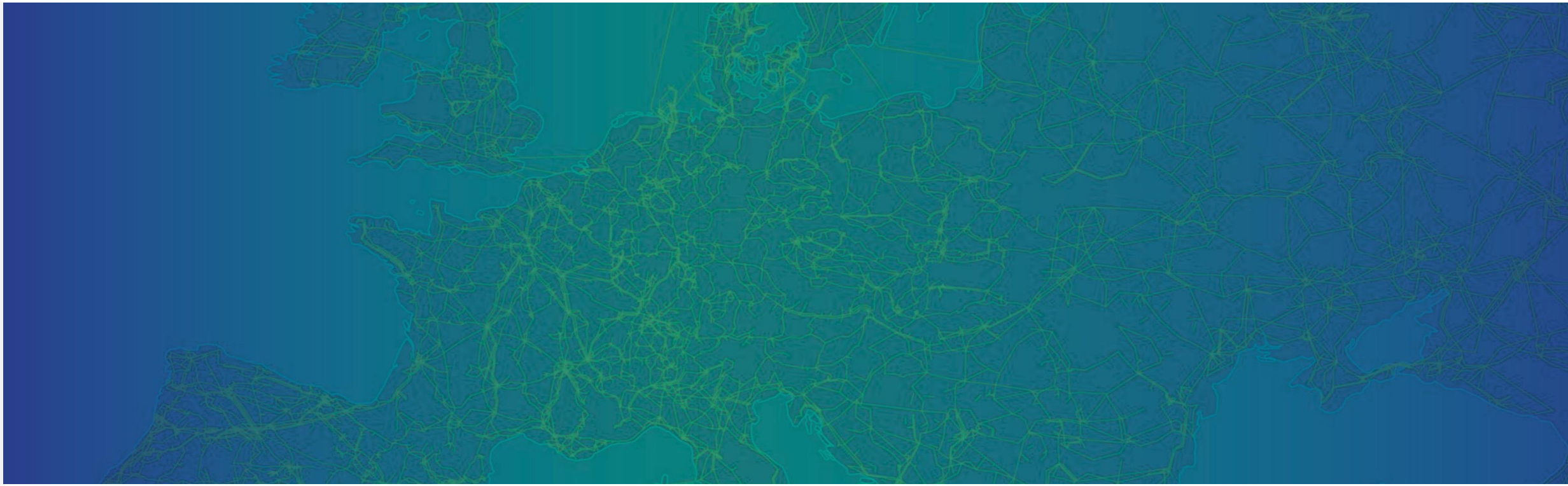
Bidding Zone Study

Public Webinar | 6 May 2025 | Presentation of results



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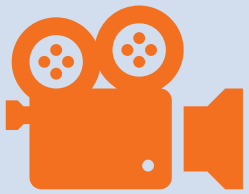
Agenda

Indicative timing	Webinar item	Speakers
8:45 – 09:00	Webinar open for log-in	
09:00 – 09:05	Welcome and organisation	All TSOs Chair
09:05 – 09:15	Introduction to the BZR process	
09:15 – 09:45	**BZ Study: Nordic BZRR results and joint proposal**	Nordic BZRR Chair Nordic BZRR Experts
09:45 – 09:55	Break	
09:55 – 10:10	**Q&A on Nordic BZRR results and joint proposal**	Nordic BZRR Chair Nordic BZRR Experts
10:10 – 11:10	**BZ Study: Central Europe BZRR results and joint proposal**	Central Europe BZRR Chair Central Europe BZRR Experts
11:10 – 11:20	Break	
11:20 – 11:50	**Q&A on Central Europe BZRR results and joint proposal**	Central Europe BZRR Chair Central Europe BZRR Experts
11:50 – 12:00	Closing remarks	All TSOs Chair

House-keeping rules



This webinar is being recorded. Recording will be available online.

Participants are muted unless the host allows them to speak

Slides will be available on ENTSO-E website shortly after the webinar

The scope of this public webinar is the presentation of the BZ Study

Out of scope: previus steps and next step (decision making on bidding zones by Member States)

Thank you for following the rules

Questions during the webinar

Please post your questions on **slido.com** using code **#4822284** or **scan QR code**

There are specific sections in the webinar (highlighted in the agenda) where questions will be answered.

Please, help us organising the questions

- Start your question by: ´CE question´ ´Nordic question´ ´General question´

Participants can like questions to increase the visibility

Remember: All questions raised in slido will be answered. If the questions are not answered during the webinar, the questions will be answered in a written format afterwards.

Introduction to the Bidding Zones Review process

Bidding Zone Review (BZR) of the Target year 2025: the process

Overview in a nutshell

We are here

Scope of this Public webinar: The BZ Study

CEP triggers BZR Stage 1

Stage 1 BZR

- Assumption
- Methodology
- Alternative configurations

ACER decision triggers BZR Stage 2

Stage 2 BZR: The BZ Study

- by CE and Nordic TSOs

…e delivery of the BZ Study (proposal) triggers MS decision on bidding zones

Decision

- **by** member states (EC last resort)

As part of Stage 1 BZR, ACER requested TSOs to do a LMP (Locational Marginal Pricing) study to decide on the alternative configurations that will be part of stage 2 BZR.

Bidding Zone Review of the Target year 2025: the process

Overview

BZR was triggered by the entry into force of the Regulation (EU) 2019/943

All TSOs' proposal for methodology and configurations submitted in October 2019 was transferred by NRAs to ACER.

We are here

Methodology and assumptions

- ACER's decision 29-2020
- Approved: 24 Nov 2020
- Target year: 2025

Locational Marginal Pricing (LMP) study

- by All TSOs
- Delivered: Mar 2022

Alternative configurations

- ACER's decision 11-2022
- Approved: 8 Aug 2022

Bidding Zone Study

- by TSOs of BZRR CE and Nordics

Decision to maintain or amend the BZ

- by Relevant MSs (EC may be the last resort) in 6 + 6 + 6 months

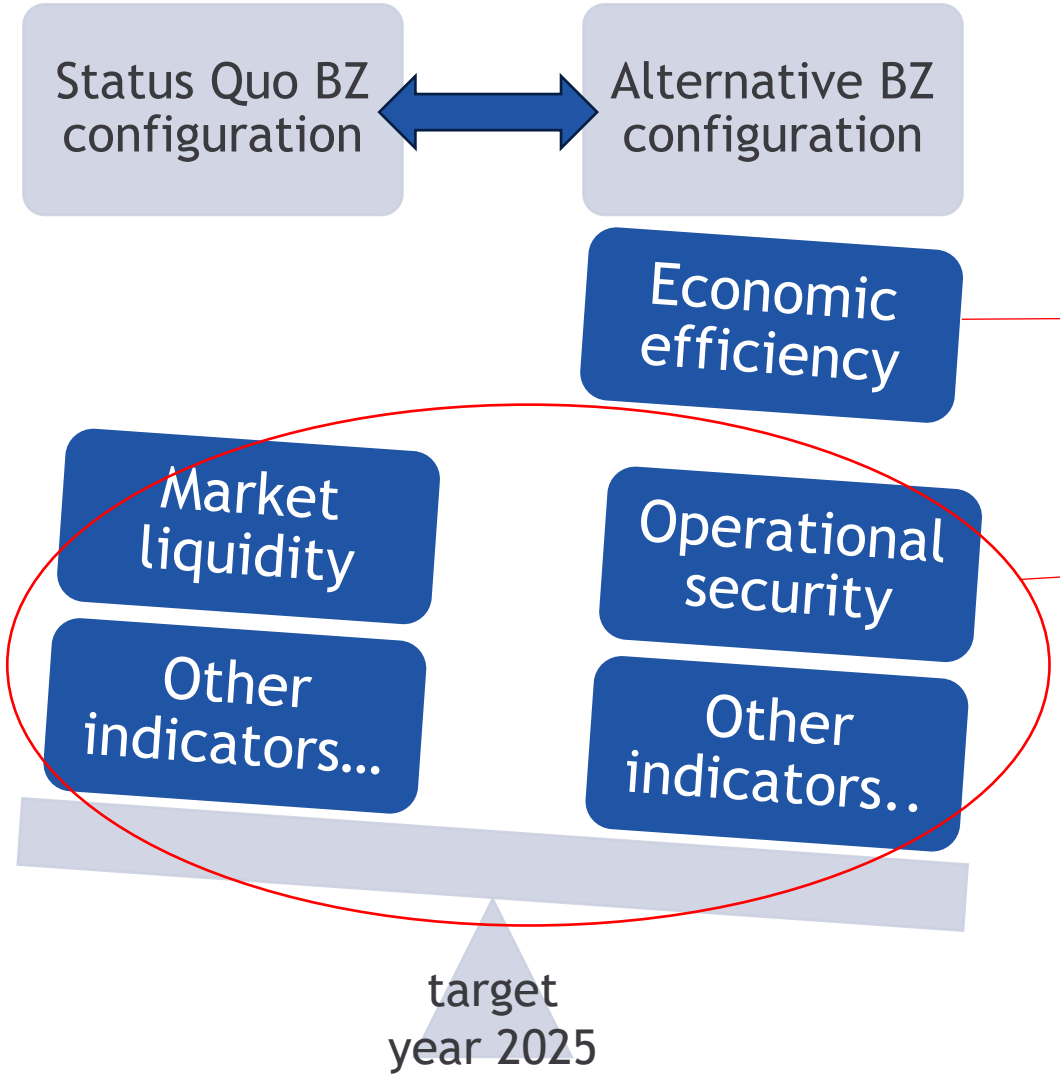
ACER's approved methodology split in two decisions:

1. Methodology + request to TSOs to deliver LMP
2. Definition of alternative configurations

Deliverables:

1. Final **report** with assessment of **22** indicators
2. Joint proposal to relevant Member States (MSs) to amend or maintain the BZ configurations.

What is the general idea of the BZ Study (stage 2 of the BZR)?



The BZR methodology: 4 steps

Step 1: Monetised benefits
- Change in economic efficiency (criterion 4)

Step 2: Assessment of all other criteria
- Assessment of all other criteria
  Alternative BZ configurations perform better, the same or worse than status quo.

Step 3: Acceptability assessment of the alternative BZ configurations
- Identify ´unacceptable configurations´ and consult NRAs

Step 4: Consolidation of the results
- Proposal from TSOs:
  TSOs to propose from the acceptable configurations the one with the highest economic efficiency or duly justify any other decision

Bidding Zones Review of the 2025 Target Year

The Bidding Zones Study Report:

- Chapter 1: Executive summary
- Chapter 2: Introduction
- Chapter 3: The process of the current BZR process.
- Chapter 4: Stakeholders involvement and consultation
- Chapter 5 Starting point of the BZ study
- Chapter 6: The result in Central Europe BZ Review Region
- Chapter 7: The result in Nordic BZ Review Region
- Additional 8 Annexes

Bidding Zones Review of the target year 2025: 2 regions participated in the stage 2 of the BZR (The BZ Study)

Region Nordic

Region Central Europe

BZ Study: Nordic region results and joint proposal

Please post your questions on **slido.com** using code **#4822284** or **scan QR code**

Start your question for this section by ´Nordic question´

Participants can like questions to increase the visibility

Agenda: Nordic region results and joint proposal

1. Nordic region: Introduction
2. Nordic region Step 1: Monetised benefits (including simulation results)
3. Nordic region Step 4: Proposal and next steps

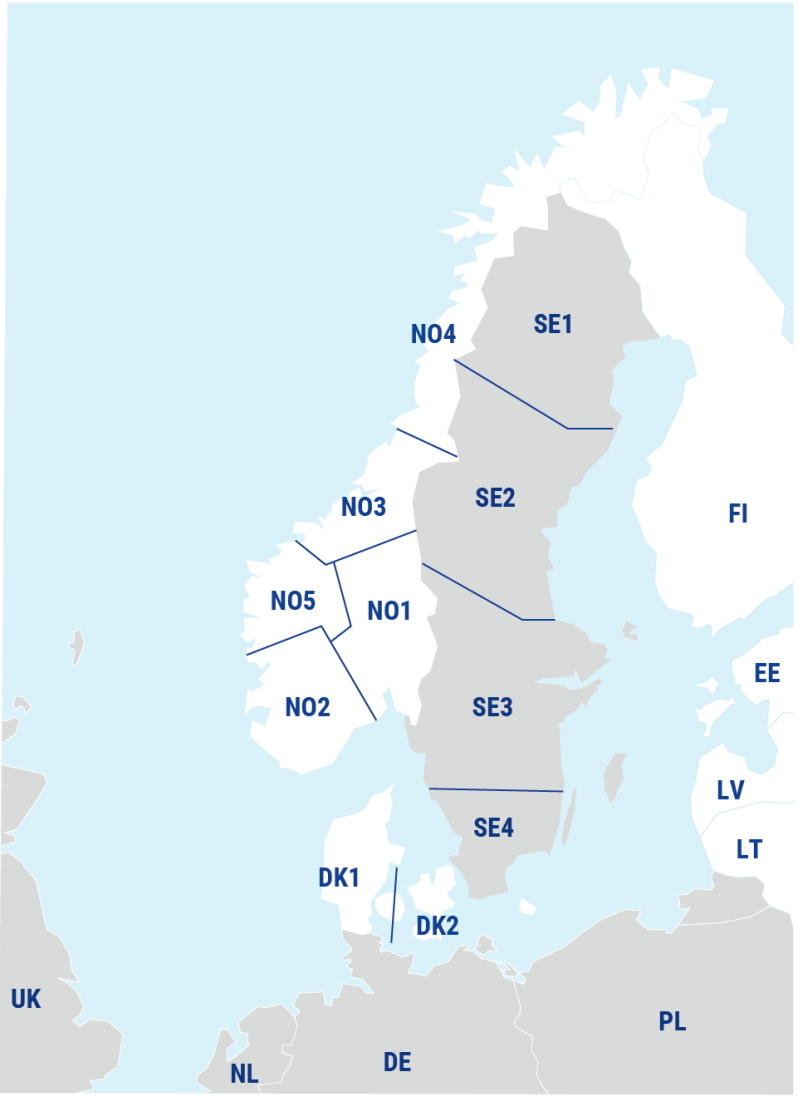
(Break and questions)

1. Nordic region: Introduction

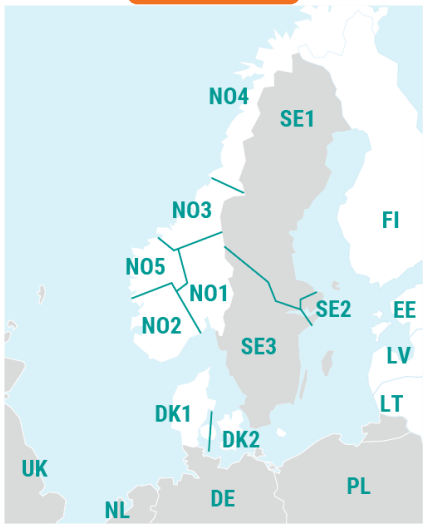
- BZ configurations assessed
- Modelling chain

Nordic region - BZ Configurations assessed

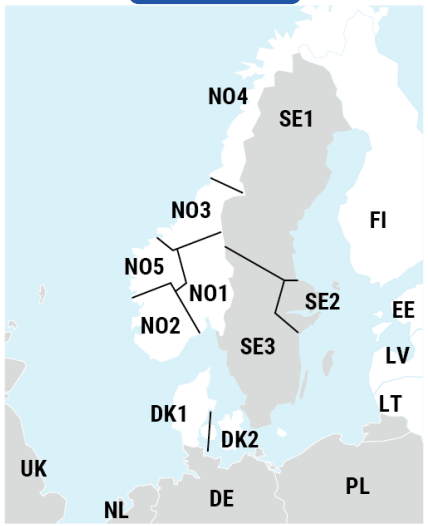
Status quo



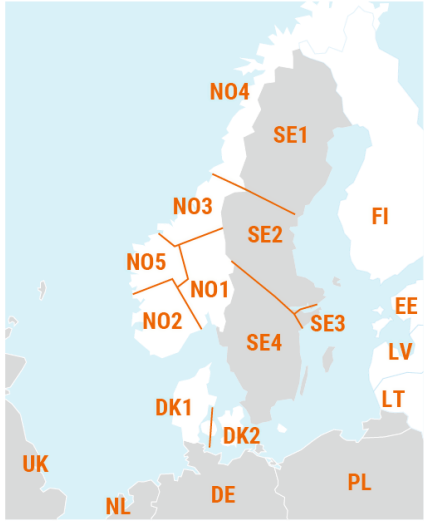
Config 8



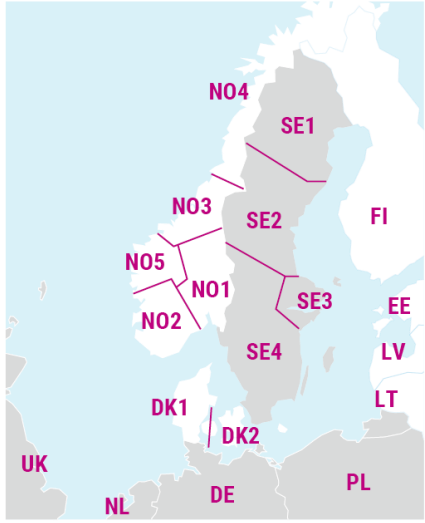
Config 9



Config 10



Config 11



- Alternative BZ delineations only for Sweden
- **Config 8 and 10** proposed by ACER on the basis of the results from the nodal simulations (LMP Study)
- **Config 9 and 11** modifications of the ACER proposals based on operational experience and suggested by the Swedish TSO, Svenska kraftnät

Nordic region - Modelling chain

Grid model for mid-2025
Intact grid adding N-1 restrictions

Whole of Europe simulated
Flow-based market coupling for Nordic CCR
NTC approach for other regions
Market welfare compared to the status quo

Presented next "Step 1: Monetised benefits"

Three climate years (1989, 1995 and 2009)

Presented previous slide

Market data from National Trends 2025 scenario (MAF 2020)
Updated consumption and wind power for the Nordic during LMP Study.

Detecting (OSA) and solving (RAO) physical overloads.
Cost during RAO compared to the status quo

2. Nordic region Step 1: Monetised benefits (including simulation results)

- Ranking and acceptability of configurations
- Economic efficiency, the change in socio-economic welfare (criterion 4)
- **Day-ahead market dispatch:** Annual power prices
- **OSA:** Total overload volumes
- **RAO:** Up- and downregulating volumes
- **RAO:** Cost

Nordic region - Step 1: Ranking and acceptability of configurations

- All four configurations demonstrated negative monetised benefit compared to the status quo and, as a result, were rejected.
- Therefore, the Nordic BZRR did not proceed with the next steps of the overall process.

BZ configuration	Economic efficiency [€ million/year]	Accepted/ rejected	Justification
8	-7.0	Rejected	Monetised benefits compared to status quo are negative
9	-34.8	Rejected	
10	-2.2	Rejected	
11	-15.9	Rejected	

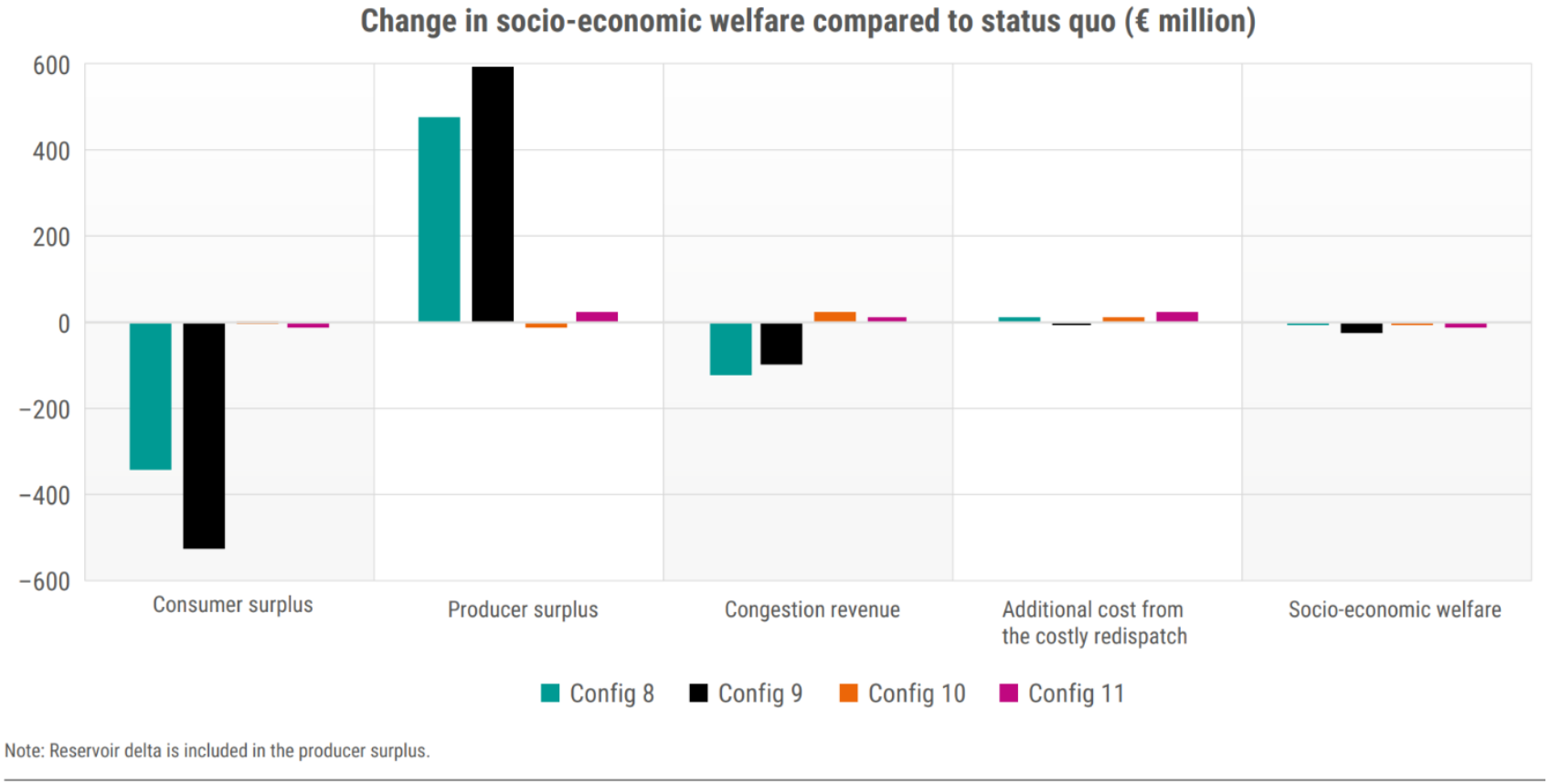
Nordic region - Economic efficiency, the change in socio-economic welfare (table)

	Average change over all climate years with respect to status quo					
	DA market dispatch				RAO	Economic efficiency
Configuration compared to Status quo	Total market welfare [€ million]	Consumer surplus [€ million]	Producer surplus [€ million]	Congestion revenue [€ million]	Additional cost from redispatch [€ million]	Socio-economic welfare (criterion 4) [€ million]
Config 8	−1.5	−349.6	472.7	−124.6	5.5	−7.0
Config 9	−38.4	−529.7	594.1	−102.8	−3.6	−34.8
Config 10	−0.6	−5.2	−19.3	23.9	1.6	−2.2
Config 11	−0.2	−14.3	14.0	0.2	15.7	−15.9

Note: Reservoir delta is included in the producer surplus.

- Lower market welfare for **all configurations** compared to the status quo (but small changes for **Config 8, 10 and 11**)
- Higher RAO costs for **Config 8, 10 and 11** compared to the status quo
- Lower RAO cost for **Config 9** compared to the status quo. Still the overall result remains negative.

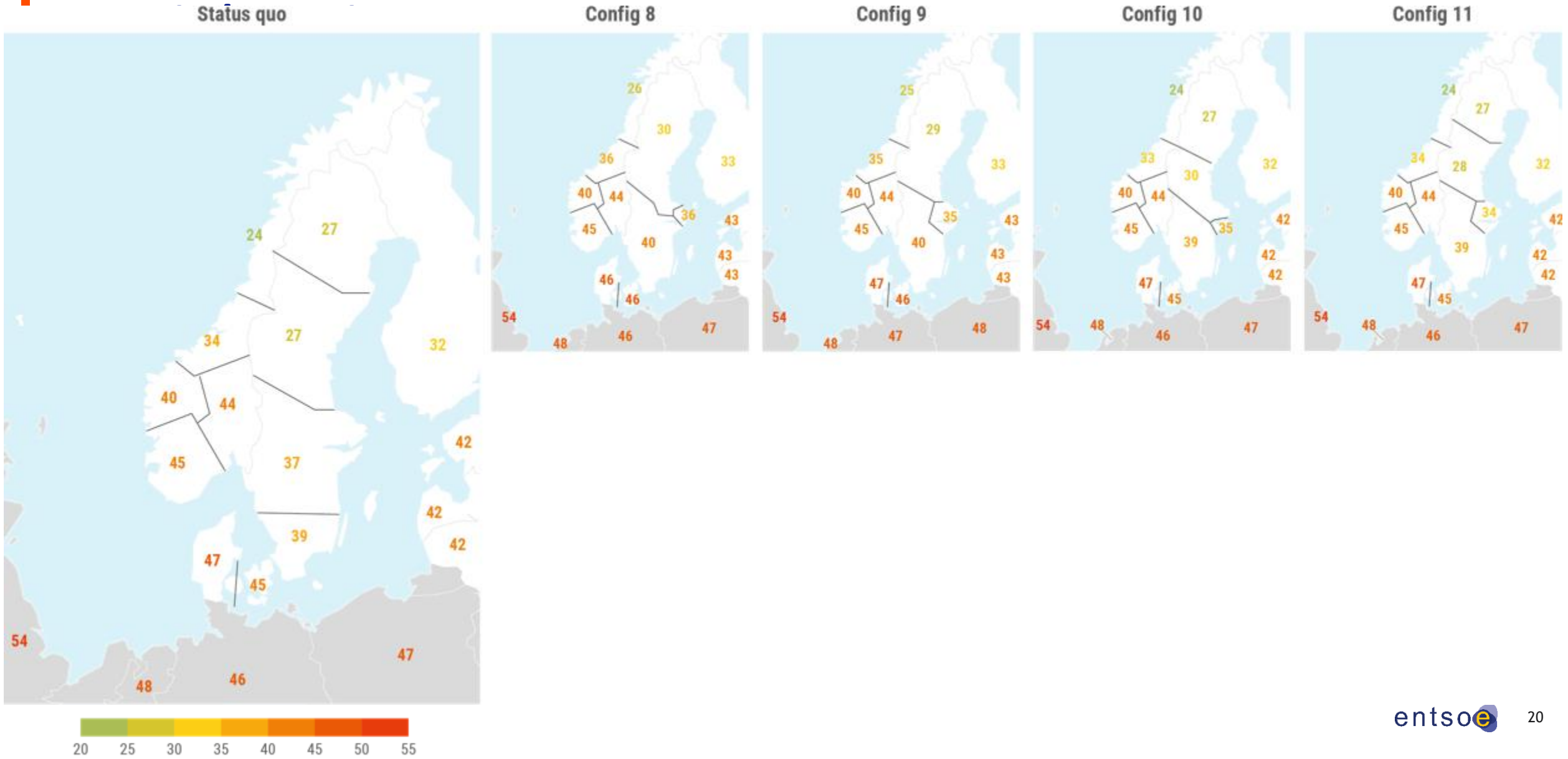
Nordic region - Economic efficiency, the change in socio-economic welfare (graph)



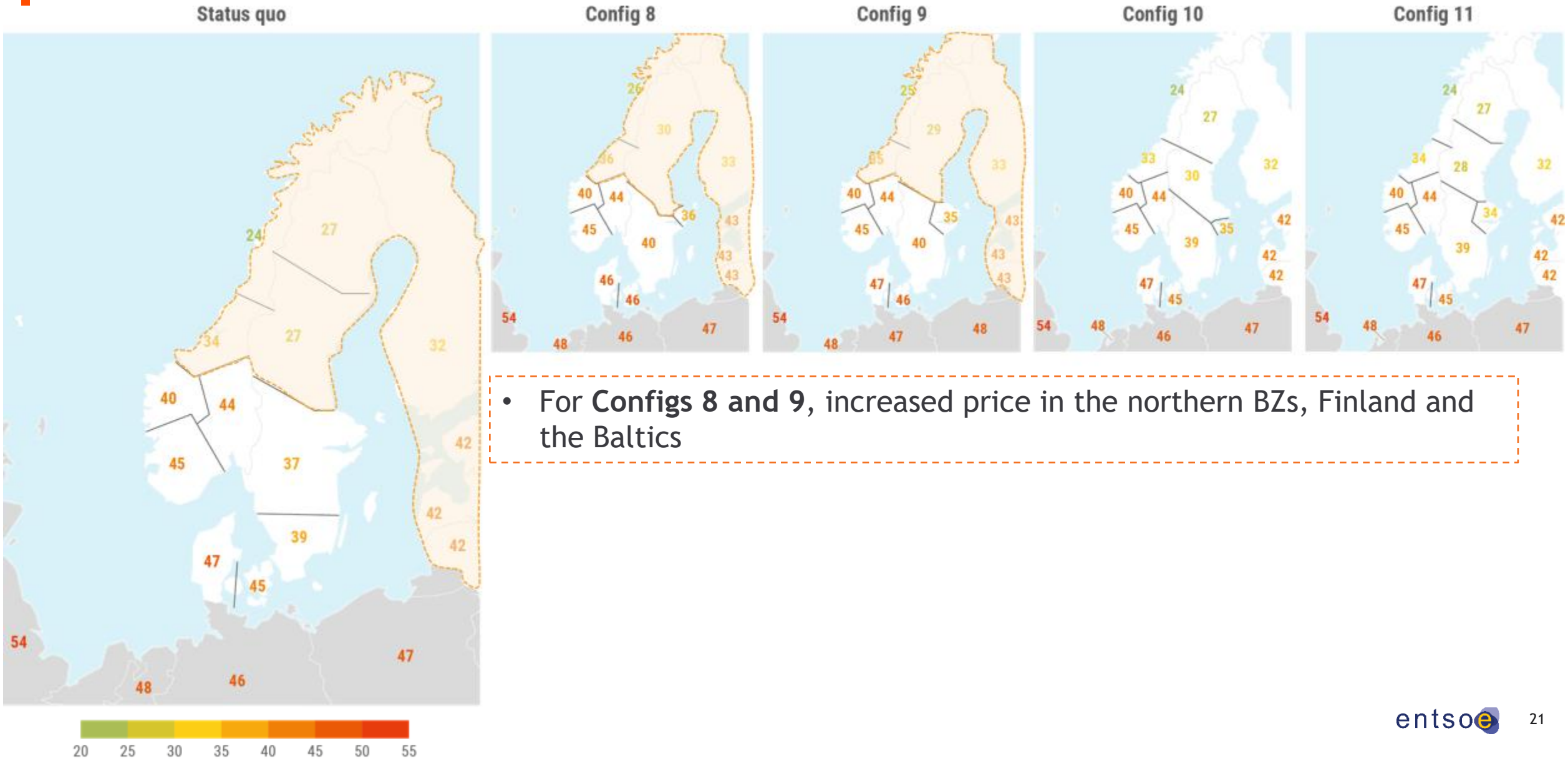
Note: Reservoir delta is included in the producer surplus.

- **Config 8 and 9** have large relocations of welfare from consumers to producers compare to the status quo
- Only minor changes in socio-economic welfare for **Config 10 and 11**

Nordic region - Day-ahead market dispatch: Annual power

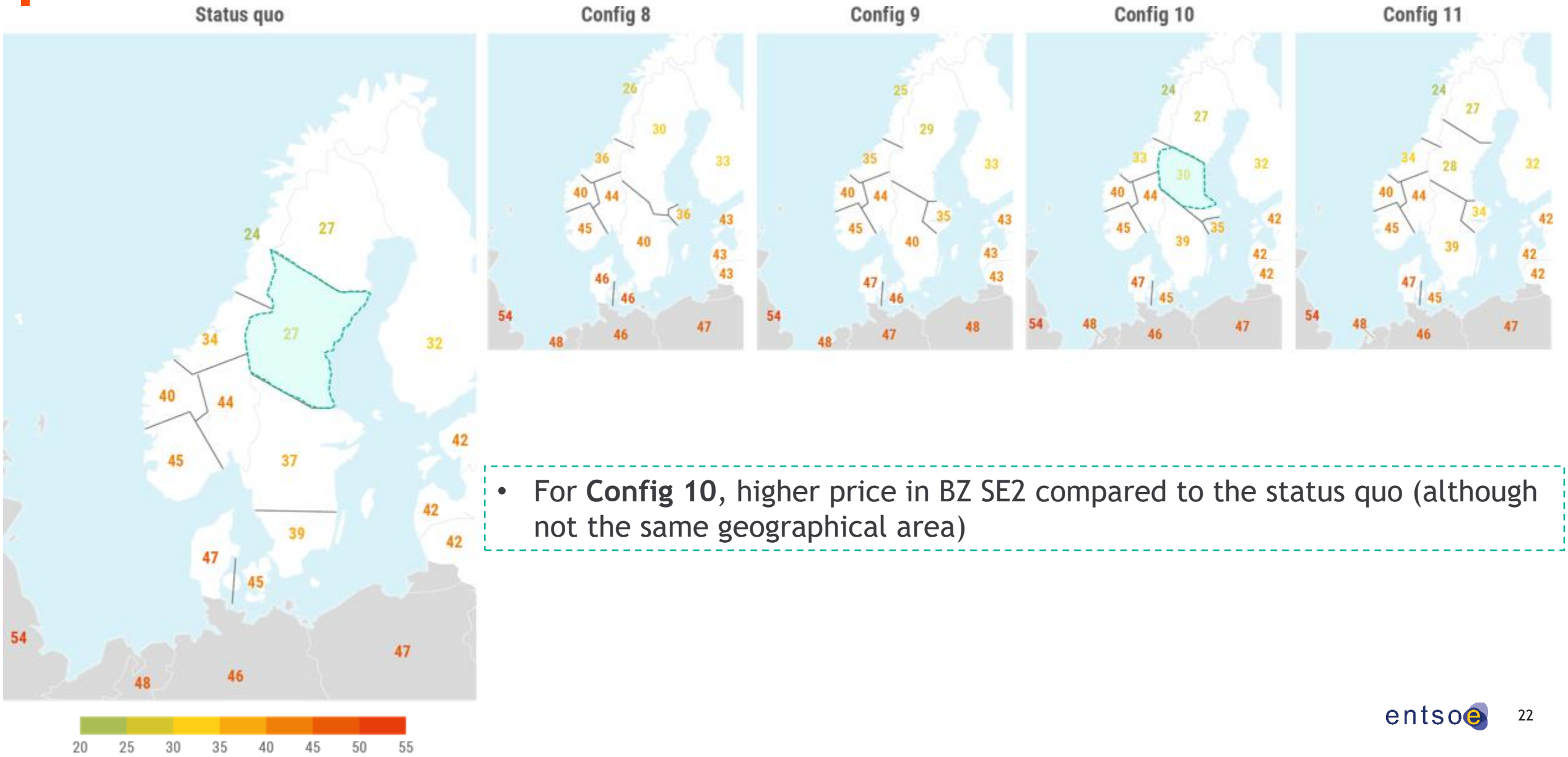


Nordic region - Day-ahead market dispatch: Annual power prices (€/MWh)



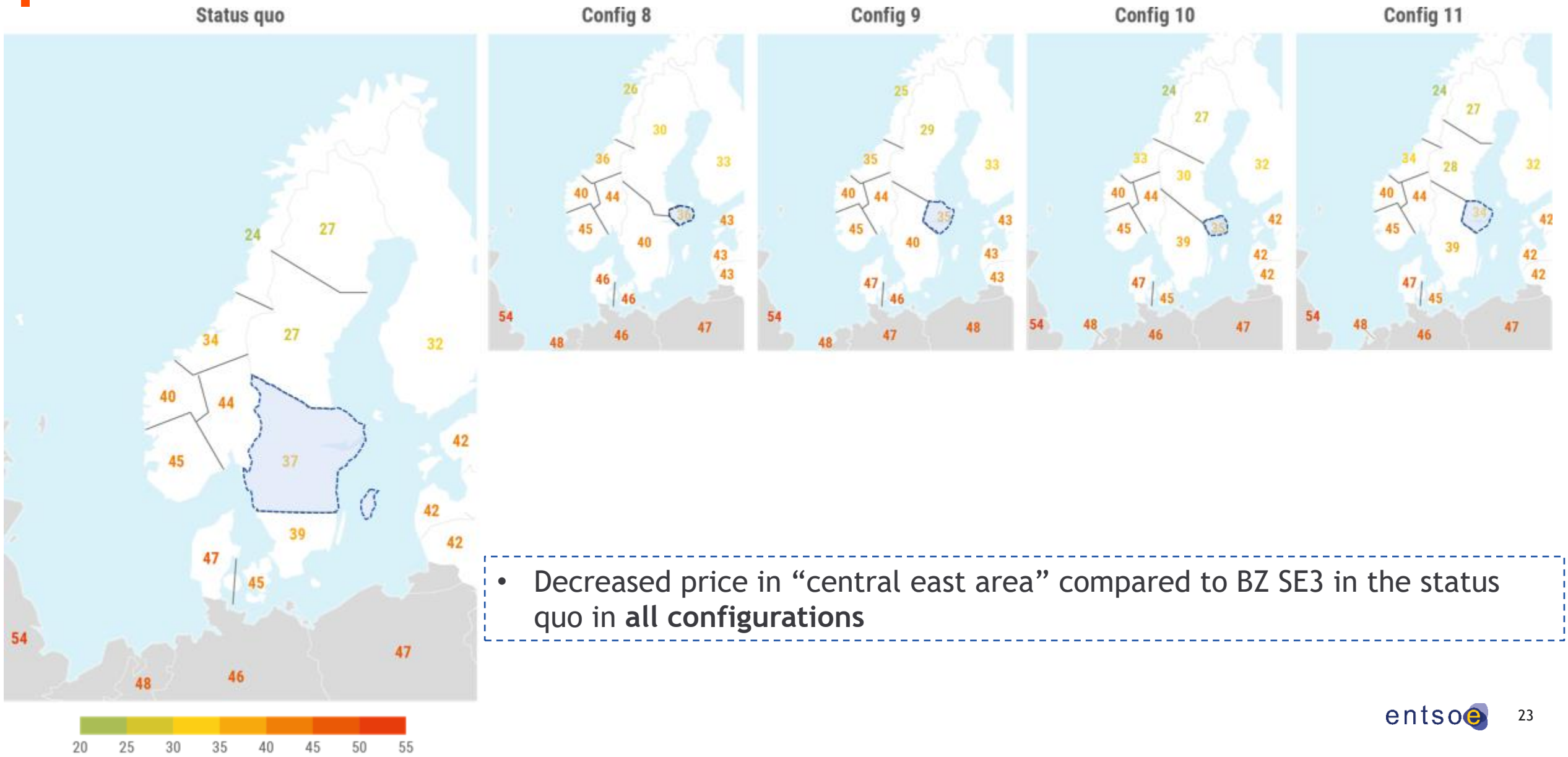
- For **Configs 8 and 9**, increased price in the northern BZs, Finland and the Baltics

Nordic region - Day-ahead market dispatch: Annual power prices (€/MWh)



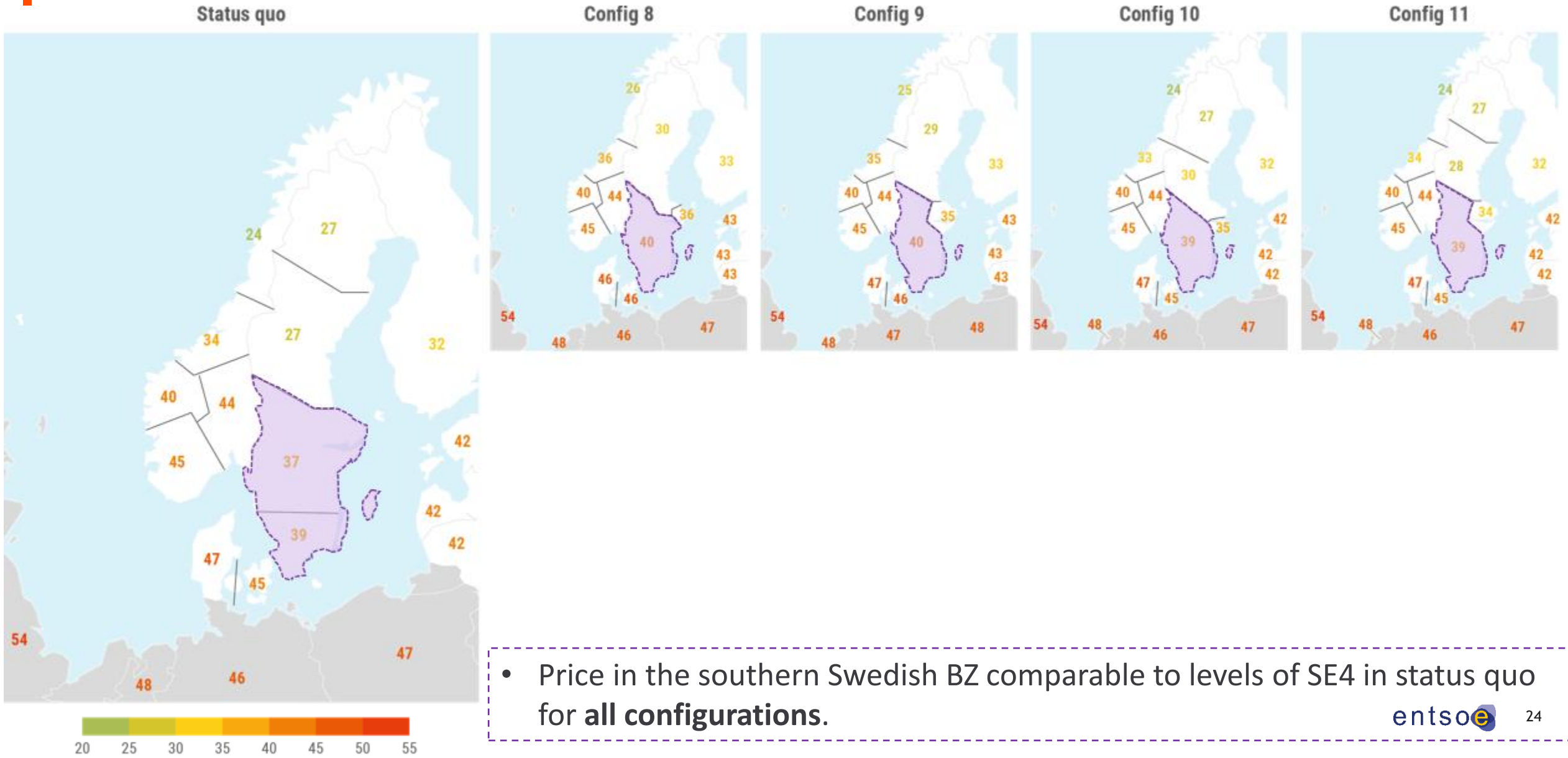
- For **Config 10**, higher price in BZ SE2 compared to the status quo (although not the same geographical area)

Nordic region Day-ahead market dispatch: Annual power prices (€/MWh)



- Decreased price in “central east area” compared to BZ SE3 in the status quo in **all configurations**

Nordic region - Day-ahead market dispatch: Annual power prices (€/MWh)

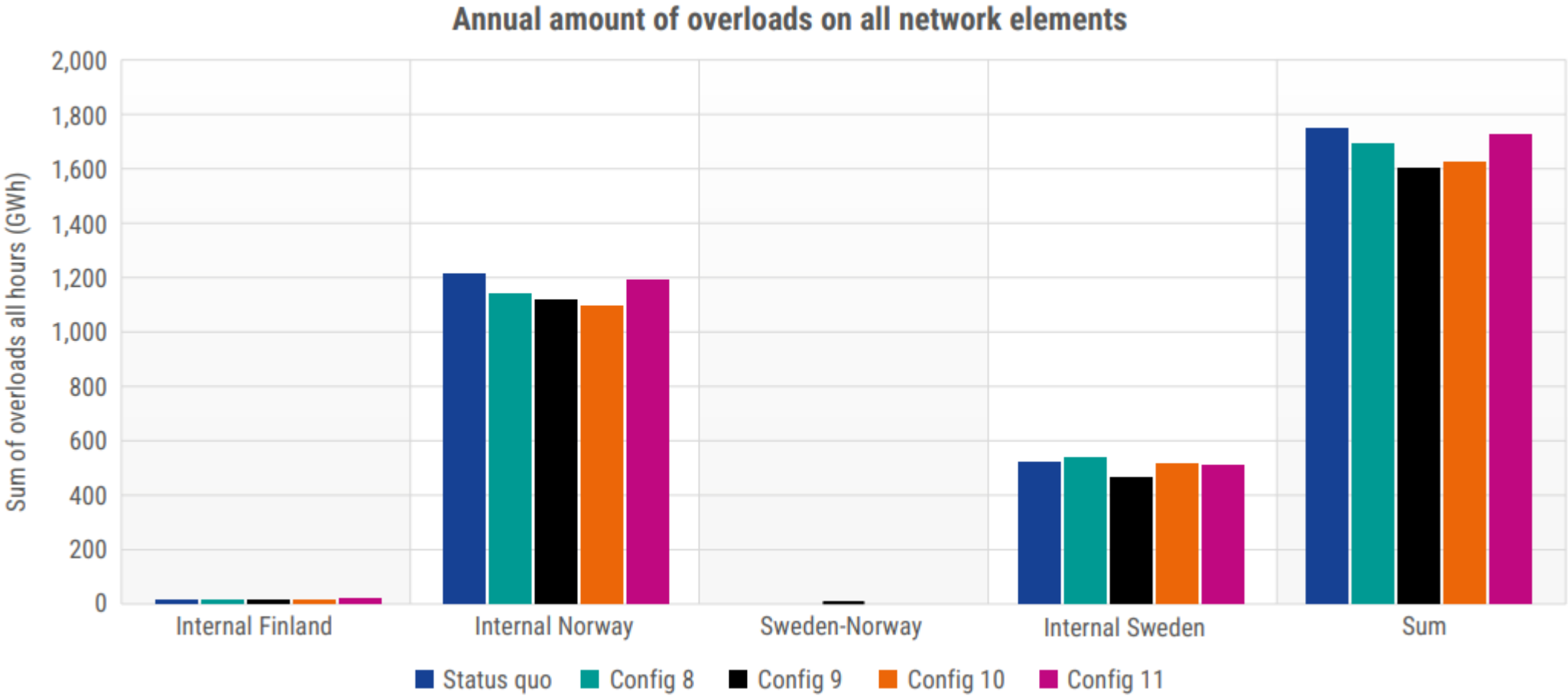


- Price in the southern Swedish BZ comparable to levels of SE4 in status quo for **all configurations**.

Nordic region - OSA: Total overload volumes

Operational security analysis, OSA: Computing production and consumption at each network node and determine resulting flows using power flow equations. Purpose: Identify overloads.

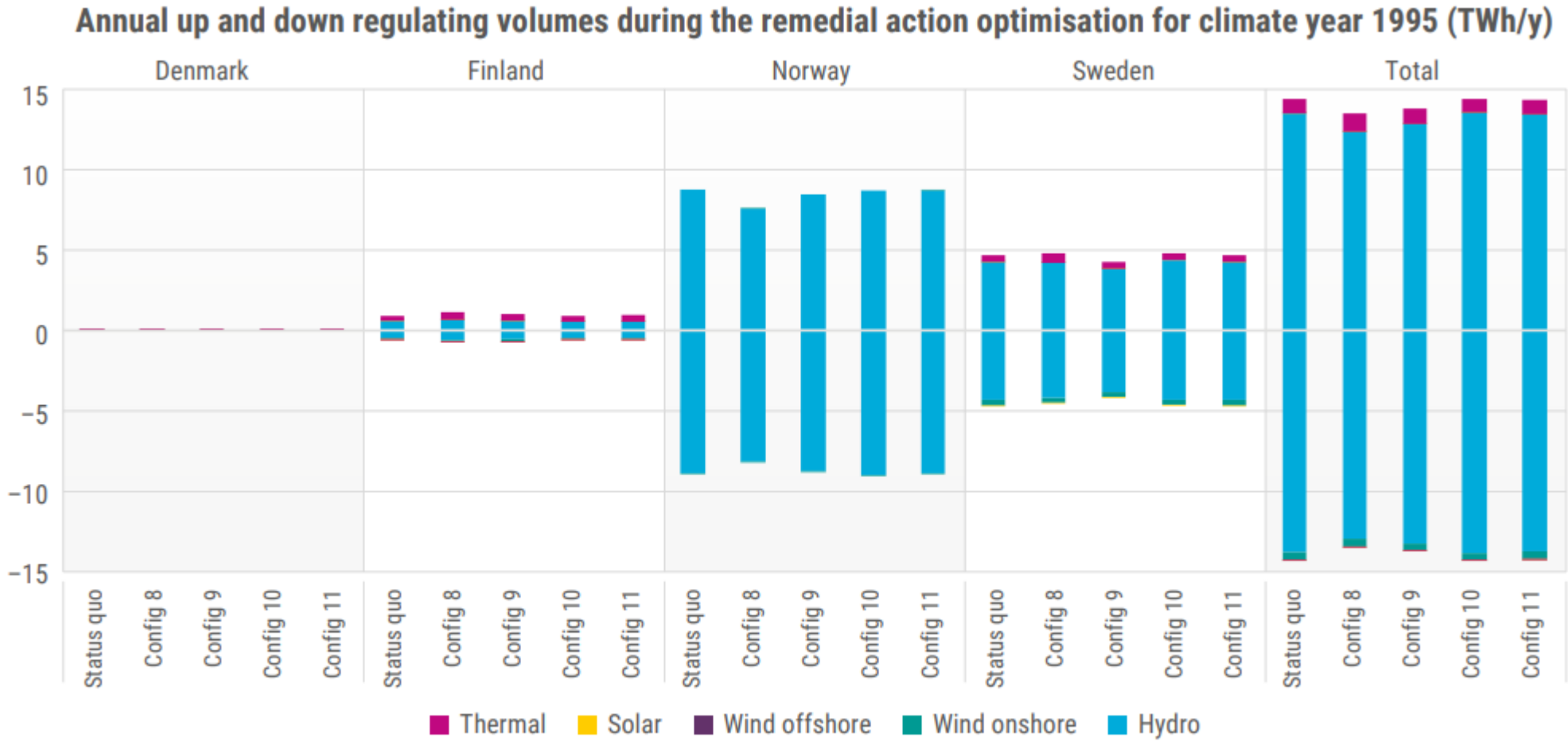
- Total overload volumes range between 1.5 TWh to 1.9 TWh annually
- Around 70% of overloads on internal network elements in Norway
- Around 30% on internal network elements in Sweden



Nordic region - RAO: Up- and downregulating volumes

Remedial action optimisation, RAO: The DA market dispatch resolved with additional transmission constraints and added cost for up- and downregulating production. Purpose: To solve overloads at a minimal cost for the system.

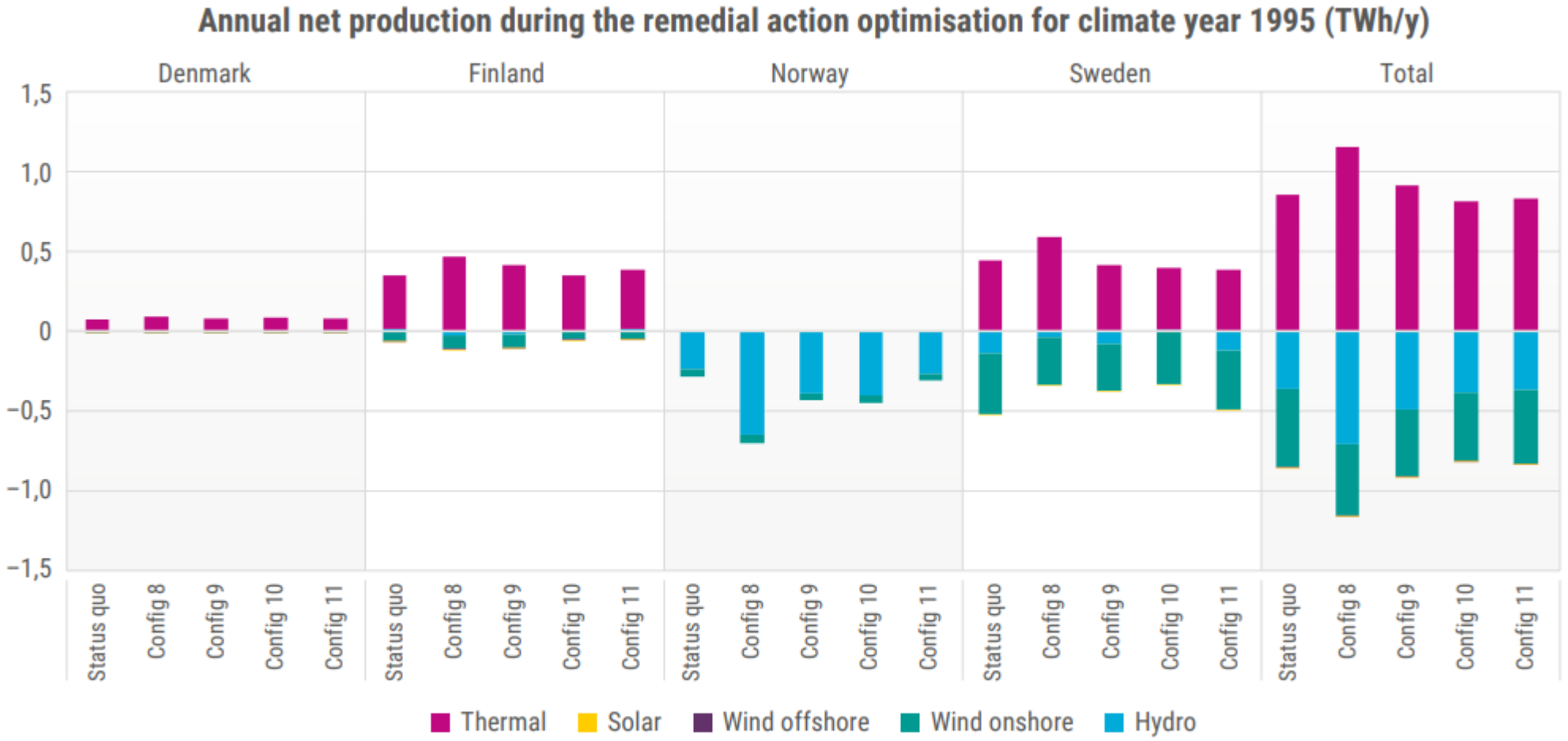
- Overloads solved mainly by up- and downregulating the hydro power production in Norway and Sweden



Note: Similar results can be seen for all three climate years.

Nordic region - RAO: Net volumes

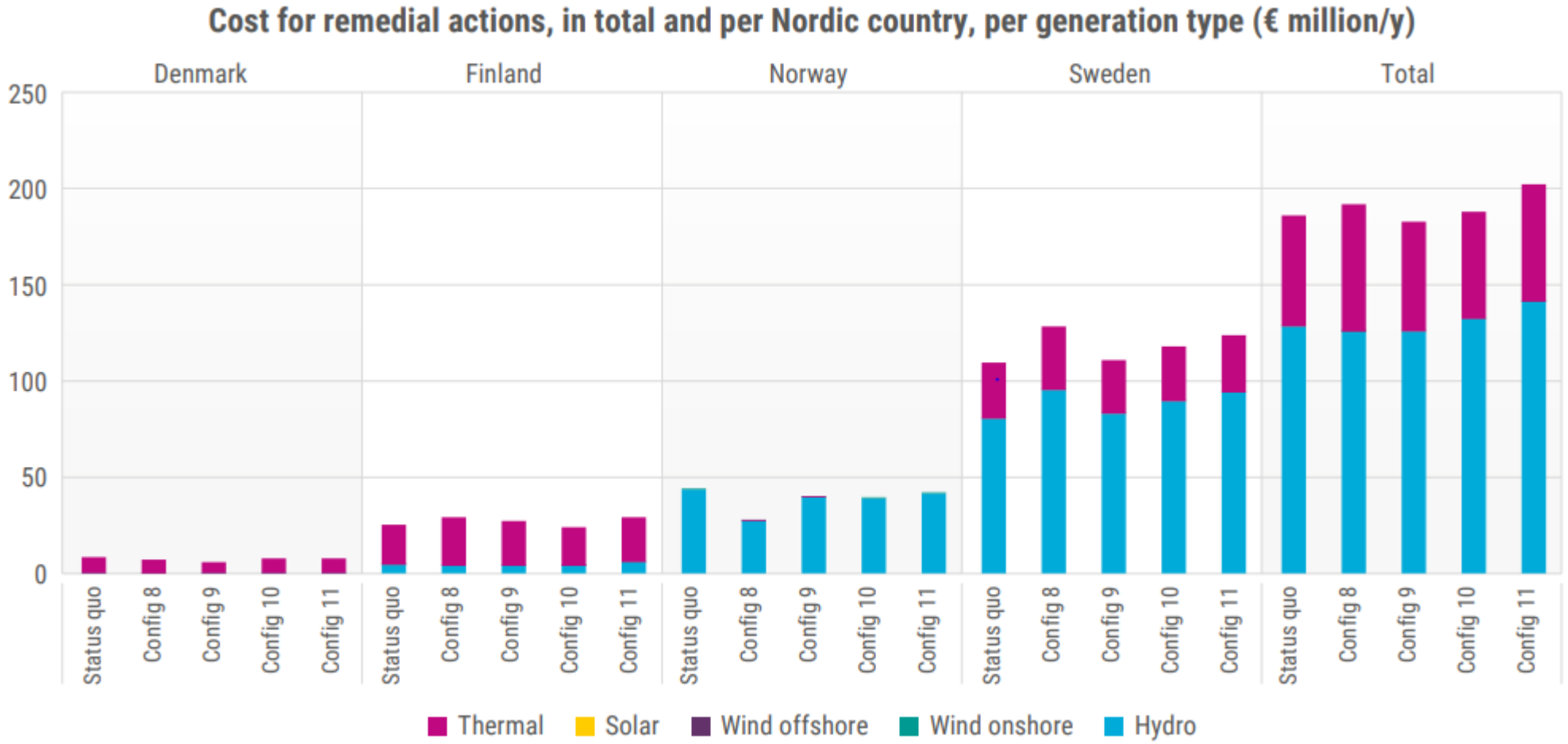
- At a net level hydro and wind power production decreased and thermal production increased



Note: Similar results can be seen for all three climate years.

Nordic region RAO: Cost

- Most of the RAO cost origins from hydro power plants in Sweden and Norway
- Around 1/3 of the cost from thermal power production in Sweden, Finland, and Denmark



3. Nordic region Step 4: Proposal and next steps

- Proposal, limitations and next step

Nordic region - Proposal, limitations and next step

Based on the modelling results (step 1 — monetised benefits) the proposal for the Nordic BZ Study is to maintain the status quo.

Important limitations affecting the result of the Nordic BZRR

- More accurate reactance could have been used in LMP Study – this would have led to impact on the results, which could have resulted in different proposals for BZ configurations. More accurate reactance were used in the BZ Study
- Several key assumptions made in the BZ Study for the 2025 target year might no longer be valid. Especially growth in the renewable energy sector has generally been faster than expected and input data for the LMP Study and the BZ Study is out of date in this case.
- Same grid model used for all simulated hours meaning temperature variations, grid maintenance, grid topology measures etc. not considered
- Only three climate years ran in parallel – less robust hydro power optimisation

Svenska kraftnät sees a need for a new bidding zone configuration, taking into account the upcoming changes in the electricity system. We are currently looking into what the next steps should be.

Break (10 min)

Please post your questions on **slido.com** using code **#4822284** or **scan QR code**

Start your question for this section by ´Nordic question´

Participants can like questions to increase the visibility

Q&A on Nordic region results and joint proposal

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BZ Study: Central Europe BZRR results and joint proposal

Please post your questions on **slido.com** using code **#4822284** or **scan QR code**

Start your question for this section by ´CE question´

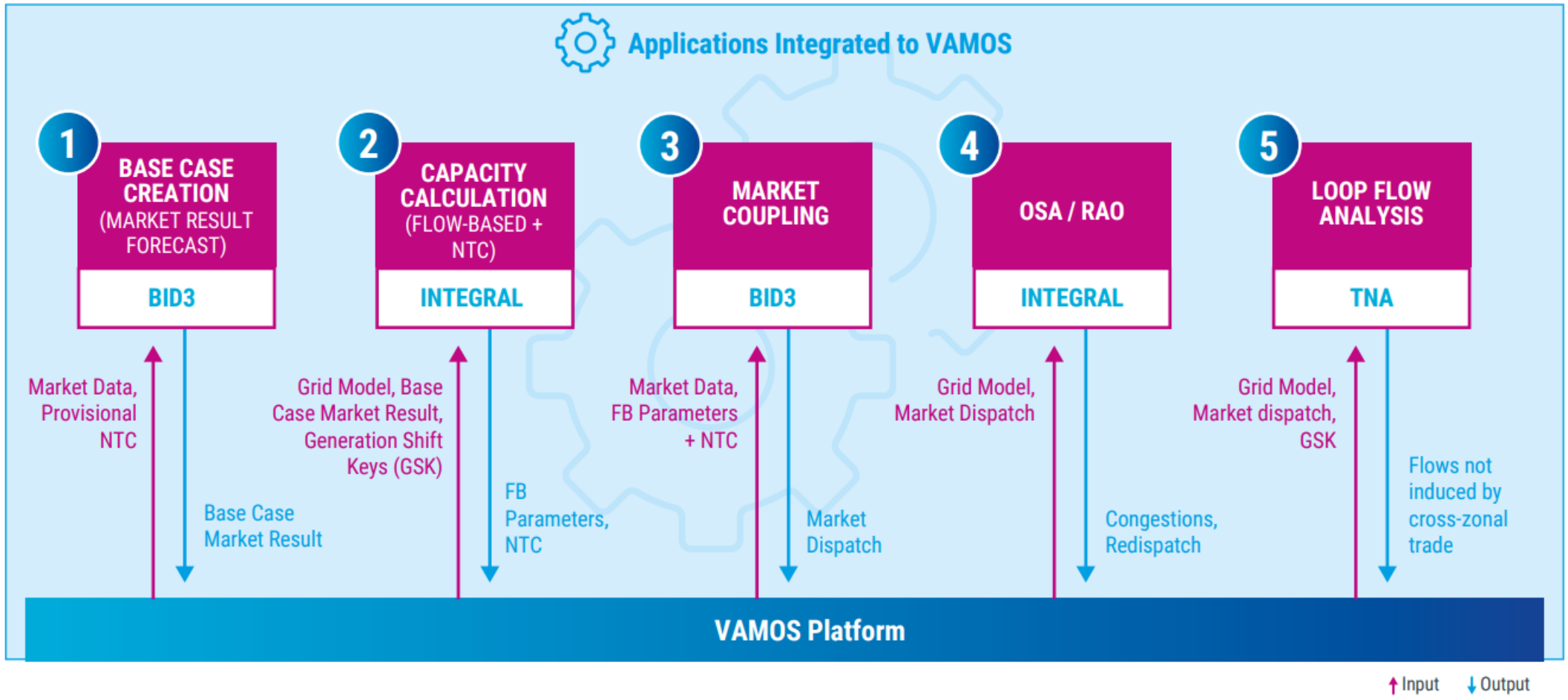
Participants can like questions to increase the visibility

Agenda: CE region - results and joint proposal

1. CE region: introduction
2. CE Step 1: monetized benefits
3. CE step 2: assessment of other criteria
4. CE Step 3: overview of all criteria and assessment of acceptability
5. CE Step 4: proposal

1. CE region: introduction

CE region - Modelling Chain



CE model complexity

- **The BZR Methodology** defines the **complexity of the study,** as well as the **geographical scope**
- **Model dimension: Very detailed grid model utilised**
- **Temporal resolution: hourly, full-year runs, 3 climate years**
- **Indicative size of the CE computation: 11 (Status Quo + 10 BZ configurations) x 3 (climate years) x 2 (main scenario + sensitivity) = 66 full-year hourly simulations**
  - To manage computational times and delivery of the report, CE had to reduce the size of the simulations: one sensitivity analysis has been performed for one climate year only

MODEL DIMENSION FOR CE

17000 nodes

15000 generators & energy storages

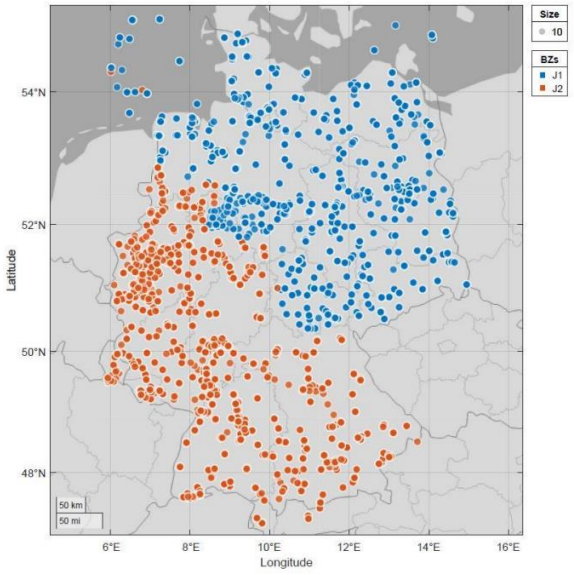
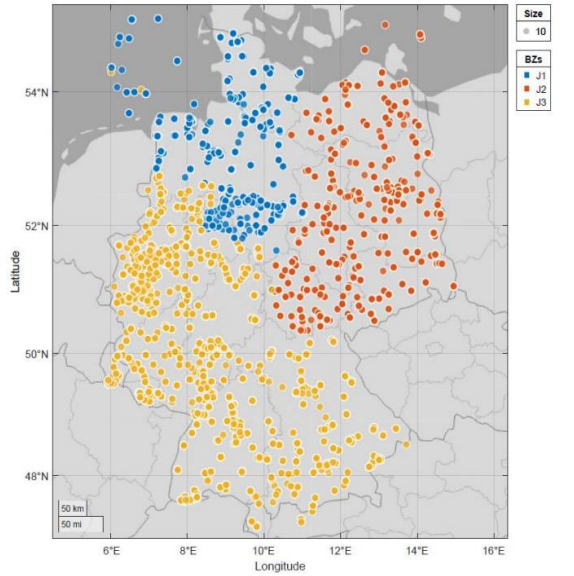
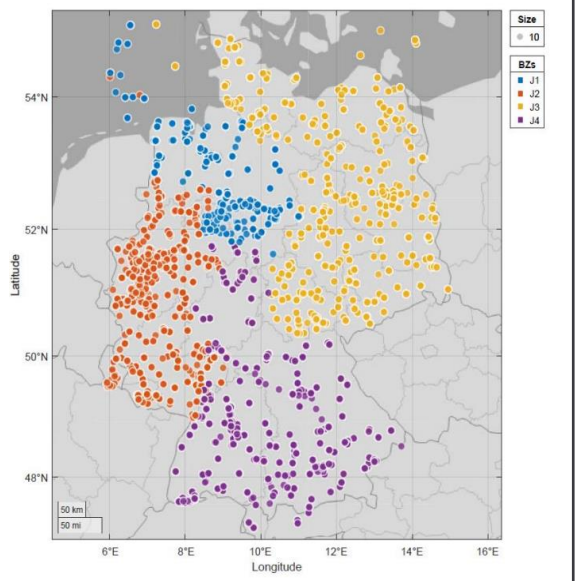
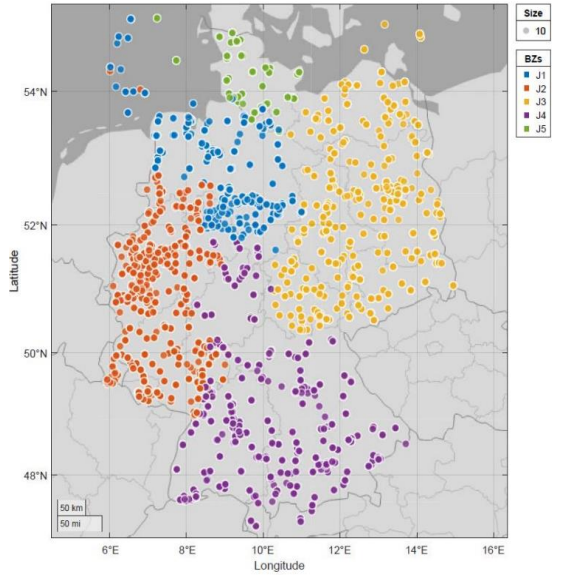
17500 transmission lines

5 000 transformers

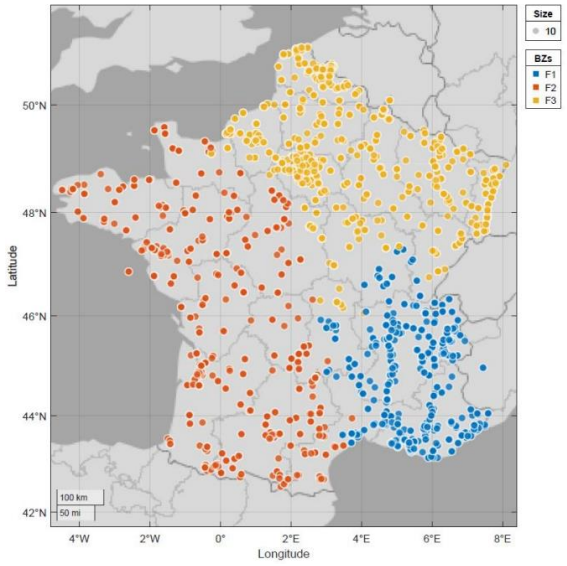
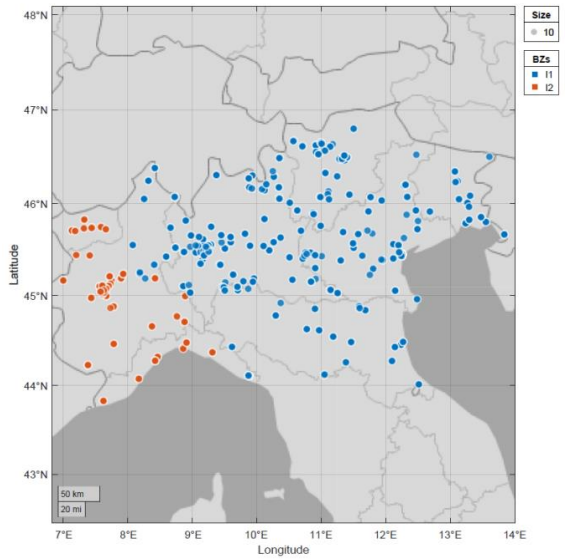
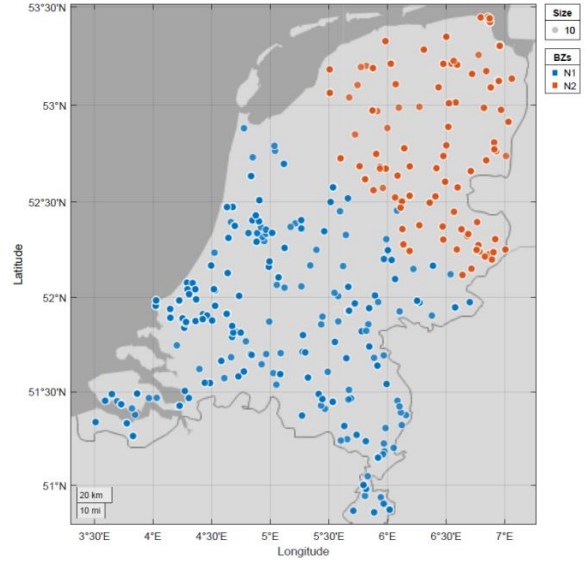
*7 000 CNECs**

**CNEC:* Critical network element and contingency

CE bidding zone alternative configurations (1/2)

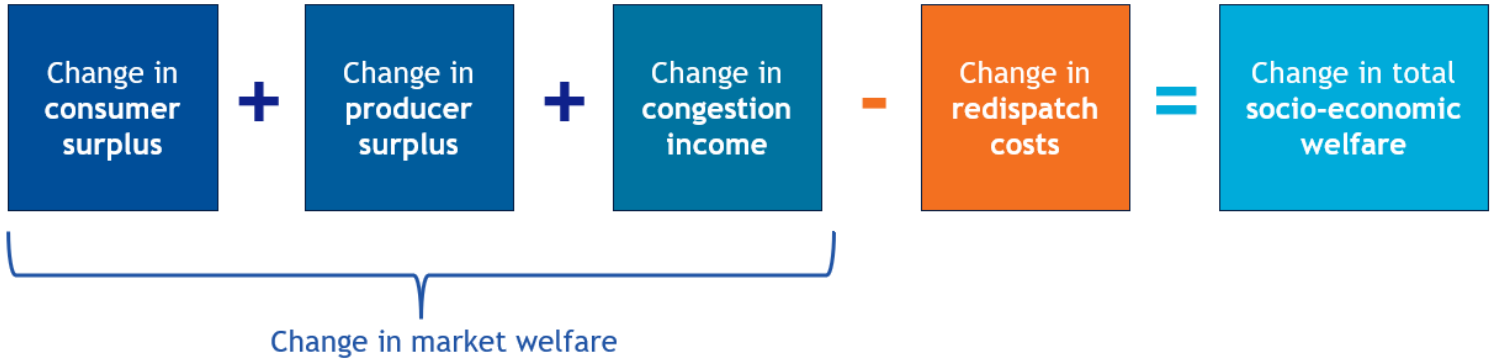
DE2 – ACER ID 2 (Germany)	DE3 – ACER ID 12 (Germany)	DE4 – ACER ID 13 (Germany)	DE5 – ACER ID 14 (Germany)
			

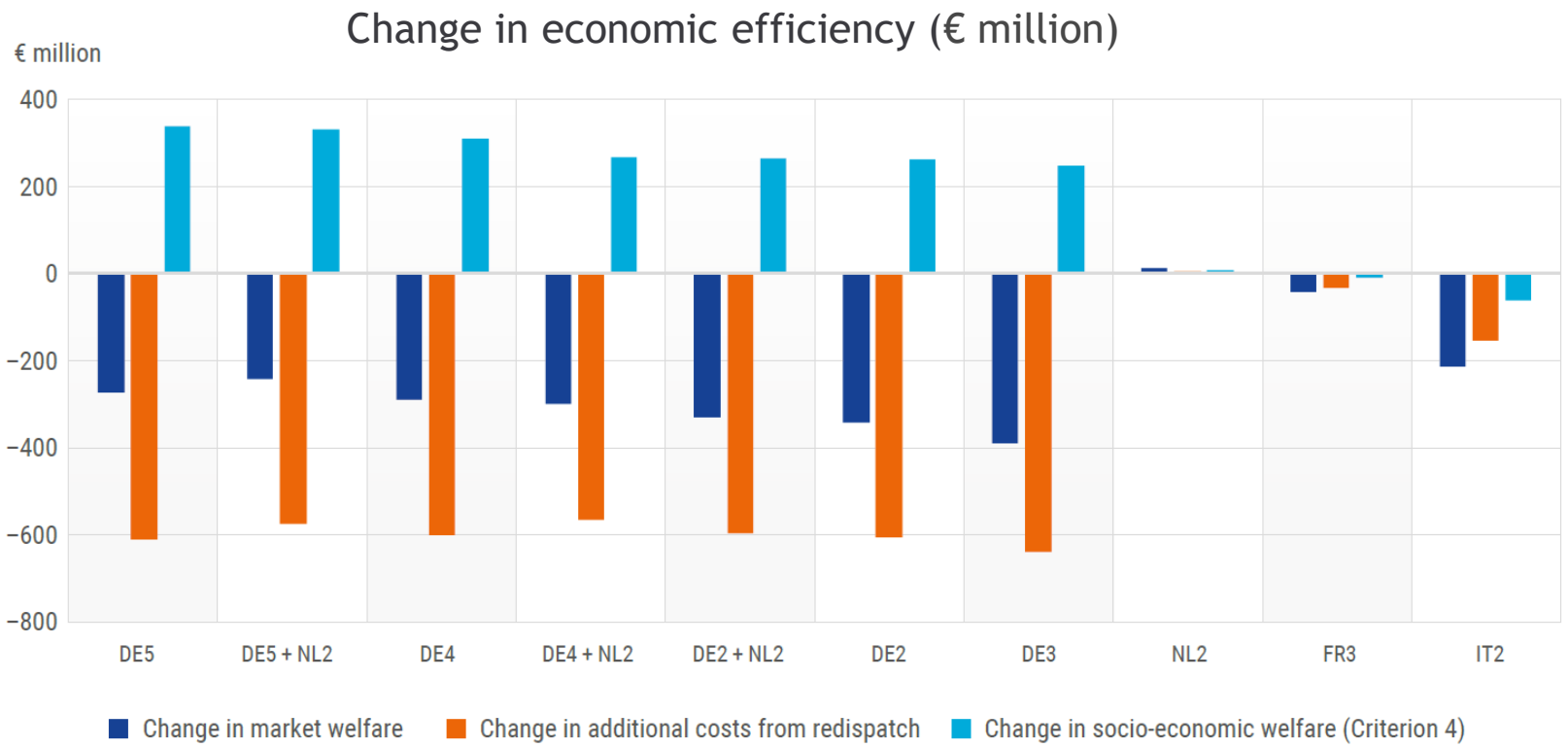
CE bidding zone alternative configurations (2/2)

FR3 – ACER ID 5 (France)	IT2 – ACER ID 6 (Italy)	NL2 – ACER ID 7 (the Netherlands)
		

CE region step 1: monetized benefits

CE region - Criterion 4: Economic Efficiency



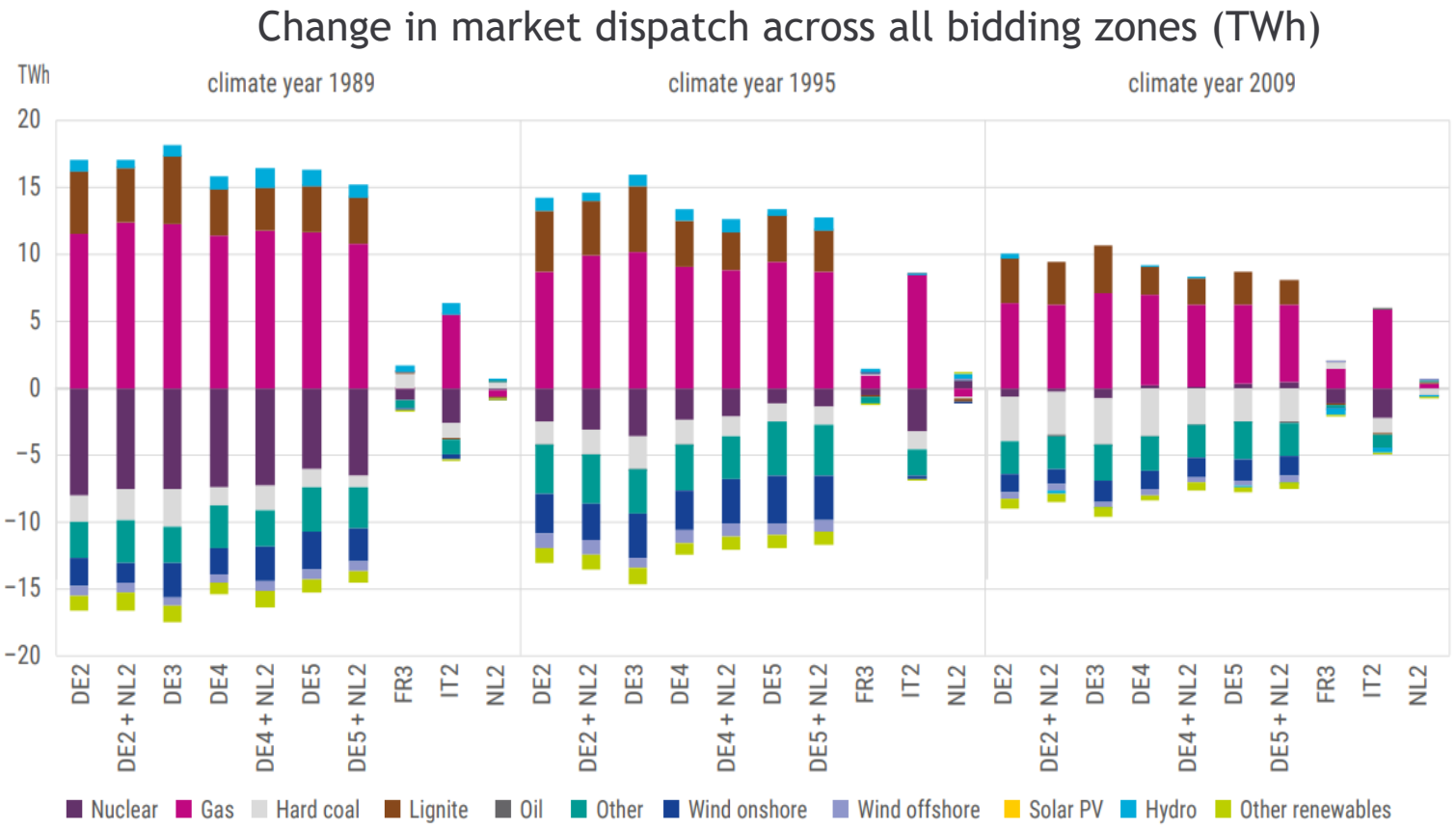


- **Economic efficiency** is evaluated for the 2025 target year as difference of:
  - the **average change** (over all climate years) in the **socio-economic welfare** coming from the market dispatch (calculated at the European level)
  - the **average change** (over all climate years) in total **additional RAO costs** at the CE BZRR level

Choice of Combinations:

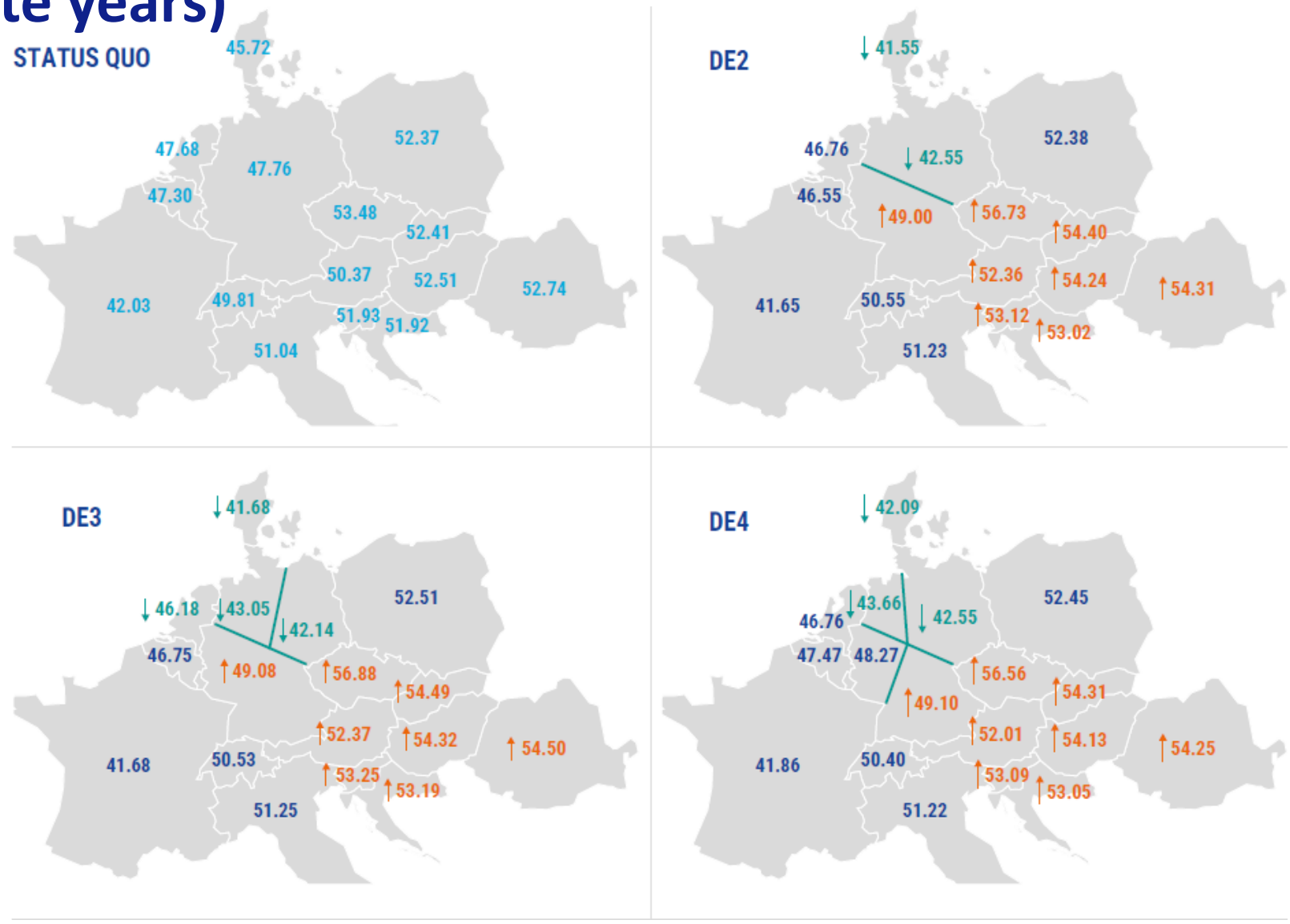
- The combinations leading to the **highest sum of individual monetised benefits** are a combination of DE5+NL2, DE4+NL2
- Additionally, TSOs assessed a combination of DE2+NL2

CE region - Market Dispatch based on all-EU NTC and CE FB market simulations

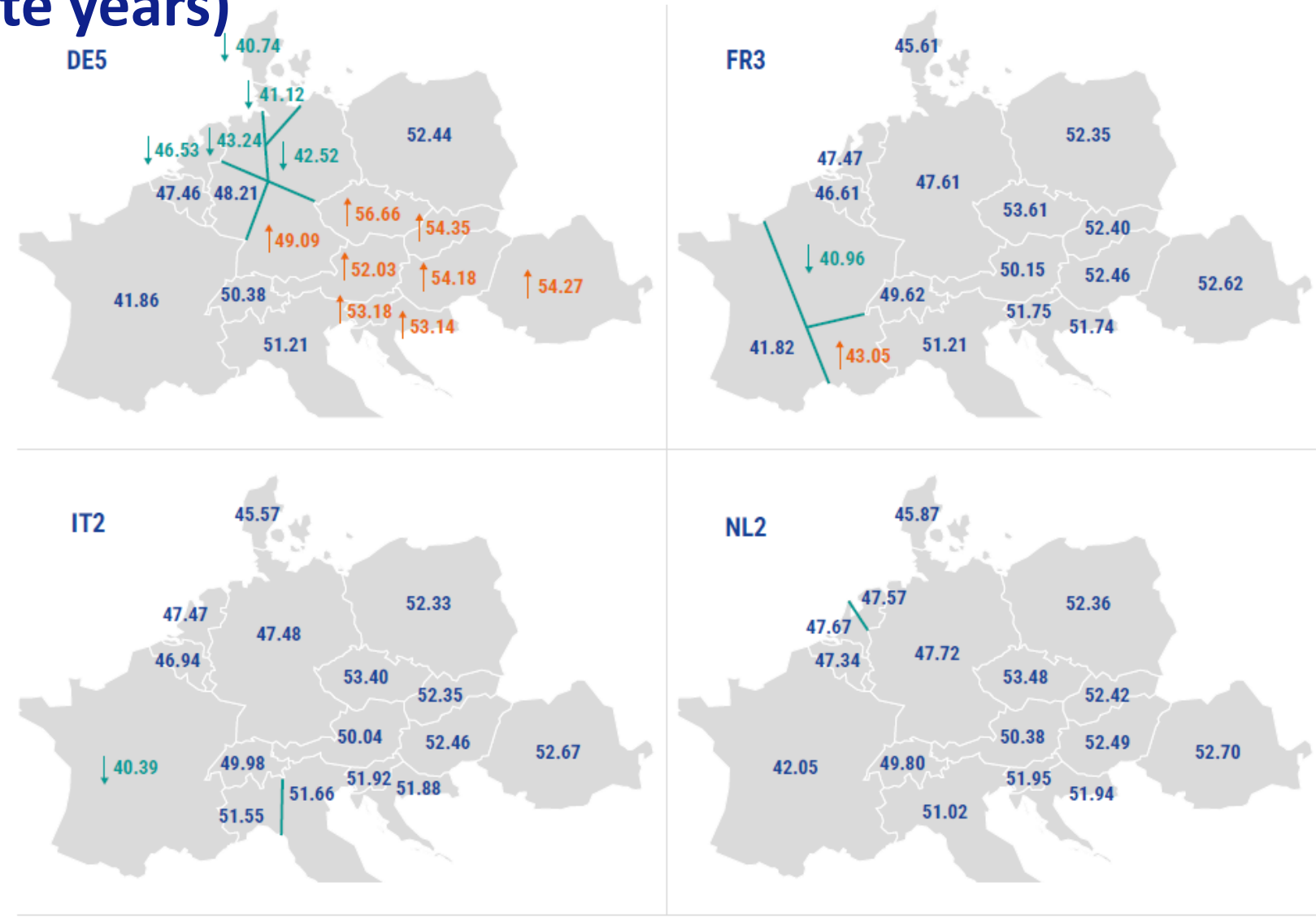


- **DE/LUX Configuration:** The surplus of **renewable energy sources** in northern Germany leads to market-based curtailment when these cannot be exported, resulting in negative prices. Following is observed:
  - Reduced imports from the Nordics (reflected in reduction in **nuclear**)
  - decreased **gas** and other (non-renewable) in northern Germany
  - reduced **gas** and **coal** generation in the Netherlands due to lower export towards Germany
  - a minor reduction in gas production in Poland and Belgium
- **FR3 configuration**: reduced exports from France towards Italy. This results in an increase in **gas** generation in Italy.
- **IT2 configuration**: reduced imports from France, resulting in the reduction of **nuclear** and **gas** generation in France, some reduced **gas** generation in Germany and Belgium. Reduced imports are compensated by increased **gas**-based generation in Italy.
- **NL2 configuration:** small changes in market dispatch

CE region - Average market clearing prices per Bidding Zone (average of three climate years)

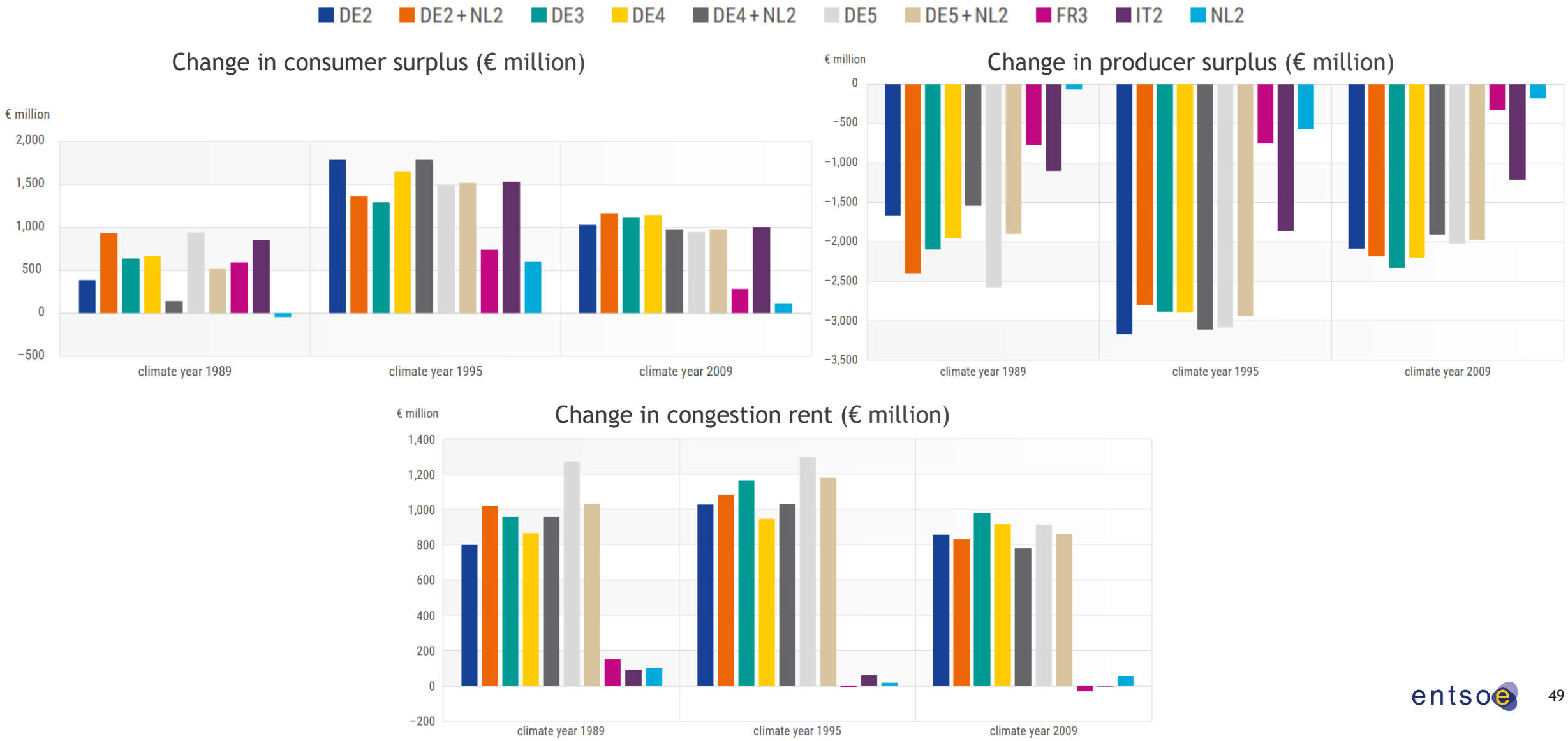


CE region - Average market clearing prices per Bidding Zone (average of three climate years)

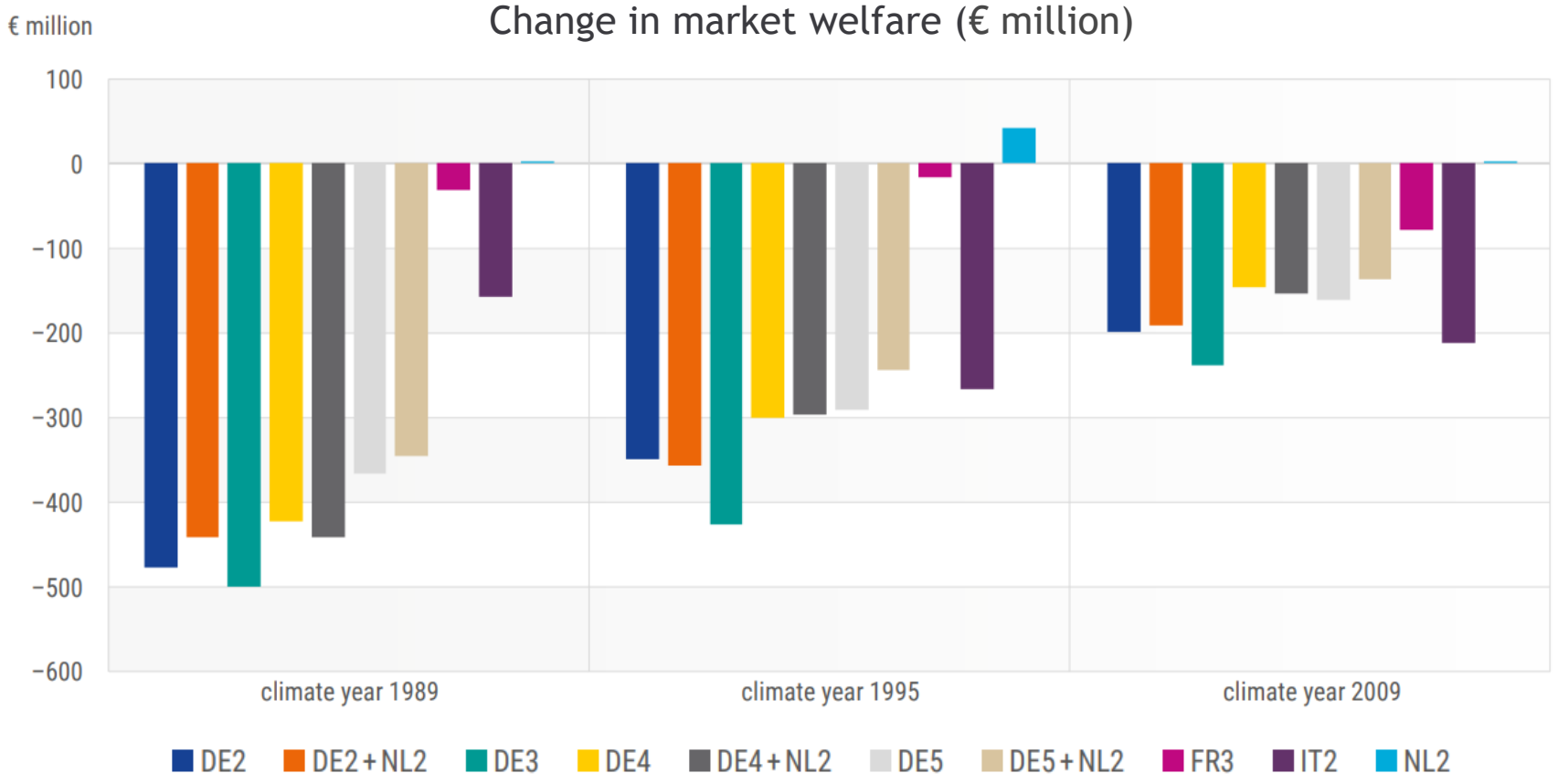


Average MCP (Absolute Value) −1 EUR / MWh < Δ Average MCP to SQ < 1 EUR / MWh Δ Average MCP to SQ > 1 EUR / MWh Δ Average MCP to SQ < −1 EUR / MWh

CE region - Market Welfare Components

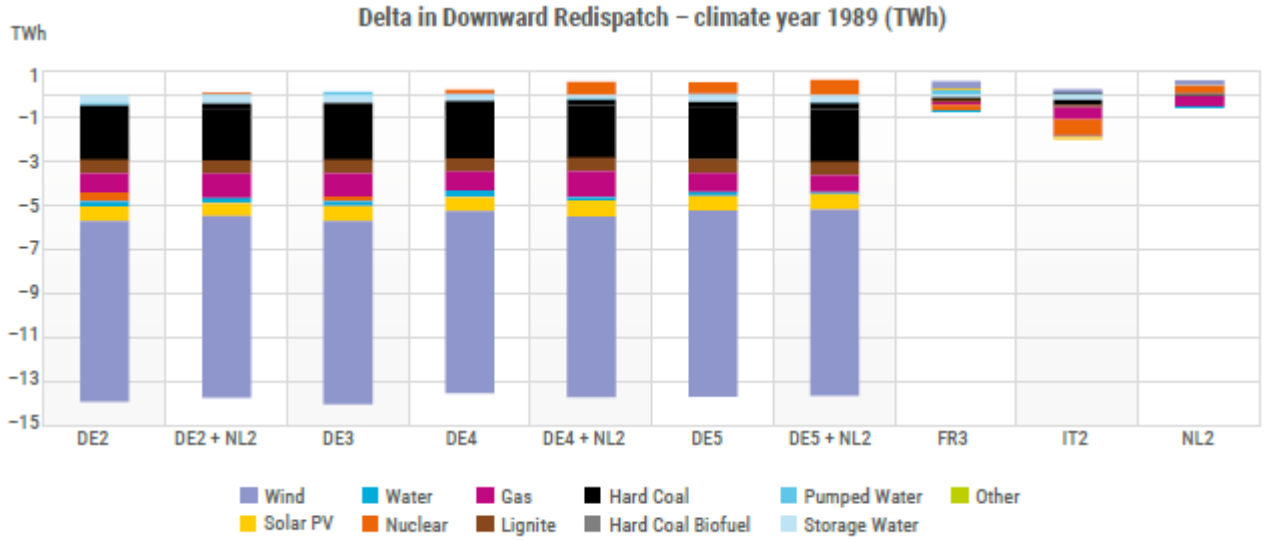


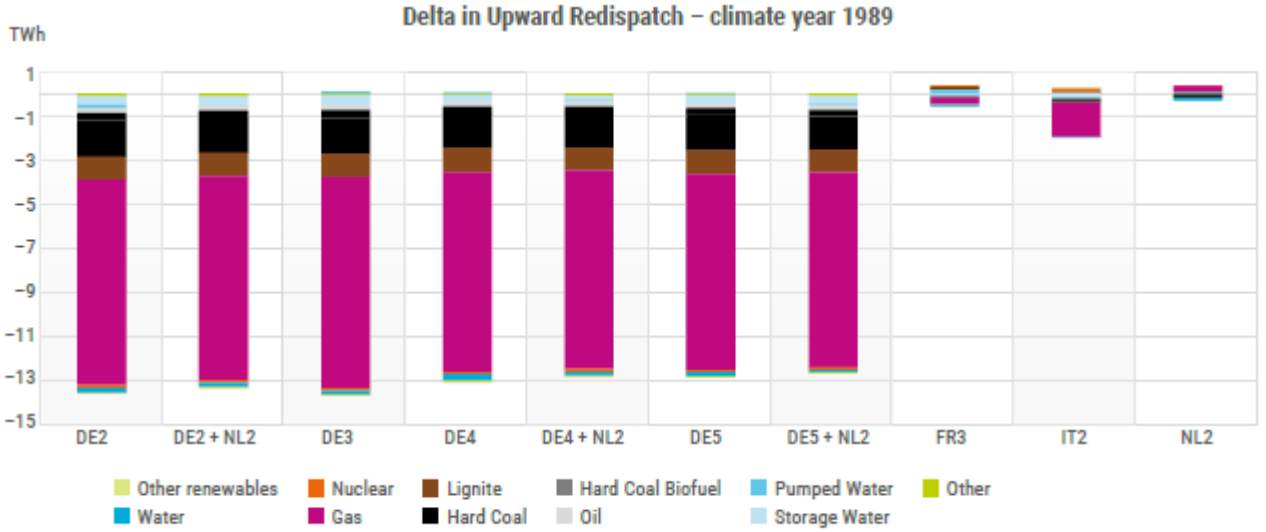
CE region - Market Welfare based on the all-EU NTC and CE FB market simulations



- **Market Welfare** is the sum of the producer surplus, consumer surplus, congestion rent.
- Splitting presents a decrease in almost every case.
- This result is expected as introducing a split leads to a restriction of the market and therefore a reduction in overall welfare.
- An exception is the NL2 split, which shows increased market welfare in climate year 1995, attributed to the overall numerical accuracy of the modelling chain.

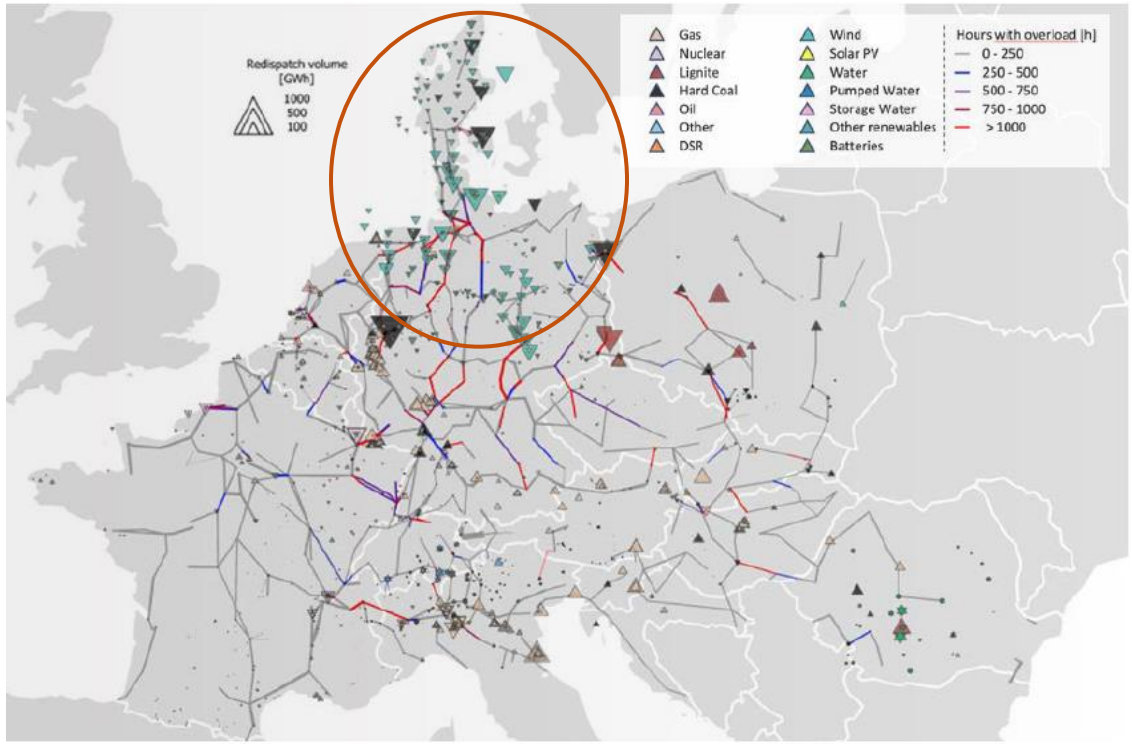
CE region - Redispatching volumes: Example on Climate Year 1989





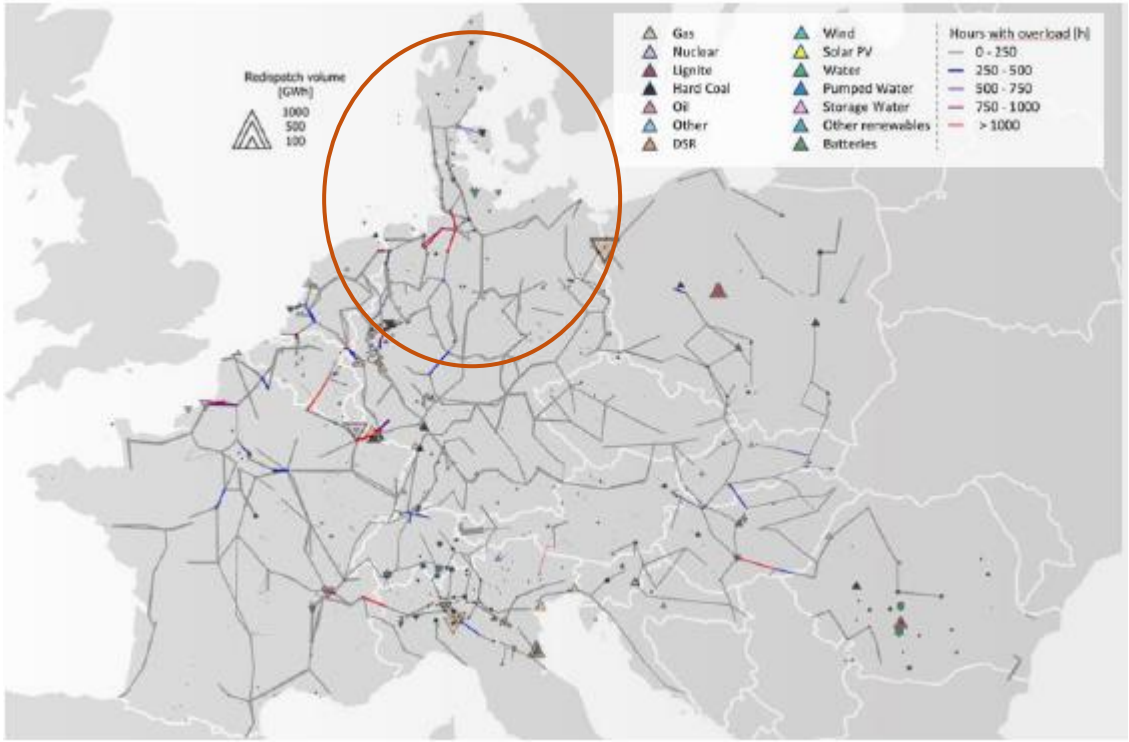
- **DE / LUX configuration:** The most significant reduction of volumes can be observed for the DE / LUX split scenarios. Attributed to reduction of wind curtailment (and imports from the Nordics) in the northern zones and a respective reduction in gas upward redispatching needed for compensation.
- **Combinations:** The results of the combinations are similar to the results of their respective individual German splits, indicating no major impact of the NL2 split to the output of the redispatching process.
- **FR3 configuration:** No major impact on redispatch volumes compared to the status quo is observed.
- **IT2 configuration:** Splitting Italy leads to a reduction of nuclear downward redispatching and a respective reduction of gas upward redispatching
- **NL2 configuration:** No major impact in redispatch volumes compared to the status quo is observed.

CE region - Redispatching volumes: Example on Climate Year 1989



Status Quo – Climate Year 1989

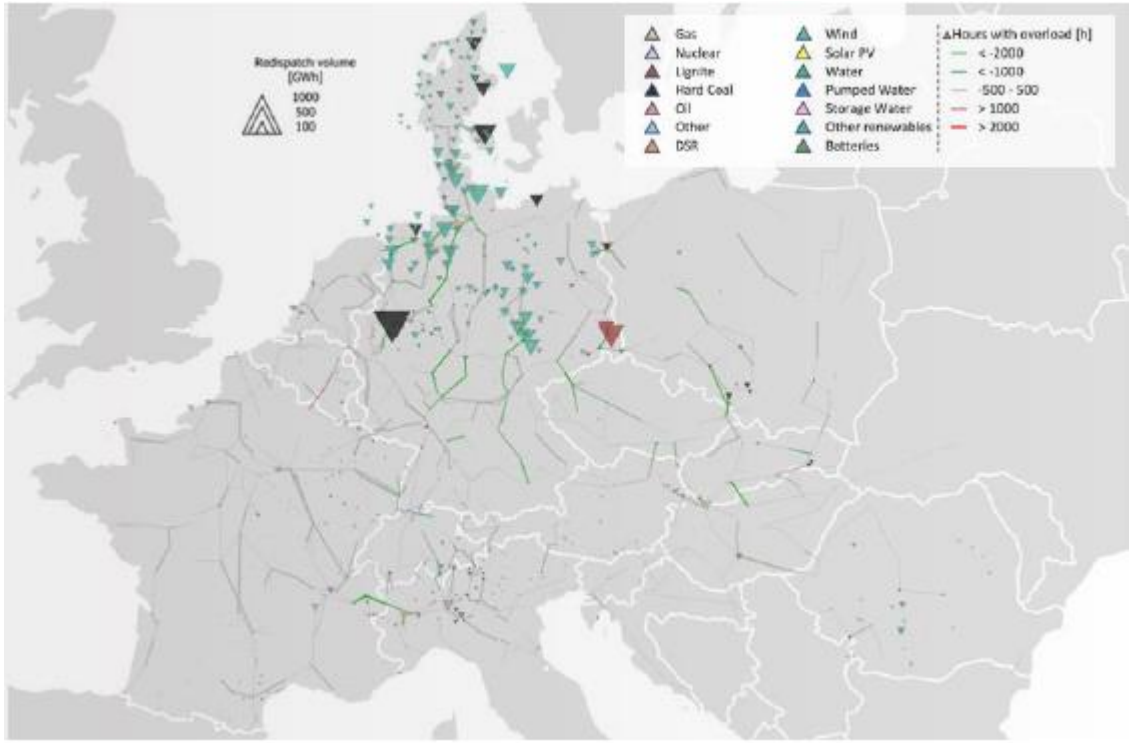
- Nordic imports and concentrated wind energy in northern Central Europe causes north-south flows and grid overloads
- Redispatching actions are taken like curtailing wind and reducing thermal generation, and lignite redispatching
- Plants in southern Germany, Italy, and Poland, and numerous smaller plants in southeastern Europe provide upward redispatch to balance the system.



DE2 – Climate Year 1989

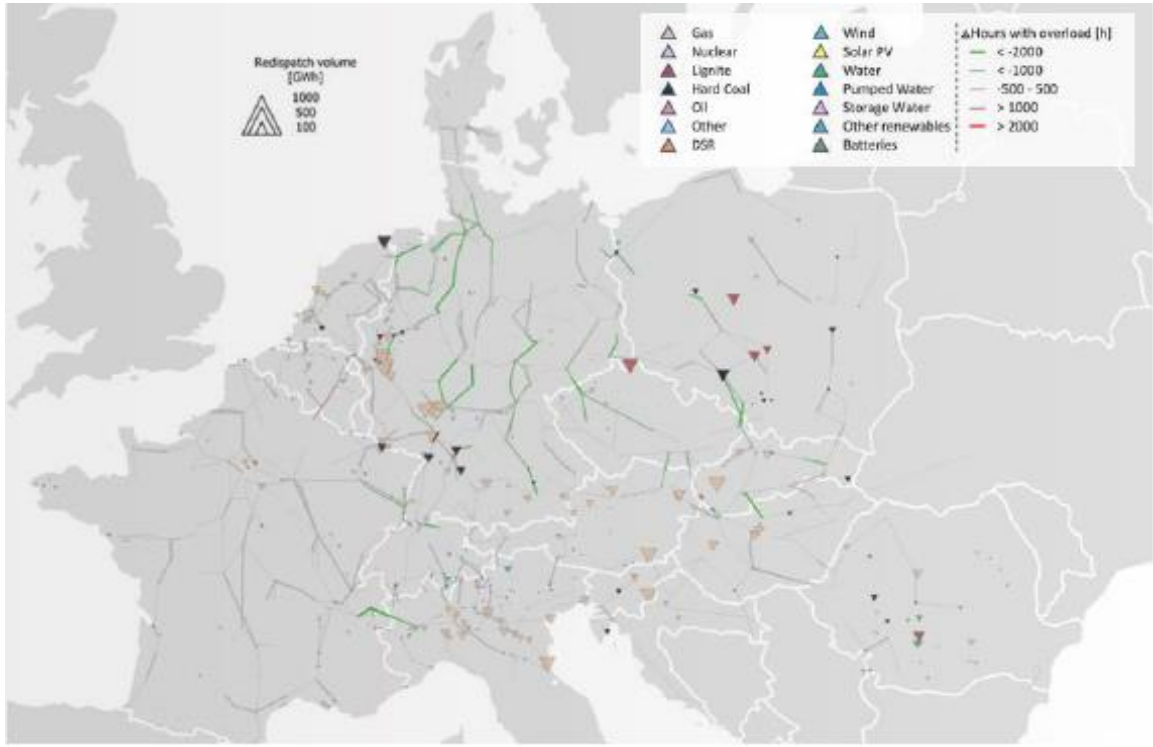
- Volume of redispatching actions is reduced as most bottlenecks in the grid in Germany do not appear due to the updated market dispatch.
- Remaining congestions appear in the area around Hamburg and Bremen in the northwestern part of Germany. This effect can be traced back to high wind infeed in Denmark and Schleswig-Holstein.
- No significant downward redispatch and RES curtailment are observed in Germany

CE region - Change in redispatching volumes: Example on Climate Year 1989



Downward redispatch volume change between the DE2 and SQ

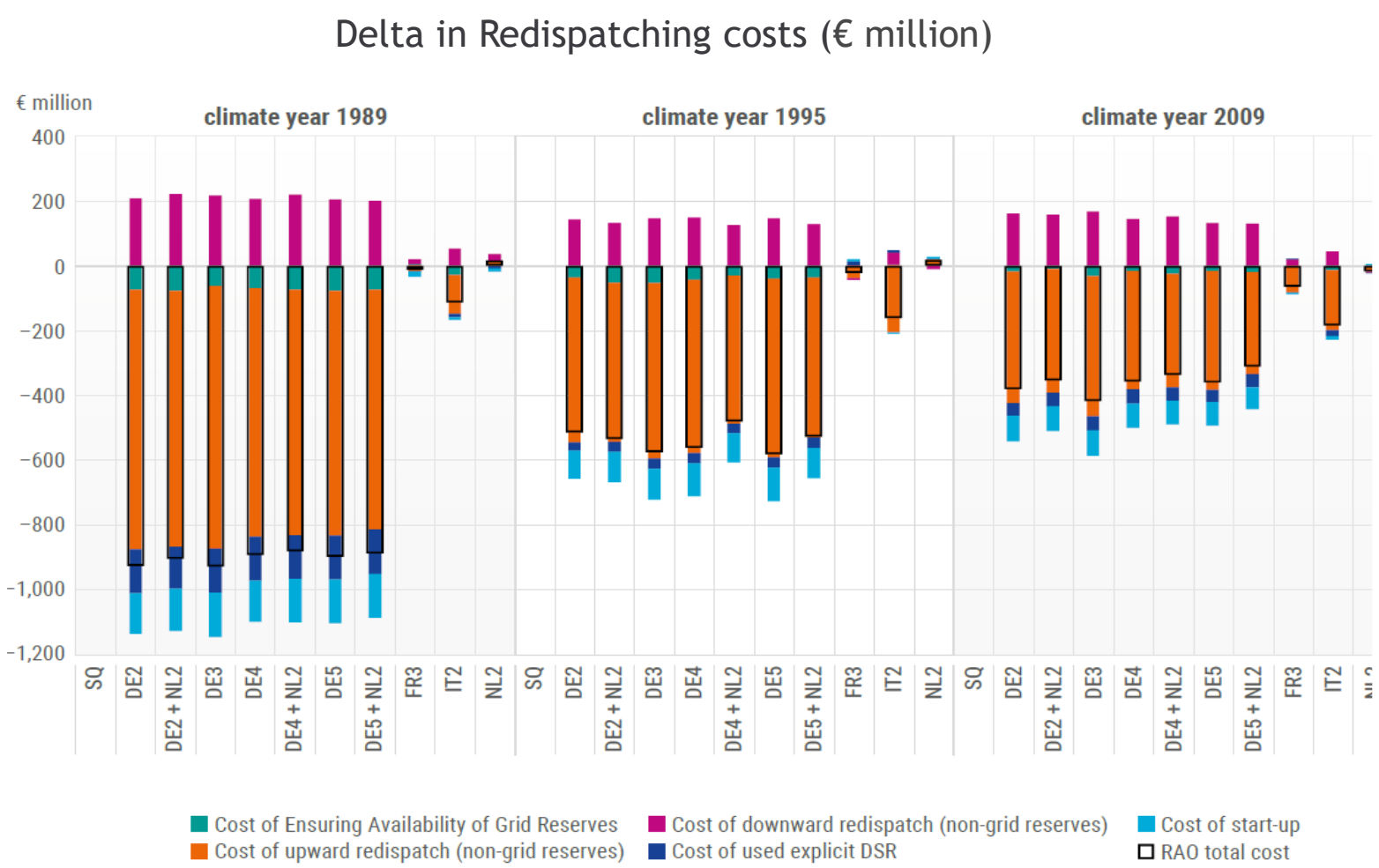
- The downward redispatch reduction is mainly attributed to RES curtailment in Germany and Denmark, and to hard coal and lignite.



Upward redispatch volume change between the DE2 and SQ

- The upward redispatch reduction is mainly attributed to the reduction of use of gas and to a lesser extent hard coal and lignite in Germany and southern CE zones

CE region - Redispatching costs: Breakdown on components



- The **German-Luxembourgish** split configuration achieves the largest reduction in RAO costs due to the decrease in redispatch volumes
- The splits significantly reduce gas redispatch volumes, with some reduction in hard coal and lignite. These reductions directly reduce the upward redispatch costs. Additionally, there is a notable reduction in startup costs linked to the reduced use of these fuels.
- Costs of used explicit DSR also decrease under the **German-Luxembourgish** splits. The cost of ensuring availability decreases as the redispatch peaks in Germany – on which this calculation is based – are reduced in the German-Luxembourgish splits.
- In the case of the **Italian** split configuration, there is a reduction in upward redispatch due to reduced gas redispatch.
- The **FR3** and **NL2** configurations, there is no significant change compared to the status quo.

CE region step 2: assessment of other criteria

CE region - Overview of all other criteria

	Configuration								
Criterion	**DE2**	**DE2 + NL2**	**DE3**	**DE4**	**DE4 + NL2**	**DE5**	**DE5+NL2**	**NL2**	**Remarks**
1 – Operational security	**Better**	**Better**	**Better**	**Better**	**Better**	**Better**	**Better**	**Same**	
2 – Security of supply	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	Detailed assessment could not be performed, performance assumed the same as the status quo
3 – Degree of uncertainty in cross-zonal capacity calculation	Implicit assessment through criterion 4 (economic efficiency)								
5 – Firmness costs	Implicit assessment through criterion 4 (economic efficiency)								
6 – Market liquidity and transaction costs	**Worse**	**Worse**	**Worse**	**Worse**	**Worse**	**Worse**	**Worse**	**Worse**	
7 – Market concentration and market power	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	See section 6.3.6 for assessment of the sub-criteria
8 – Facilitation of effective competition	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Worse**	See section 6.3.7 for assessment of the sub-criteria
9 – Price signals for building infrastructure	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	
10 – Accuracy and robustness of price signals	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	
11 – Transition costs (ranges in € mn)	[1,186; 1,540]	[1,233; 1,969]	[1,191; 1,566]	[1,263; 2,266]	[1,863; 2,695]	[1,269; 2,378]	[1,316; 2,807]	[47;429]	Used to calculate the minimum lifetime of a bidding zone
12 – Infrastructure costs	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	Assessed as criterion 9 and 10
13 – Market outcomes in comparison to corrective measures	Implicit assessment through criterion 4 (economic efficiency)								

Table continues on the next slide

CE region - Overview of all other criteria

	Configuration								
14 – Adverse effects of internal transaction on other bidding zones	Better	Better	Better	Worse	Worse	Worse	Worse	Same	
15 – Impact on the operation and efficiency of the balancing mechanisms and imbalance settlement processes	Same	Same	Same	Same	Same	Same	Same	Same	See section 6.3.14 for assessment of the sub-criteria For sub-criterion 15.1, monetised assessment could not be performed For sub-criterion 15.2, assessed as criterion 10
16 – Stability and robustness of bidding zone over time	Better	Better	Better	Better	Better	Better	Better	Worse	
17 – Consistency across capacity calculation time frames	Same	Same	Same	Same	Same	Same	Same	Same	Assessment set upfront in the BZR Methodology
18 – Assignment of generation and load units to BZs	Same	Same	Same	Same	Same	Same	Same	Same	Assessment set upfront in the BZR Methodology
19 – Location and frequency of congestion	Worse	Worse	Worse	Worse	Worse	Worse	Worse	Same	
20 – Short-term effects on CO_{∞} emissions	Same	Same	Same	Same	Same	Same	Same	Same	
21 – Short-term effects on RES integration	Same	Same	Same	Same	Same	Same	Same	Same	
22 – Long-term effects on low-carbon investments	Same	Same	Same	Same	Same	Same	Same	Same	Assessed as criterion 9 and 10

CE region - Criterion 1: Operational security

The first indicator is assessed by the number of occurrences where the CNEs (defined in the status quo) were congested for N and N-1 violations.

	SQ	DE2	DE2 + NL2	DE3	DE4	DE4 + NL2	DE5	DE5 + NL2	NL2
N (total in thousands)	96	48	50	62	69	65	70	57	95
N (% change)	–	–49.9	–48.1	–35.4	–28.5	–32,1	–27.3	–40.7	–0.9
N-1 (total in thousands)	1,191	472	466	538	618	589	606	525	1,181
N-1 (% change)	–	–60.3	–60.8	–54.8	–48.1	–50,5	–49.1	–55.9	–0.9

The second indicator – physical congestion index - is defined by the sum of physical overloads on all network elements for all MTUs.

	SQ	DE2	DE2 + NL2	DE3	DE4	DE4 + NL2	DE5	DE5 + NL2	NL2
Aggregated index (in TWh)	307	93	97	103	121	118	119	106	303
Change (%)	–	–69.8	–68.5	–66.4	–60.4	–61.5	–61.1	–65.6	–1.1

	DE2	DE2 + NL2	DE3	DE4	DE4 + NL2	DE5	DE5 + NL2	NL2
Security violations	Better	Better	Better	Better	Better	Better	Better	Same
Congestion index	Better	Better	Better	Better	Better	Better	Better	Same
Assessment	Better	Better	Better	Better	Better	Better	Better	Same

CE region - Criterion 6: Market liquidity and transaction costs

- The “market liquidity and transaction costs” criterion was evaluated through a study performed jointly for the CE and Nordic BZRRs.
- This study aimed to assess the expected evolution of market liquidity and its impact on transaction costs for the long- and short-term timeframes.
- Stakeholders suggested several potential mitigation measures in the public consultation. While they might help to improve liquidity, it is not possible for TSOs to conclude ex-ante that they will be sufficient to mitigate the expected negative effect of a BZ reconfiguration on liquidity and transaction costs.

Alternative Configuration	Assessment on changes to liquidity metrics of short-term markets	Assessment of changes to liquidity metrics of the long-term markets	Performance with respect to criterion 6 market liquidity and transaction costs
DE2	Same	Worse	Worse
DE2 + NL2	Same	Worse	Worse
DE3	Same	Worse	Worse
DE4	Same	Worse	Worse
DE4 + NL2	Same	Worse	Worse
DE5	Same	Worse	Worse
DE5 + NL2	Same	Worse	Worse
NL2	Worse	Worse	Worse

CE region - Criterion 10: Accuracy and robustness of price signals

- Prices are accurate and robust when a majority of market participants – i. e. participating in DA markets and/or using the DA price as the main price reference – perceive the benefits of reacting to the actual needs of the system at the precise location and point in time.
- Please note that for the assessment of this criterion, the different regions were volume-weighted according to their share of the total generation and demand in the CE region in the respective configuration, averaged over the three climate years.
- Note that the methodology focuses the criterion very narrowly on the **accuracy** of price signals, while the **robustness** of prices signals is omitted

Configuration	CE-wide weighted correlation	CE-wide weighted correlation in SQ	Absolute difference to SQ	Relative change to SQ	Evaluation
DE2	0.697	0.692	0.005	0.7 %	**Same**
DE2 + NL2	0.700	0.691	0.009	1.3 %	**Same**
DE3	0.698	0.691	0.007	1.0 %	**Same**
DE4	0.699	0.690	0.009	1.3 %	**Same**
DE4 + NL2	0.700	0.689	0.011	1.6 %	**Same**
DE5	0.698	0.690	0.008	1.2 %	**Same**
DE5 + NL2	0.701	0.689	0.012	1.7 %	**Same**
NL2	0.692	0.693	−0.001	−0.1 %	**Same**

CE region - Criterion 11: Transition costs

- The transition costs to a new BZ configuration are one-off costs that have been evaluated through a study performed jointly for the CE and Nordic BZRRs.
- EU stakeholders have been thoroughly involved in the determination of the transition costs (2 online surveys, public consultation).

BZ configuration	Monetised benefits [€ million]	Transition costs [€ million] *			Minimum lifetime [years]		
		min	med	max	min	med	max
DE2	264	1,186	1538	1,540	5.1	6.8	6.8
DE2 + NL2	266	1,233	1,785	1969	5.2	8.0	9.0
DE3	251	1,191	1,542	1,566	5.4	7.2	7.3
DE4	312	1,263	1,616	2,266	4.5	5.9	8.7
DE4 + NL2	268	1,310	1,863	2,695	5.5	8.3	13.1
DE5	339	1,269	1,621	2,378	4.1	5.4	8.4
DE5 + NL2	332	1,316	1,868	2,807	4.4	6.5	10.5
NL2	9	47	247	429	6.2	270.3	1,240.0

* Estimates of the transition costs for individual split configurations were evaluated in the transition costs study. For the combinations, they were calculated as the sum of the estimates of the transition costs of the individual split configurations.

Note: The "min" costs are based on the scaled cost of the relatively lowest cost estimate, "med" costs are based on the scaled costs of the median cost estimate, and "max" costs are the scaled costs of the relatively highest cost estimate.

CE region - Criterion 14: Adverse effects of internal transactions on other BZs

First indicator “Average share of loop flows on network elements” was calculated based on CNECs, which showed market congestion or physical congestion respectively in at least one MTU for a given BZ configuration.

1. Average share of loop flows on network elements	Configuration	DE2	DE2 + NL2	DE3	DE4	DE4 + NL2	DE5	DE5 + NL2	NL2
	FBMC	Better	Better	Better	Better	Better	Better	Better	Better
	OSA before RAO	Worse	Worse	Worse	Worse	Worse	Worse	Worse	Same
	Performance Results	Same	Same	Same	Same	Same	Same	Same	Better

The second indicator “Number of occurrences (hours) with loop flows, on all network elements, higher than a given threshold” is calculated based on counting the occurrences with loop flows on network elements, higher than a given threshold (10% threshold is used for internal CNECs and 20% for cross-border CNECs).

2. Number of occurrences (hours) with loop flows, on all network elements, higher than a given threshold	Configuration	DE2	DE2 + NL2	DE3	DE4	DE4 + NL2	DE5	DE5 + NL2	NL2
	Performance results	Better	Better	Better	Worse	Worse	Worse	Worse	Worse

Criterion 14 Overall results	Configuration	DE2	DE2 + NL2	DE3	DE4	DE4 + NL2	DE5	DE5 + NL2	NL2
	Results	Better	Better	Better	Worse	Worse	Worse	Worse	Same

CE region - Criterion 16: Stability and robustness of bidding zones over time

In line with the BZR Methodology, this criterion has been assessed by **analysing exclusively the 'economic efficiency'** of the alternative configurations in relation to the status quo **for the sensitivity analysis** (without comparing the sensitivity scenario and the main scenario).

On the sensitivity analysis:
BZRR CE originally intended to perform sensitivity analyses on multiple dimensions including: (a) higher fuel and carbon prices, (b) additional grid expansion projects, (c) additional build-out of renewable energy sources, and (d) additional load. However, ultimately it was only possible to perform one sensitivity analysis considering the impact of **higher fuel and carbon prices** than in the main scenario, and **alternative redispatch markups**.

Average change with respect to status quo for the sensitivity analysis (climate year 1989)						
	Market dispatch (CE + non-CE)				RAO (CE)	Economic Efficiency
Configuration compared to status quo	Market welfare [€ million]	Consumer surplus [€ million]	Producer surplus [€ million]	Overall congestion revenue [€ million]	Additional costs from redispatch [€ million]	Socio-economic welfare (criterion 4) [€ million]
DE2	−1,197	1,087	−3,899	1,615	−1,666	468
DE2 + NL2	−1,188	1,640	−4,843	2,014	−1,636	447
DE3	−1,270	1,190	−4,346	1,885	−1,732	462
DE4	−1,257	1,344	−4,156	1,555	−1,701	444
DE4 + NL2	−1,298	461	−3,501	1,742	−1,619	321
DE5	−1,053	1,931	−5,352	2,368	−1,607	554
DE5 + NL2	−1,037	796	−3,671	1,839	−1,565	528
NL2	2	−521	401	122	42	−40

Criterion 16	DE2	DE2 + NL2	DE3	DE4	DE4 + NL2	DE5	DE5 + NL2	NL2
Stability and robustness of bidding zones over time	Better	Better	Better	Better	Better	Better	Better	Worse

CE region Step 3: overview of all criteria and assessment of acceptability

CE region - Step 3: overview of all criteria and assessment of acceptability

	Configuration								
Criterion	**DE2**	**DE2 + NL2**	**DE3**	**DE4**	**DE4 + NL2**	**DE5**	**DE5+NL2**	**NL2**	**Remarks**
1 – Operational security	Better	Better	Better	Better	Better	Better	Better	Same	
2 – Security of supply	Same	Same	Same	Same	Same	Same	Same	Same	Detailed assessment could not be performed, performance assumed the same as the status quo
3 – Degree of uncertainty in cross-zonal capacity calculation	Implicit assessment through criterion 4 (economic efficiency)								
5 – Firmness costs	Implicit assessment through criterion 4 (economic efficiency)								
6 – Market liquidity and transaction costs	Worse	Worse	Worse	Worse	Worse	Worse	Worse	Worse	
7 – Market concentration and market power	Same	Same	Same	Same	Same	Same	Same	Same	See section 6.3.6 for assessment of the sub-criteria
8 – Facilitation of effective competition	Same	Same	Same	Same	Same	Same	Same	Worse	See section 6.3.7 for assessment of the sub-criteria
9 – Price signals for building infrastructure	Same	Same	Same	Same	Same	Same	Same	Same	
10 – Accuracy and robustness of price signals	Same	Same	Same	Same	Same	Same	Same	Same	
11 – Transition costs (ranges in € mn)	[1,186; 1,540]	[1,233; 1,969]	[1,191; 1,566]	[1,263; 2,266]	[1,863; 2,695]	[1,269; 2,378]	[1,316; 2,807]	[47;429]	Used to calculate the minimum lifetime of a bidding zone
12 – Infrastructure costs	Same	Same	Same	Same	Same	Same	Same	Same	Assessed as criterion 9 and 10
13 – Market outcomes in comparison to corrective measures	Implicit assessment through criterion 4 (economic efficiency)								

Table continues on the next slide

CE region - Step 3: overview of all criteria and assessment of acceptability

	Configuration								
14 – Adverse effects of internal transaction on other bidding zones	Better	Better	Better	Worse	Worse	Worse	Worse	Same	
15 – Impact on the operation and efficiency of the balancing mechanisms and imbalance settlement processes	Same	Same	Same	Same	Same	Same	Same	Same	See section 6.3.14 for assessment of the sub-criteria For sub-criterion 15.1, monetised assessment could not be performed For sub-criterion 15.2, assessed as criterion 10
16 – Stability and robustness of bidding zone over time	Better	Better	Better	Better	Better	Better	Better	Worse	
17 – Consistency across capacity calculation time frames	Same	Same	Same	Same	Same	Same	Same	Same	Assessment set upfront in the BZR Methodology
18 – Assignment of generation and load units to BZs	Same	Same	Same	Same	Same	Same	Same	Same	Assessment set upfront in the BZR Methodology
19 – Location and frequency of congestion	Worse	Worse	Worse	Worse	Worse	Worse	Worse	Same	
20 – Short-term effects on CO_{∞} emissions	Same	Same	Same	Same	Same	Same	Same	Same	
21 – Short-term effects on RES integration	Same	Same	Same	Same	Same	Same	Same	Same	
22 – Long-term effects on low-carbon investments	Same	Same	Same	Same	Same	Same	Same	Same	Assessed as criterion 9 and 10
Evaluation	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	

TSOs concluded that even though some alternative configurations might perform worse on some criteria, when considering the relative performance of these criteria and the need to consider all criteria assessed in steps 1 and 2, taken together, rather than considering each criterion individually all remaining configurations perform as “acceptable”.

CE region Step 4: proposal

CE region - Step 4: proposal

- For the TSOs of the Central European BZR region, the simulation results of the BZ Study indicate that the configuration with the highest positive monetized benefit in relation to criterion 4 compared to the status quo would be the split of Germany–Luxembourg into five BZs (DE5).

- The Central Europe TSOs proposal stresses that this result stems from the BZR Methodology defined by ACER and does not take important additional aspects into account and therefore should not be seen in isolation, but rather in combination with certain considerations, which should be thoroughly assessed prior to the eventual decision of the relevant member state(s) affected by a split on the future BZ configuration, as they could have a considerable impact on the interpretation and the outcomes of the BZ Study performed by the TSOs

CE region - Additional considerations included in the proposal

1. The target year of the study (2025)
2. The fact that input data are already outdated, because the study started in 2019
3. The delay to implement a new bidding zone configuration (3-5 years) and the pay-back time (4-9 years)
4. The necessity to assess impact of market liquidity and transaction costs
5. The potential impact on balancing markets

Considerations related to the Bidding Zone Review methodology

Conclusions solely based on simulation results are not suitable for decision-making when seen in isolation. The BZR Methodology focuses on a quantitative assessment of the various criteria, which is largely based on simulation results and leaves insufficient room for interpretation or consideration of an expert assessment. Simulation results can only offer an indication of a future situation, and they should always be carefully evaluated against the background of qualitative considerations.

6. The price impact on certain consumer groups
7. The difficulty for certain (industrial) consumers to access renewable electricity (e.g. PPAs)
8. The potential impact on investment decisions in new low-price zones
9. The expected increase of support costs for RES

Considerations beyond the application of Bidding Zone Review methodology

Break (10 min)

Please post your questions on **slido.com** using code **#4822284** or **scan QR code**

Start your question for this section by ´CE question´

Participants can like questions to increase the visibility

Q&A on Central Europe region results and joint proposal

Please post your questions on **slido.com** using code **#4822284** or **scan QR code**

Start your question for this section by ´CE question´

Participants can like questions to increase the visibility

- ✓ Presentation will be available in ENTSO-E website.
- ✓ Questions raised in the webinar will be answered and published in ENTSO-E website.
- ✓ ENTSO-E website BZ link: Bidding Zone Review
- ✓ If you have additional questions, you can raise them till the 28 May through this link: https://forms.office.com/e/vFhnP2ggMB (answers will be published by the end of June 2025 in ENTSO-E website)

General Q&A and closing remarks

Please post your questions on **slido.com** using code **#4822284** or **scan QR code**

Start your question for this section by ´general question´

Participants can like questions to increase the visibility

Our values define who we are, what we stand for and how we behave.
We all play a part in bringing them to life.