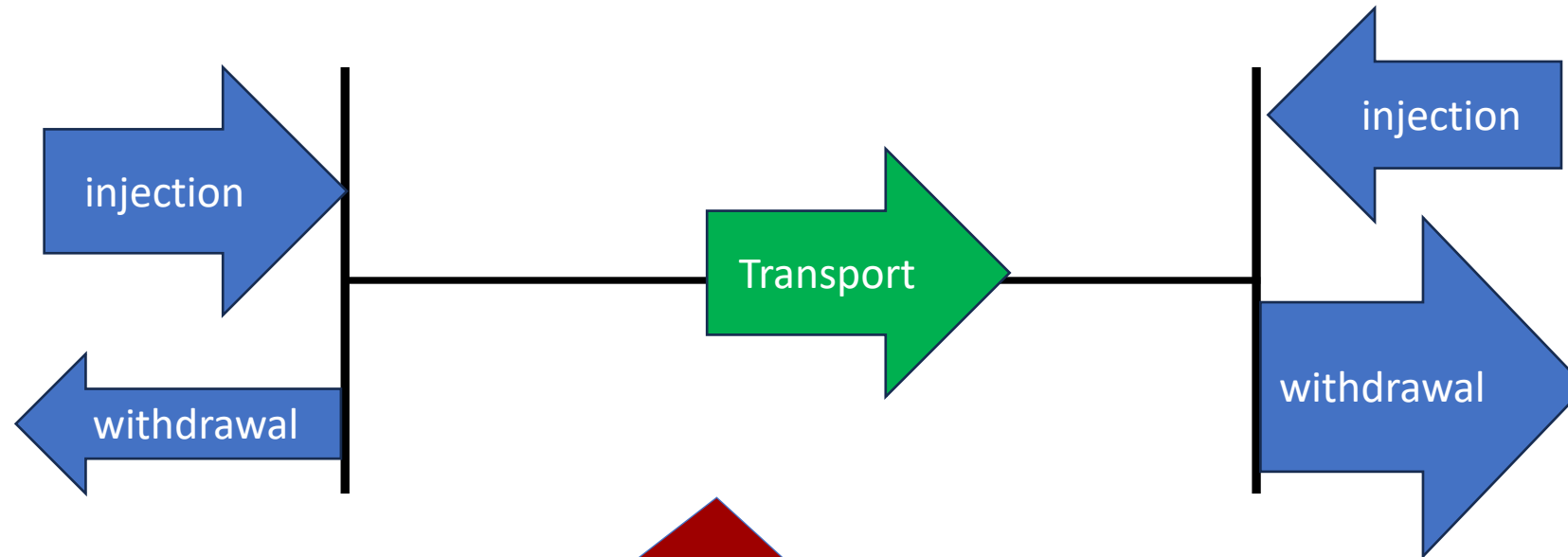
Still many variants:
- Timing of intervention
- One-sided / two-sided
- With / without BRP adjustment
- (non) market based compensation

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Congestion management inside the NL bidding zone

- **Since 2010 in Dutch Grid Code Electricity**

- **Grid Code decision of 2022 introduced duty of SO to provide capacity, also in case of congestion**
  - Technical limit (100% plus flex capacity, up to 150%) and financial limit (€1.02 per MWh)
  - Financial limit has no meaning for daily application of CM
  - "optimum" between DE and former NL approach
  - If there is no congestion-investigation that shows that financial or technical limit is reached, than SO *must provide capacity* as requested

Congestion management in NL
three different instruments:

Type	Compensation
Capacity restriction	Market-based
Redispatch	Market-based or non market-based
Market restriction	None

Congestion management in EU Regulation 2019/943

- Definition of 'redispatching':
  - a measure, including curtailment, that is activated by one or more transmission system operators or distribution system operators by altering the generation, load pattern, or both, in order to change physical flows in the electricity system and relieve a physical congestion or otherwise ensure system security;

- Article 13 Redispatching
  - A.o. rules for non-market based compensation

- Applicability in NL
  - ACM states that capacity restriction & market restriction are not covered by redispatching as defined in EU Regulation

Congestion management in NL: Still room for improvement

But no panacea

- System Operators want:
  - Standard contract, including price formula and price cap, for CBC
  - Tighten obligation to participate
  - Incentives on quality for T-forecast

- Other ideas:
  - Integrate Gopacs & RESIN (pool demand & flex)
  - One-sided redispatch close to real-time (with real-time interface)
  - Formula for non-market based compensation
  - Employ group-CBC
  - Increase technical limit and (especially for withdrawal congestion) financial limit

Other ideas (next to congestion management) to relieve grid congestion

- Flex tender
- Alternative Transmission rights (non-firm transmission)
- Use It or Loose It (UIOLI / GOTORK)
- Group Transmission Agreement (groeps-TO)
- Energy hub
- Time-of use grid tariff
- Different priority
- Smaller bidding zones

Alternative transmisison rights (ATR); non-firm ATO (NFA)

- NFA 1.0
  - Zero right on capacity
  - Full discount on grid fee (so mainly for off-take, i.e. storage and consumption)
- NFA 2.0
  - Tijdduurgebonden contract (NFA85)
    - TenneT
    - Max 15% of time no capacity
  - Tijdblokgebonden
    - DSOs
  - Full discount on grid fee
  - Available 2025 / 2026
- No real added value next to Congestion Management
- But especially relevant for storage

Energy hubs

- Local balancing of demand and supply (including storage) of electricity is suboptimal

- Optimal dispatch of each individual asset/option (e.g. battery or demand response) is found by optimising against the market price (bidding zone NL)

- Only local solutions needed in case of congestion, so …

- …. apply congestion management! (possibly with a group-CBC)

Contents

- Grid congestion & congestion management
- **Flexibility for the market and flexibility for the grid**
- Off-shore bidding zones

ACM decision: Codebesluit deelname Europese platforms balanceringsenergie (13-09-2024)
## *mFRR product may not be used for redispatch*

48. De ACM neemt, na afstemming met de gezamenlijke netbeheerders, de derde voorgestelde reden voor activatie van biedingen van het MAR... ...heerders stellen in het codewijzigingsvoorstel ... ...P goedgekeurd, voor redispatch in te z... congestiesystematiek en de rolverde... ...eergelegd. De ACM acht het onwenselijk om het ... ...or biedingen voor een balanceringsenergieproduct ook voor congestie-doeleinden in te ... ... zetten. Hierbij merkt de ACM op dat de *gate closure time* voor redispatch-biedingen vóór de BE-GCT ligt, waardoor een marktpartij die als CSP én als BSP is erkend, zelf kan bepalen op welke markt hij zijn flexibiliteit aanbiedt, dan wel zijn flexibiliteit eerst voor redispatch en, indien niet afgeroepen, vervolgens voor balanceringsdoeleinden kan aanbieden. Hiermee wordt tegelijkertijd invulling gegeven aan de behoefte van de gezamenlijke netbeheerders om schaarse flexibiliteit voor verschillende doeleinden beschikbaar te houden én blijft de in de Netcode elektriciteit neergelegde rolverdeling tussen de BSP en de CSP behouden.

> … a market party (both BSP and CSP) may decide itself at which market it offers its flexibility …

The inc-dec game: an example

- Assume:
  - Power plant variable costs €50 per MWh
  - Expected market price around €70 per MWh
  - Plant expects to be needed to relieve congestion
  - Offers at €200 per MWh (both on market & for congestion management)
- Result
  - Plant misses €20 /MWh margin on market
  - Somewhat higher market price
  - T-forecast: 0 MW, more congestion
  - Plant called for redispatch and makes margin of €150 per MWh
- Likely to qualify as "financial capacity withholding" = REMIT violation

Is flexibility a goal in itself?

reliability

Energy-trinity

efficiency

sustainability
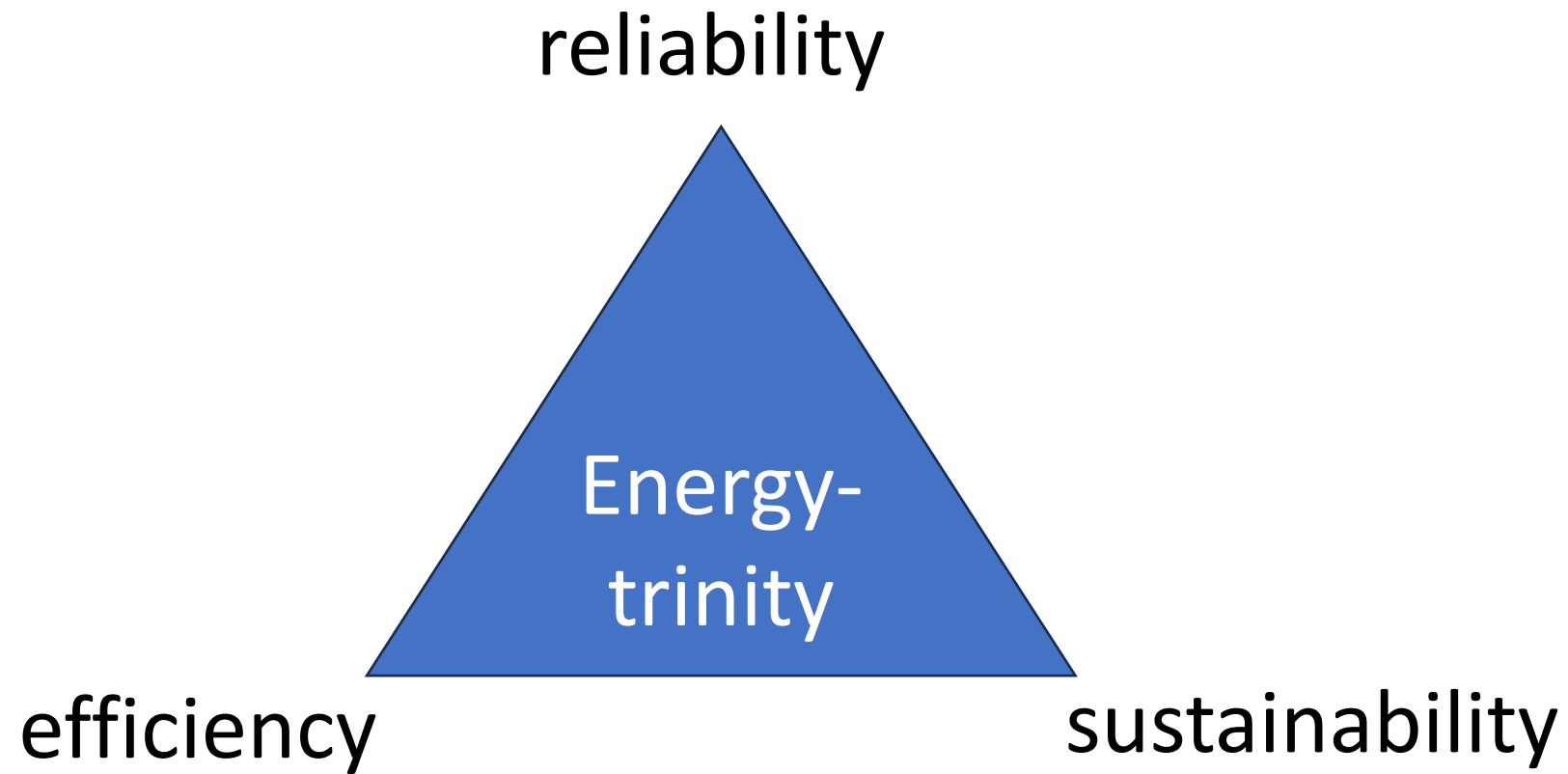
Definitions: capacity & flexibility

- **Capacity**: is the ability (option) to supply or take electrical energy (buy or sell)

- **Flexibilitity** is the ability to use/exploit capacity with few limitations
  - Flexibility is a characteristic of capacity
  - Flexibility has many different time dimensions
    - Example: A battery has short-term flexibility, but not longer-term flexibility

Flexibility for the grid means a limitation to exploit flexibility on the market

- Flex can be used on all market segments
- System balancing is not exclusive task of TSO
- TSO responsible for MW-balance, market parties balance energy position continuously

- If grid reaches limits, dispatch is restricted
- That's a congestion service, and it is compensated
- Congestion management is not a market
- Flex for market and flex for grid are not competing

Flex for the market

Flex for the grid

ELECTRICITY MARKET

Forward | Day ahead | Intra-day | Imbalance market
| | | Imbalance TSO

Production | Storage | Consumer

ELECTRICITY GRID
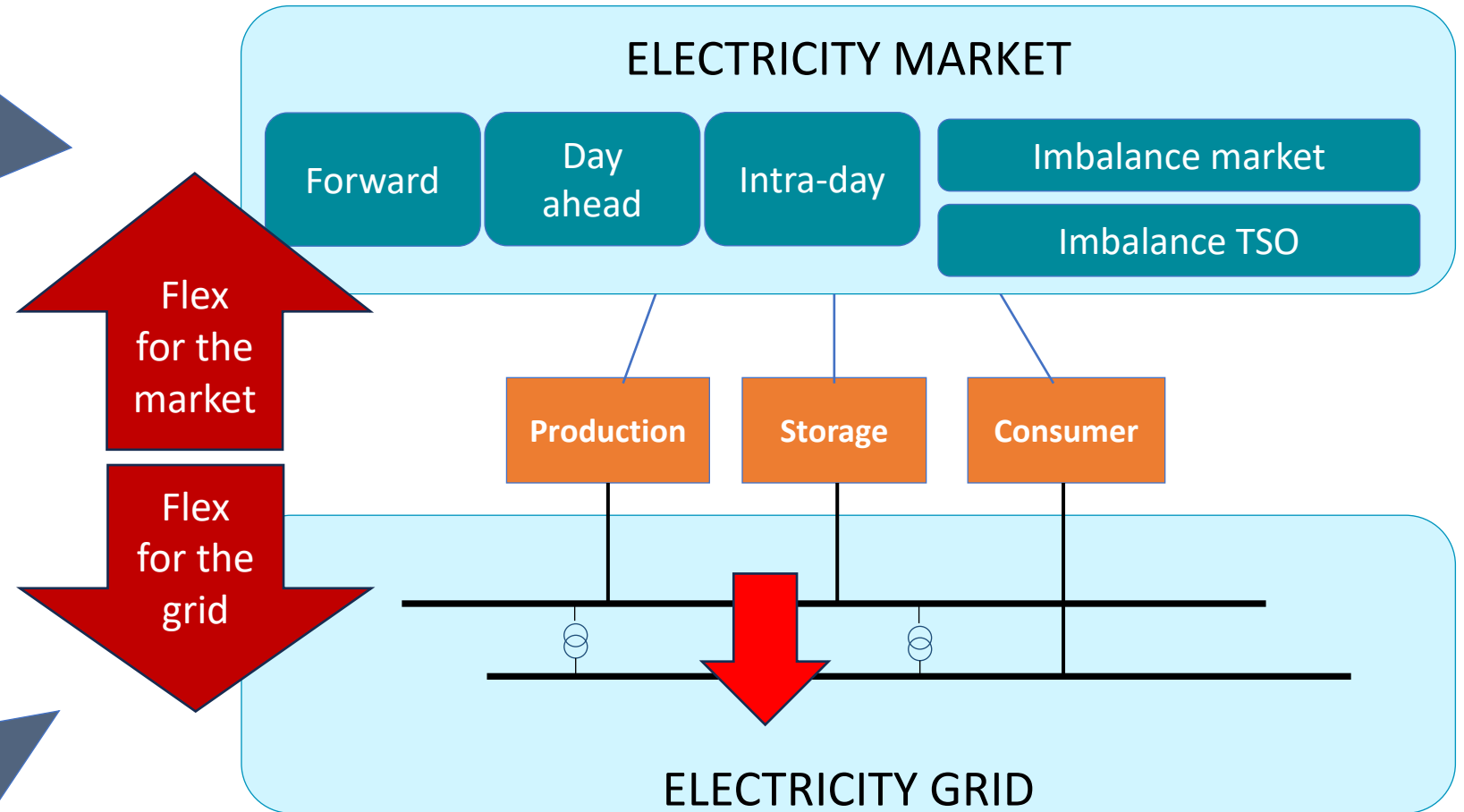
Draft EU Network Code Demand Response
Two fundamentals need to be understood before to draft **the rules**

- **Local market**
  - An unnecessary term that will cause problems

- **Coherence between balancing services and congestion services**
  - E.g. blocking a balancing bid for congestion reasons is a congestion service

ACER consultation runs until October, 30

Contents

- Grid congestion & congestion management
- Flexibility for the market and flexibility for the grid
- **Off-shore bidding zones**

Congestion within a bidding zone and between bidding zones

- Congestions within a bidding zone
  - Market/trade doesn't take congestions into account
  - TSO / DSO manages congestion
- Congestions between bidding zones
  - TSOs determine the amount of available capacity for`import/export
  - Price differences occur in case of congestion
  - Market manages congestion

Bidding zones
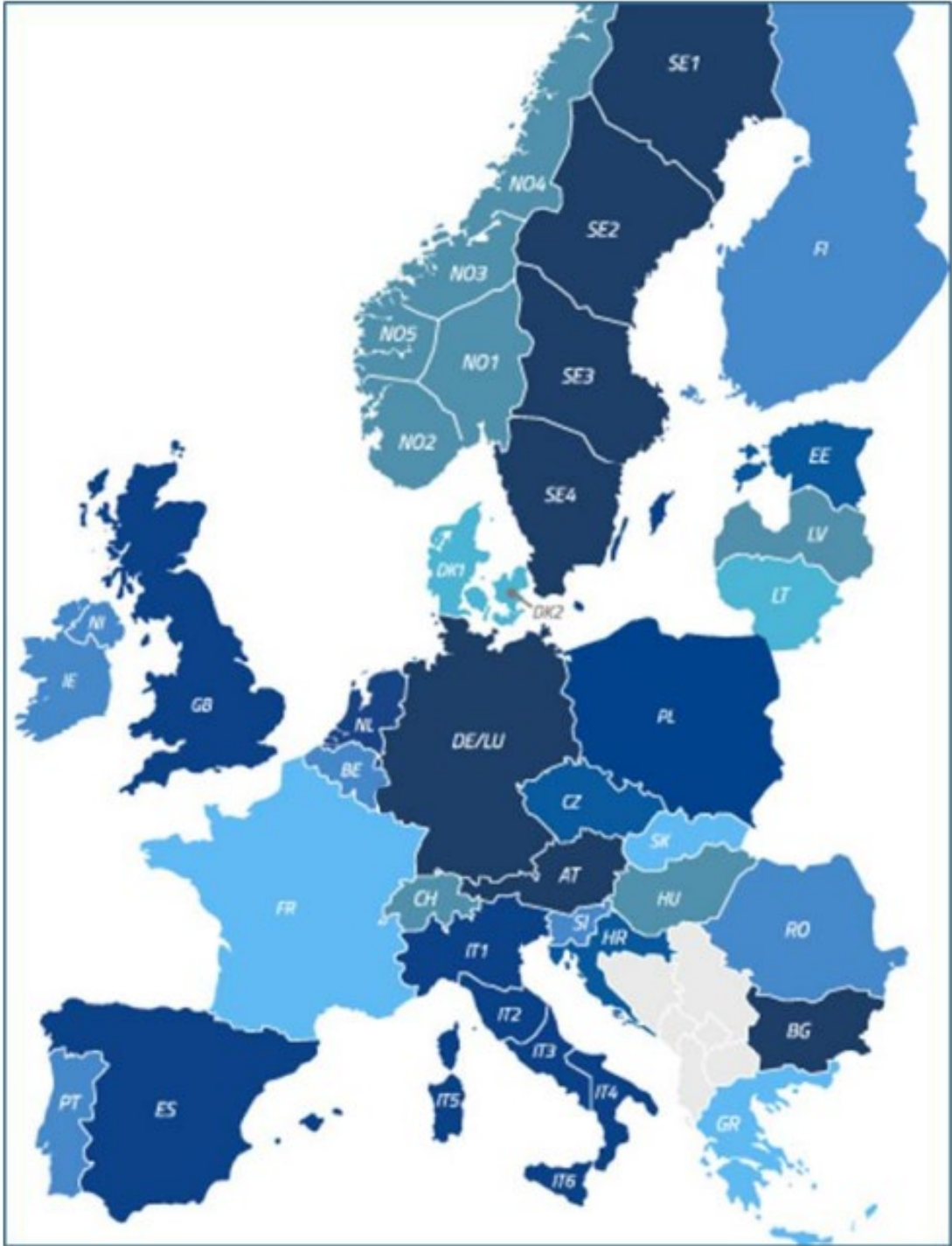
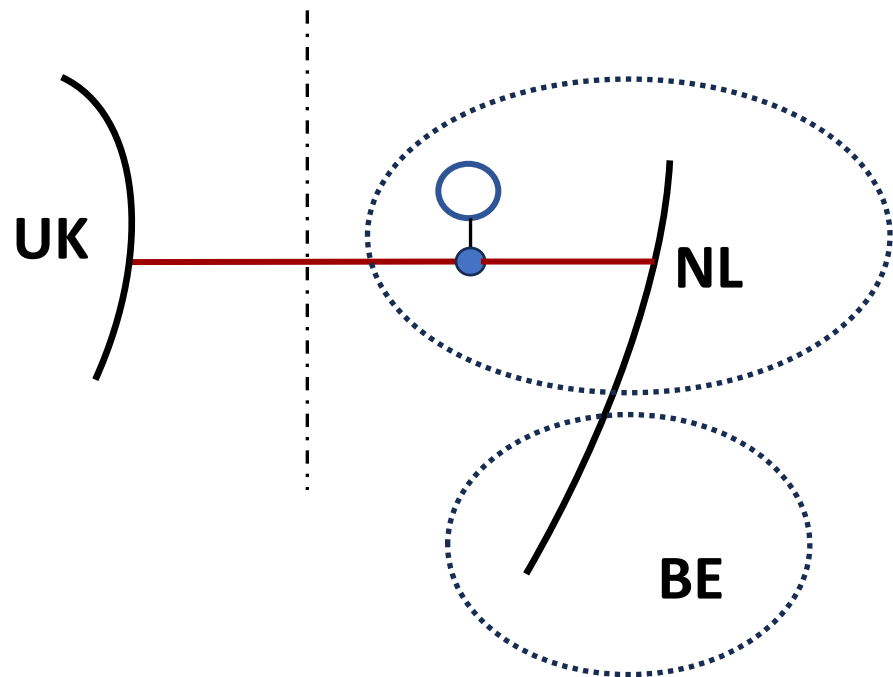# Bidding zones – DA Prices, Monday 3 juni 2024
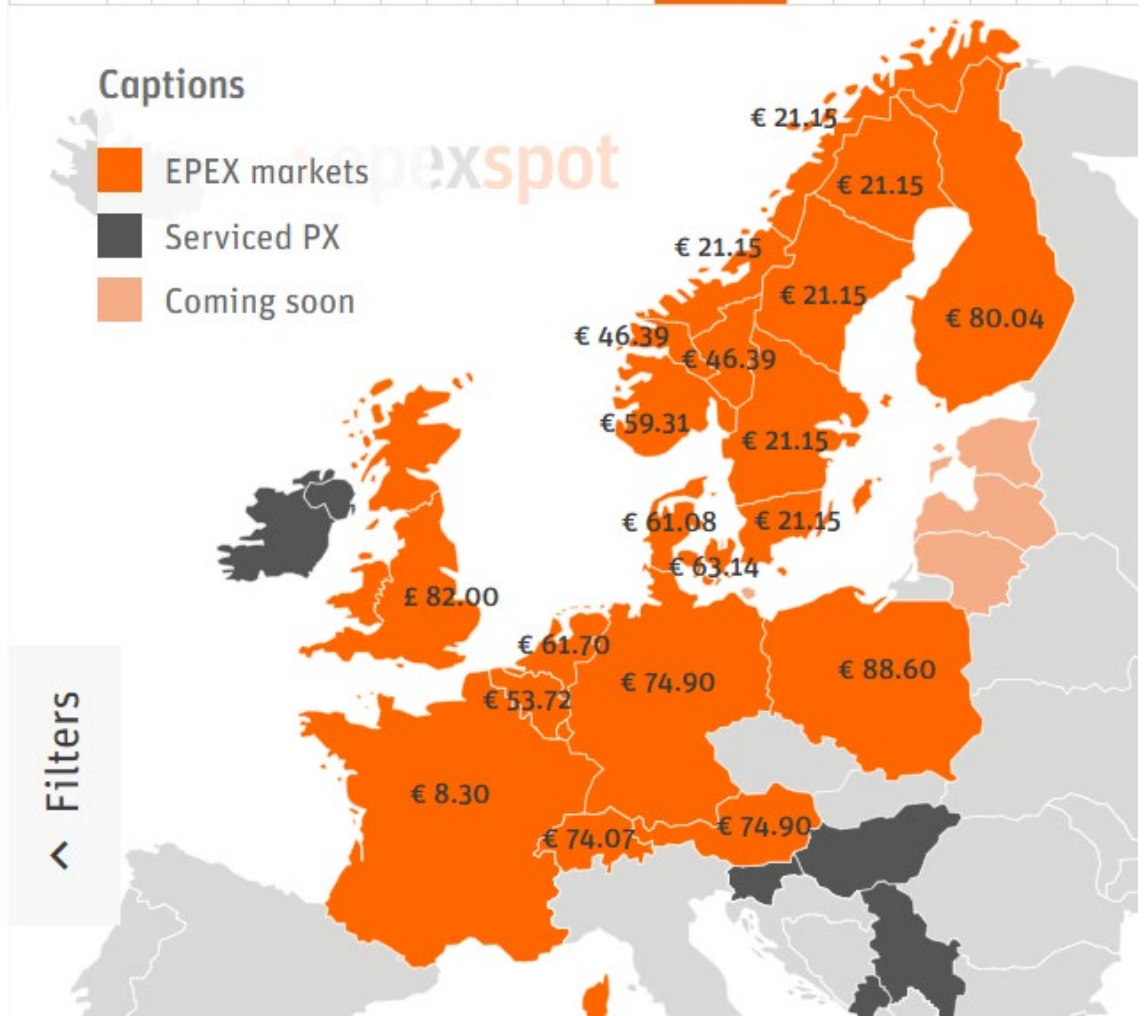
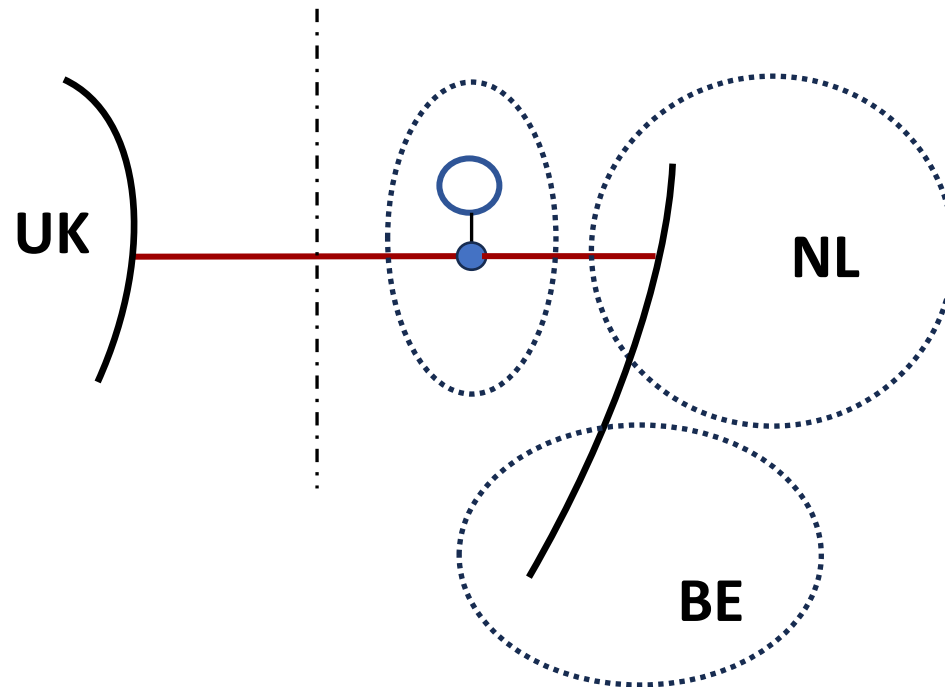# Review of bidding zone configuration
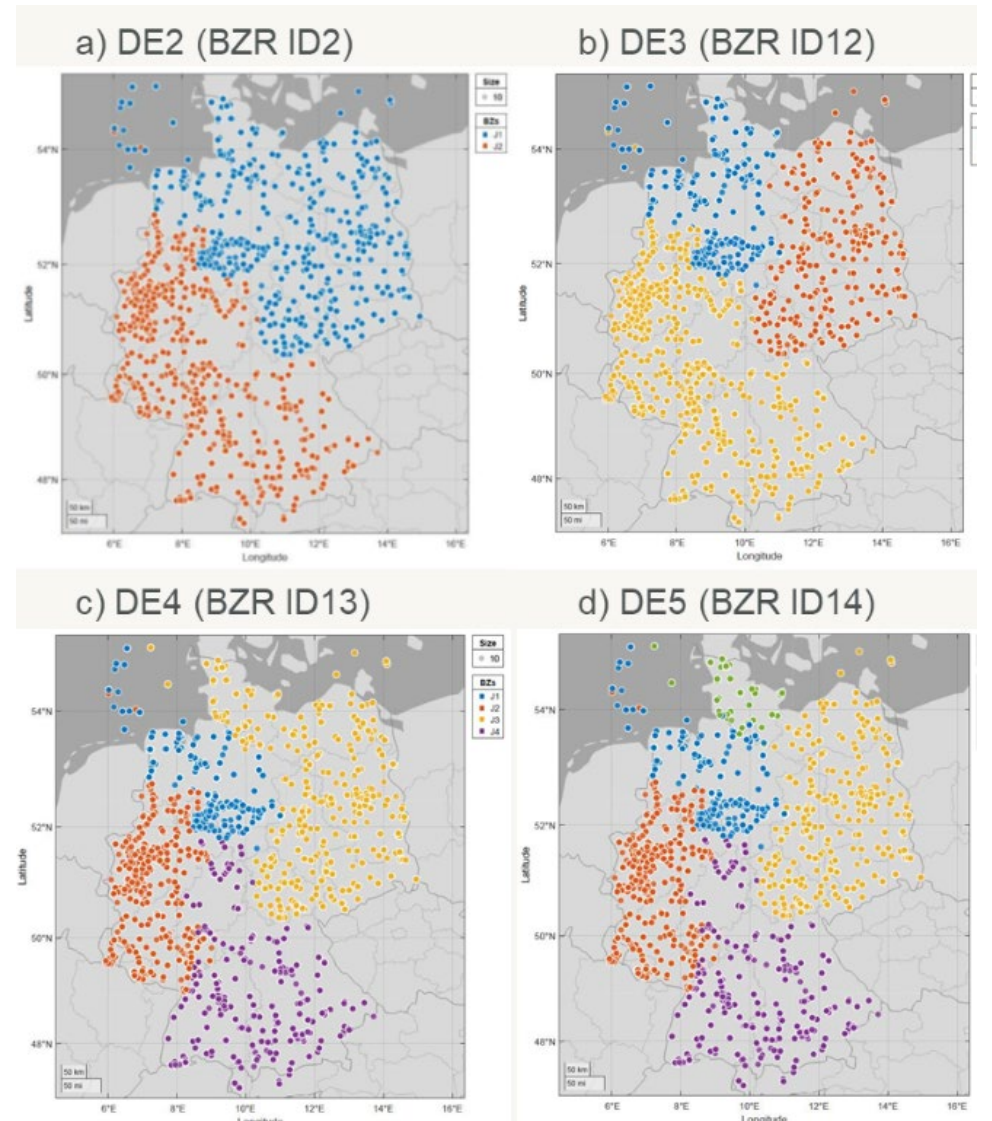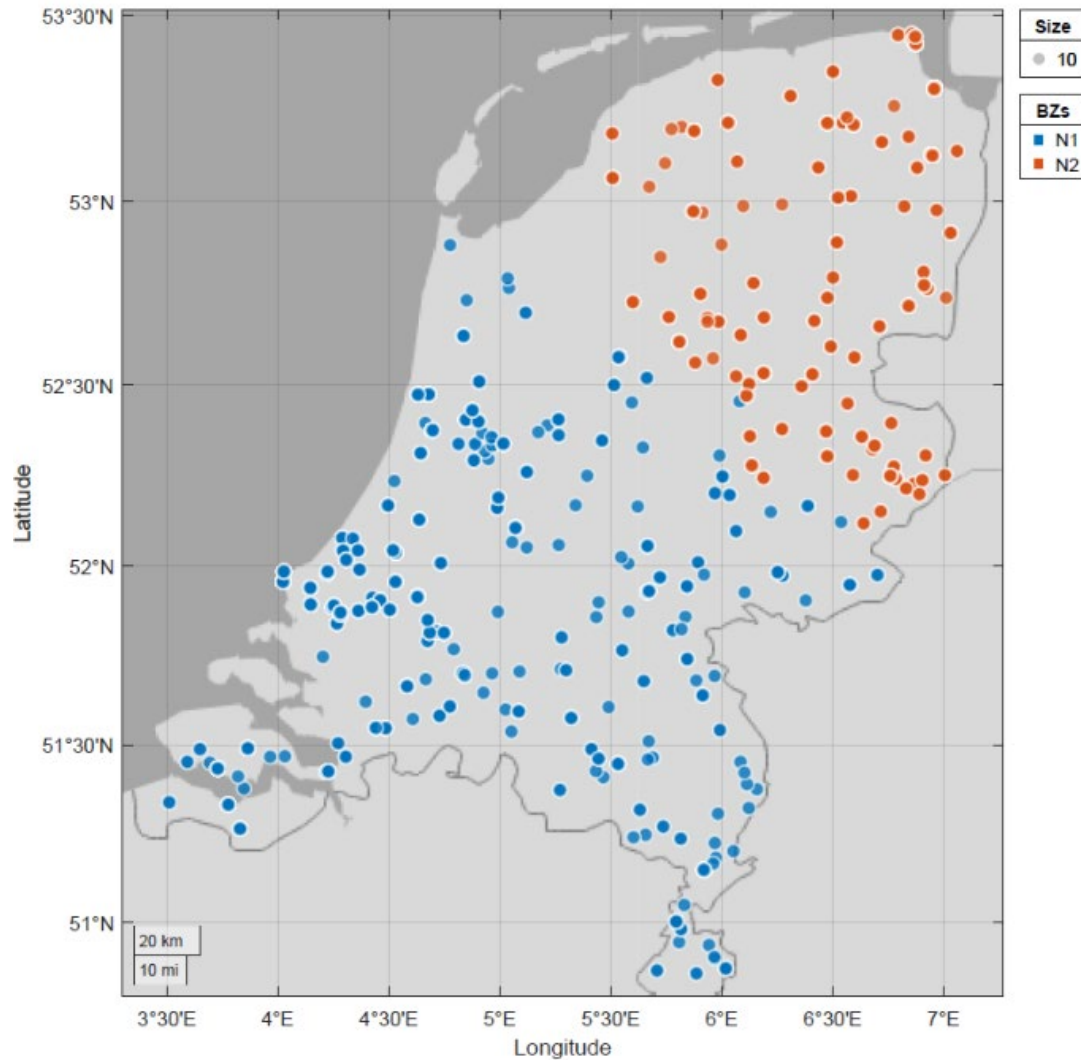
The vision of Matti Supponen is not in reach
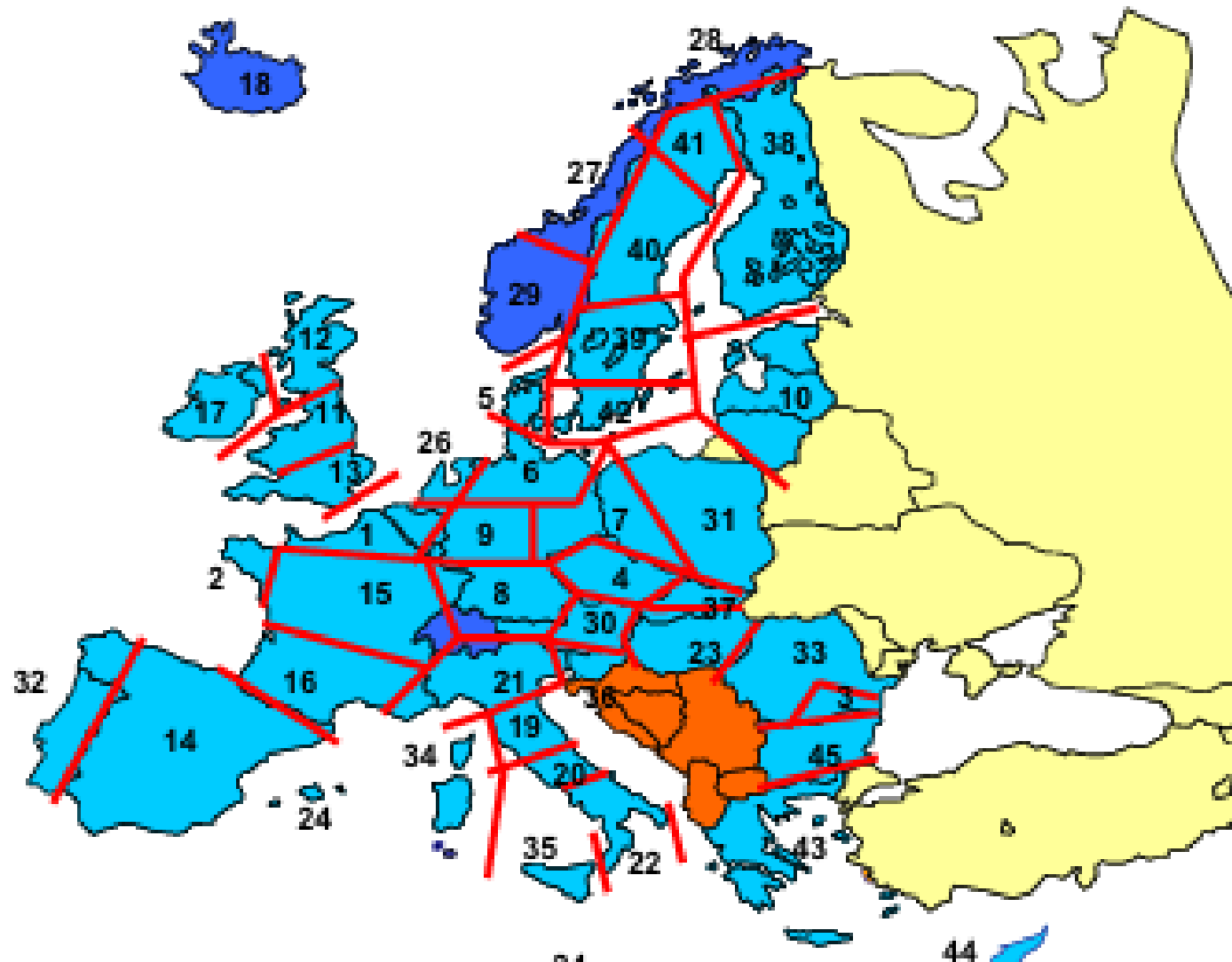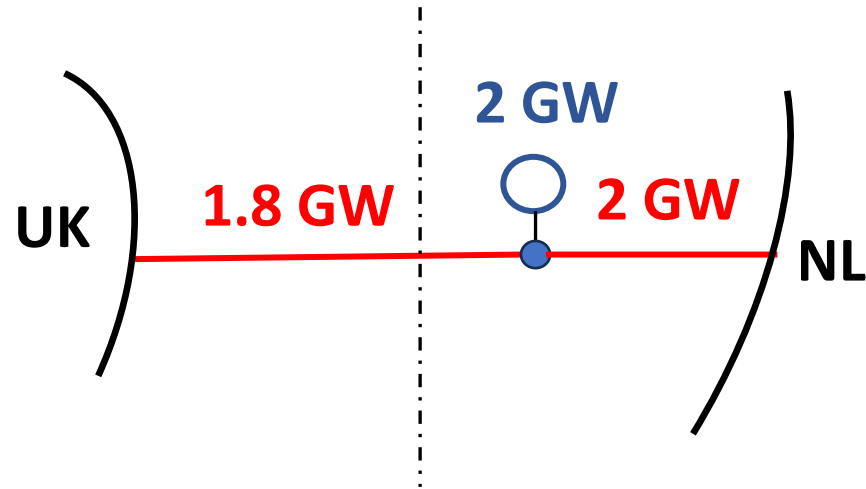
Home Market & OBZ (offshore bidding zone)

Home market

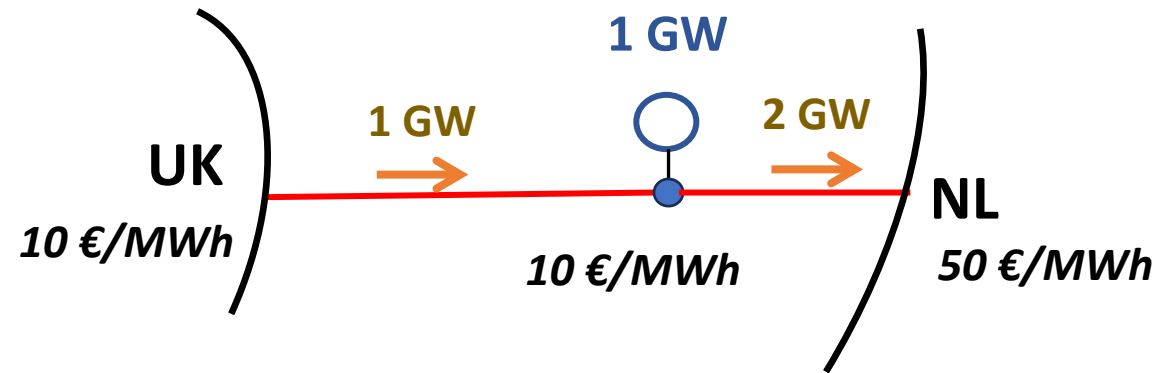**Separate OBZ**

UK

NL

BE

UK

NL

BE

⬭ Bidding Zone

◯ Offshore wind

Lion Link possible set-up

Lion Link possible day-ahead market result
Price in OBZ equal to price in low-price BZ

1 GW

1 GW　　　　**2 GW**

UK

10 €/MWh　　　　**10 €/MWh**　　　**NL**

50 €/MWh

DA Congestion revenues (1 hour) = 1000 MWh . 0 €/MWh + 2000 MWh . 40 €/MWh = 80 000 €
Note: offshore wind is not obliged to sell at DA market

Choice for Offshore Bidding Zone is harsh

- There is no market in the OBZ

- All physical cross-zonal capacity is allocated to the NEMOs

- The OBZ price is highly dependent on development of off-shore grid

- The concept of TAGs (Transmission Access Guarantees) is unlikely to be a solution

- Lesser problem if CfDs are foreseen

- Suggestion: start with the imbalance price methodology

Conclusions

- Grid strengthening is the main solution

- Congestion management is the working horse in the meantime
  - Many innovative ideas are variants of congestion management
  - Do not expect miracles from grid tariff reform, from bidding zone reconfiguration nor from local markets
  - But congestion management is not a panacea, especially for withdrawal congestion

- Take the perspective of the grid as facilitator of the market
  - The challenge for the TSOs & DSOs are enormous, congestions and grid costs are increasing, but keep an eye on the value that is created in the market

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