Bidding Zone Review (BZR) Public Webinar on Public Consultation

20 August 2024, online conference

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Agenda

Indicative timing	Webinar item	Speakers
9:45 – 10:00	Webinar open for log-in	
10:00 – 10:15	**Introductory remarks**	Marta Mendoza-Villamayor, ENTSO-E
10:15 – 10:55	**Presentation: study on market liquidity and transaction cost**	Fabien Roques, Compass Lexecon Anton Burger, Compass Lexecon Malte Nussberger, Compass Lexecon
10:55 – 11:15	**Q&A**	
11:15 – 11:55	**Presentation: study on transition costs**	
11:55 – 12:15	**Q&A**	
12:15 – 12:45	**Presentation: public consultation process and Q&A**	Marijn de Koning, TenneT
12:45 – 13:00	**Closing remarks**	Marta Mendoza-Villamayor, ENTSO-E

Introductory remarks

Housekeeping 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

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Participants can like questions to increase the visibility

Thank you for following the rules

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Bidding Zone Review: process

Overview

All TSOs' proposal for methodology and configurations submitted in October 2019 was transferred 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 Review study
- by TSOs of BZRRs
- 8 Aug 2022 – 31 Dec 2024

Relevant MSs: decision to maintain or amend the BZ in 6 months

ACER's approved methodology split in two steps:
1. Methodology + request to TSOs to deliver LMP
2. Definition of alternative configurations

Deliverables:
1. Final **report** with assessment of **22** indicators
2. Joint **recommendation** to governments of involved Member States (MSs) for future configuration.

Webinar's focus

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Scope

This **Public Consultation is conducted pursuant to Article 17.4 of the BZR Methodology**. The Public Consultation is **asking for the stakeholders' input** to the following aspects:

- The **impacts of alternative BZ configurations on** the following criteria: **'Market liquidity and transaction costs'** as well as **'Transition costs.'** To that extend, the studies performed on both criteria are included in the public consultation material,
- **Possible measures to mitigate negative impacts of specific alternative BZ configurations** regarding the reports on 'Market liquidity and transaction costs' and 'Transition costs' criteria, and
- The **identification of practical considerations which may need to be considered in case of a possible BZ configuration change** as set forth in Article 14(10) of the Electricity Regulation, including possible timescales for implementation of alternative BZ configurations.

Stakeholders are welcomed to provide their answer by 4 September 2024, 10am CEST by providing one feedback to the questionnaire per representative organisation.

Pan-EU studies: market liquidity and transaction costs

Role of Compass Lexecon in the BZ-review and process

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	Our role	Process
Liquidity and Transaction Cost Study	Provide an **understanding of the state of Liquidity in Europe** and **view on expected liquidity** in newly to-be formed bidding zones	1. **Literature review** → how does the literature see the relationships between liquidity and fundamentals? 2. **Analysis of state of liquidity in Europe** → What can we learn about liquidity in Europe and relationships now? 3. **Analysis of simulated reconfigurations** → What is our best view of the to-be expected liquidity in the new zones?
Transition Cost Study	**Estimate transition costs** from the potential bidding zone reconfigurations, based on primary data gathering though a questionnaire	1. Define groups of market participants 2. Develop **questionnaire(s)** 3. Conduct **interviews** 4. Develop method for cost estimation and data quality check 5. **Estimate transition costs** on the data basis, noting the caveats

Agenda

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1. **Liquidity and transaction cost study**
   - i. **Scope of the Study**
   - ii. **Literature Review**
   - iii. **Analysis of the State of Liquidity**
   - iv. **Analysis of simulated reconfigurations**

2. Transaction cost study
   - i. Scope of the study
   - ii. Methodology
   - iii. Data basis
   - iv. Results

Scope of the study

Scope of the study

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The liquidity and transaction cost study includes several products across several power markets in Europe, in compliance with the requirements stated in the ACER methodology.

ACER methodology[1]

- *"The analysis shall, at least, consider the following elements:*
  - *"A descriptive analysis of liquidity aiming to describe the starting point of market liquidity in the concerned BZs"*
  - *A correlation analysis, aiming to describe the correlation of average day-ahead prices of the concerned BZ with average day-ahead prices of other BZs or BZ combinations.*
  - *To describe possible liquidity impacts because of expected changes in competition"*
- changes of liquidity should not "*impact the existence of sufficient hedging opportunities for market participants*"

Liquidity and transaction cost definition

- Liquidity is an elusive concept but loosely speaking: *"the speed and easiness by which assets can be bought or sold without drastically impacting the underlying market price"*
- Transaction costs are "*intrinsically* related" to liquidity and included in the analysis through consideration of bid-ask spreads

Markets

- Bidding zones of France, Germany-Luxembourg, Italy, the Netherlands, and Sweden are subject to a potential bidding zone reconfiguration in this bidding zone review
- They show different specifications with regard to:
  - Several bidding zones per country (Sweden, Nordics, Denmark, Italy) vs single bidding zone (Germany + Luxembourg, France, Netherlands, …)
  - Exchange-trading "obligation" (Nordics, Italy, Spain) vs bilateral trades (Germany, France, Netherlands, etc.)
  - Other design/regulatory specifications (French ARENH, Nordic system price, Italian PUN)

Products

- Short term products comprise the exchange traded Intraday (ID) and Day-Ahead (DA) market but, due to data unavailability, not over-the counter trades. For ID, only traded volumes are considered
- Long term products comprise selected exchange-traded futures and cleared and non-cleared forwards. Data is sourced from EEX, NASDAQ, ICE, and LEBA. For the futures, bid-ask spreads are calculated

Source: [1] ACER Methodology

Limitations of the scope and the assessment of future liquidity metrics

Limitations regarding the exhaustiveness of products and markets considered

- We focus on each **BZ that is subject to a potential reconfiguration individually** and do not account for potential cross border effects
- We were not able to obtain data on **intraday-OTC** markets
- A newly-developing market for OTC-long-term products – **PPAs** – could not be analysed further, because it was out of scope and there were not data available
- Same limitation with regards to **combined bidding zone changes** as the dispatch model used by TSOs (not implemented yet)

Limitations due to restriction in scope, data and chosen methodology

- No modelling of **behavioural trading dynamics** – like interplay between short-term and long-term markets or exchange traded vs. OTC
- Conclusions on **LT vs. ST** markets are **indirectly inferred** from results of the **econometric analysis**
- No consideration of **mitigation measures** (out of scope)
- We have identified some **non-linear relationships** between liquidity metrics and drivers, which we cannot capture here

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Literature review

Literature review – Approximation of market liquidity

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Metrics to assess transaction and liquidity costs are based on a review of academic sources and reports from market participants.

Market characteristics

Bidding zone size:

- It has been asserted that the **size of bidding zones** positively correlates with liquidity due to the increased number of market participants.
- This has been questioned, i.e. as "the experience from different markets […] does not show a clear link".[3]

Market concentration

- The European Commission stated in its decision on Brittany's capacity tender that **market power** "contributes to a loss of liquidity".[4]
- Others have again noted from splitting a congested bidding zone, competition may in fact increase because more cross-border parties may participate.[5]

Other market characteristics

- Literature on **other market characteristics** is considered as well.

Metrics to assess liquidity

- The **traded volume** is a principal metric to assess liquidity, as established by the ACER methodology.[1]
- The **churn rate,** the ratio between total traded volume and the volume of the product, is a meaningful indicator for continuous* markets, because of the possibility of secondary trading of products.[2]
- **Bid-ask spreads** and the **time to maturity** are relevant indicators for continuous markets as well.

*Notes: *Over-the-counter markets are included within continuous trading markets.*
Sources: [1] ACER Methodology: Decision 29-2020 Annex I, [2] DNV GL 2020, [3] Ofgem 2014, [4] European Commission 2017/1540, [5] Pototschnig 2020

Literature review – Analysis of BZ reconfiguration effects on liquidity

Past bidding zone reconfigurations have been discussed in a restricted number of publications. In most cases, liquidity was assessed ca. 1 year after the split by considering traded volumes, churn rates and BAS.

Past reconfiguration: Germany-Luxembourg-Austria

- The review of literature on past reconfigurations suggests that the split had positive effects for the short- and negative for long-term products.
- DNV GL noted an increase of 13% and 20% of **DA volumes** between the 12 months before and after the split for Epex Spot and EXAA respectively. ACER attributed the increase partially to the case that companies trading in both areas cannot net their positions and have to close their position on both markets after the split.
- For **long-term products**, it was highlighted that traded volume in Austria was very limited directly after the split. Bid-ask spreads for the Austrian market decreased between the baseload products for 2019 to 2021 but remained significantly higher than in the BZ before the split. German futures remained on a high liquidity level and saw slightly decreasing BAS between 2019 and 2021 products.

Past reconfiguration: Sweden

- Results from Sweden's bidding zone split have been largely similar: The **DA volumes** have arguably increased by 10% between 2011 and 2012 but traded volumes for **long-term products** have decreased.
- Researchers and market participants are not clear about the role of the reconfiguration on the decrease of turnover. Other causes such as decreasing demand and increasing exchange fees may have also contributed to the decrease of traded volumes.

Past reconfiguration: Italy

- Liquidity effects on Italian reconfigurations have seen little discussion in the literature so far.

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Sources: ACER MMR 2019, DNV GL 2020, Pototschnig 2020, Efet 2019, Eicke & Schittekatte 2022, Tractebel EU Asset Study 2021

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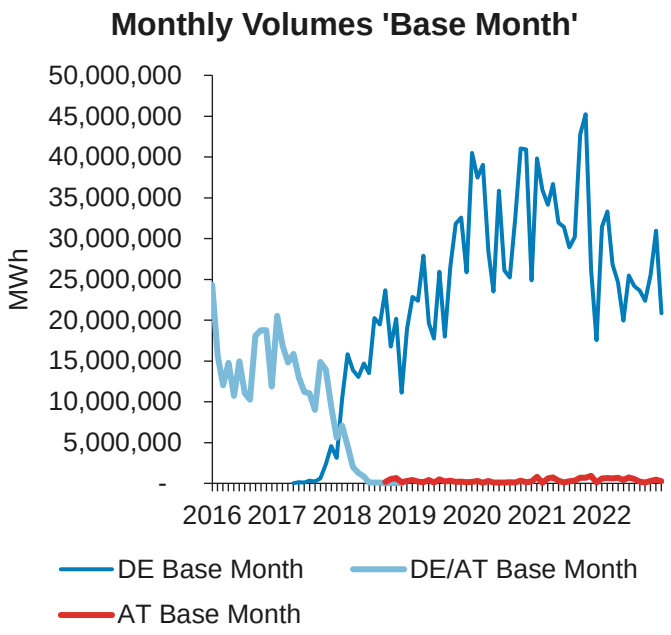
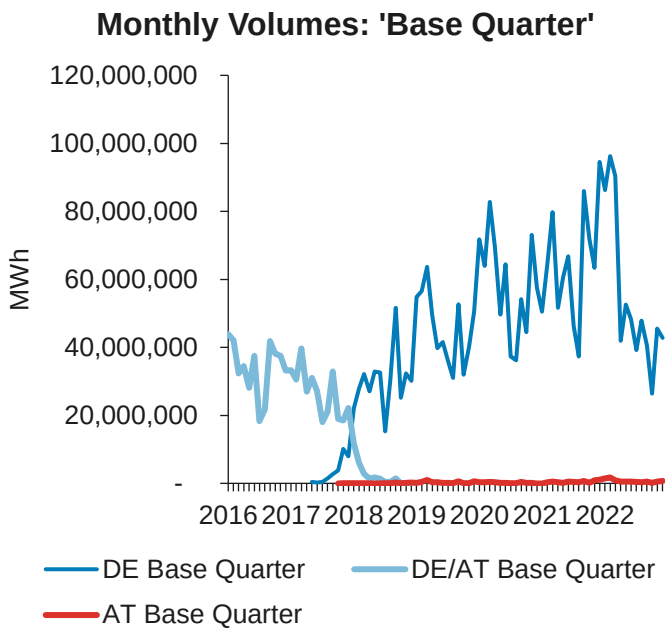
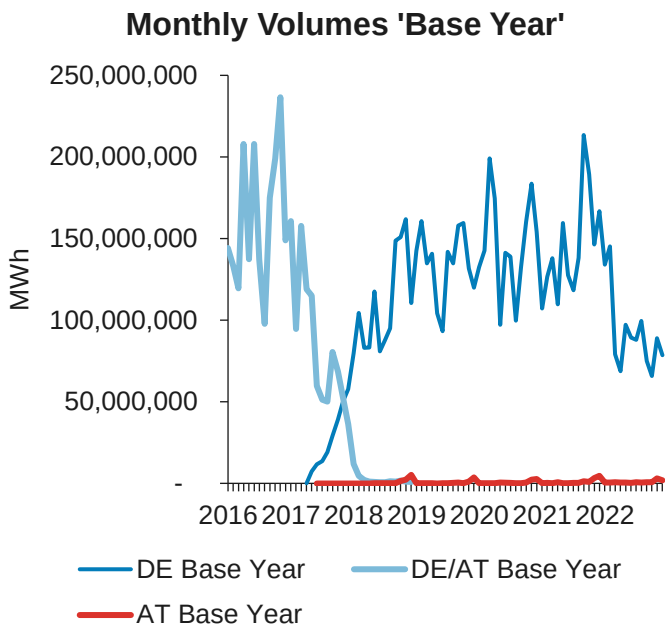
Excursion: DE/AT Bidding zone split – traded volume of key products

Market participants in Austria were confronted with significantly decreased turnover after the reconfiguration while liquidity in Germany seems to not have been compromised in general.







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Note: "DE" denotes the German-Luxembourg bidding zone; "DE/AT" the German-Luxembourg-Austrian zone. Further note that the observable trends until 2021 and thereafter are not necessarily originating in the bidding zone reconfiguration. Others have reduced the time frame for analysis of the reconfiguration to one year before and one year after the split.
Source: Compass Lexecon analysis of EEX data

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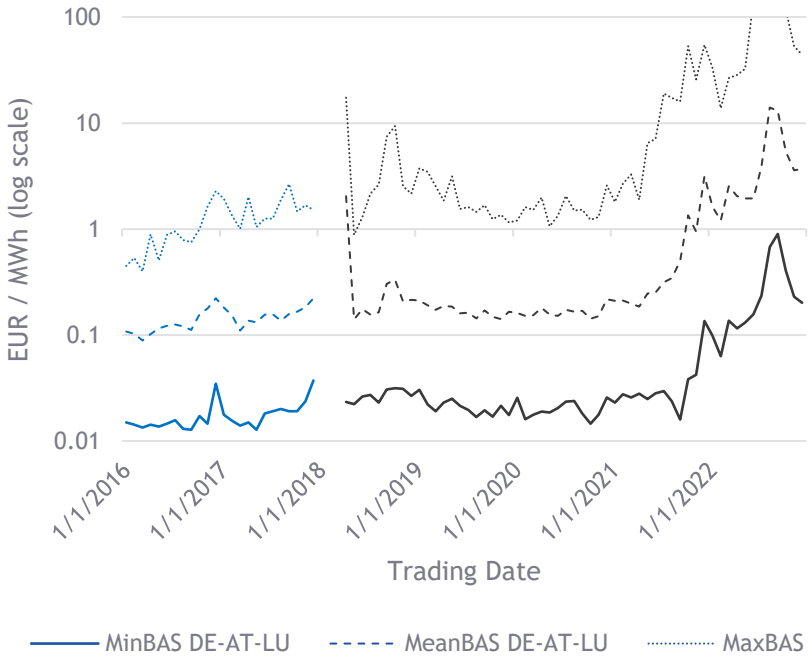
Excursion: DE/AT Bidding zone split – Bid-ask spreads of key products

Transaction costs (i.e. bid-ask spreads) have not changed significantly for German market participants but increased substantially for Austrian participants.

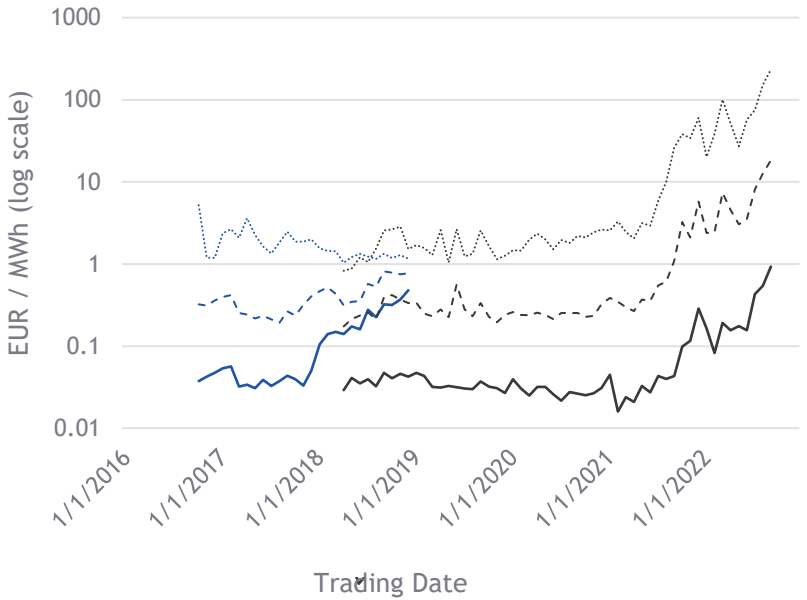
Liquidity and transaction cost

- Bid-ask spreads (BAS) remained largely unchanged in **Germany**: while BAS decreased for Q+1 base load products slightly also after the split, year-ahead products showed a slightly higher avg. spread.
- In contrast, **Austria** (not shown) saw significantly less turnover after the split. In association, BAS – when bids were actually made – were substantially higher than before the split.

Monthly averages of daily Bid-ask spreads of Y+1 products in GER BZ*



Monthly averages of daily Bid-ask spreads of Q+1 products in GER BZ



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*Notes: * Data is missing for 01/01/2018-31/03/2018*
Source: Compass Lexecon analysis of EEX data provided by ICE

Analysis of the State of Liquidity

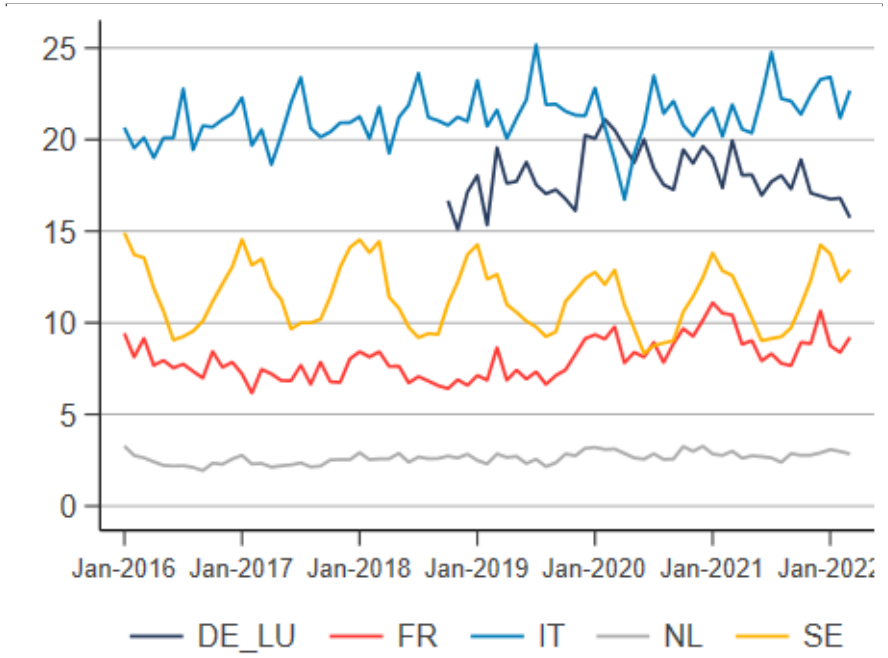
Market liquidity “starting point” – Exchange-traded short-term products

Traded volumes in Day-Ahead have been relatively stable over the past few years. Traded volumes in intraday have increased in most markets, but remain a fraction of amounts traded in Day-Ahead.

- **Traded volumes on the DA market** tend to be relatively stable between 2016 and 2022. In DE_LU and FR, a significant share is traded OTC such that their exchange turnover is lower compared to SE (for FR) or IT (for DE_LU)
- **ID traded volumes** in all countries except for IT exhibit a significant and positive trend, which is the most pronounced for DE_LU.
- **Seasonal variation** is generally higher in the DA-market with SE and IT showing significantly more variation than i.e. FR.

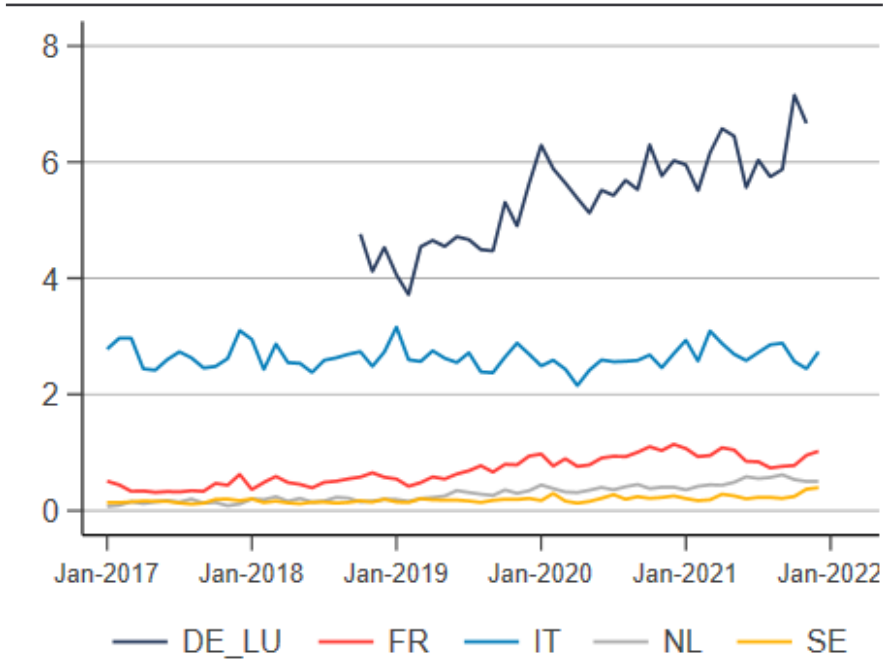
DA-market traded volumes

(monthly aggregate, TWh)



Intraday-market traded volumes

(monthly aggregate, TWh)



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Abbreviations: DE_LU … Germany-Luxembourg, FR … France, IT … Italy, NL … Netherlands, SE … Sweden, ID … Intraday, DA … day-ahead
Sources: Compass Lexecon analysis of NEMO and ACER data

Market liquidity “starting point” – Long-term products

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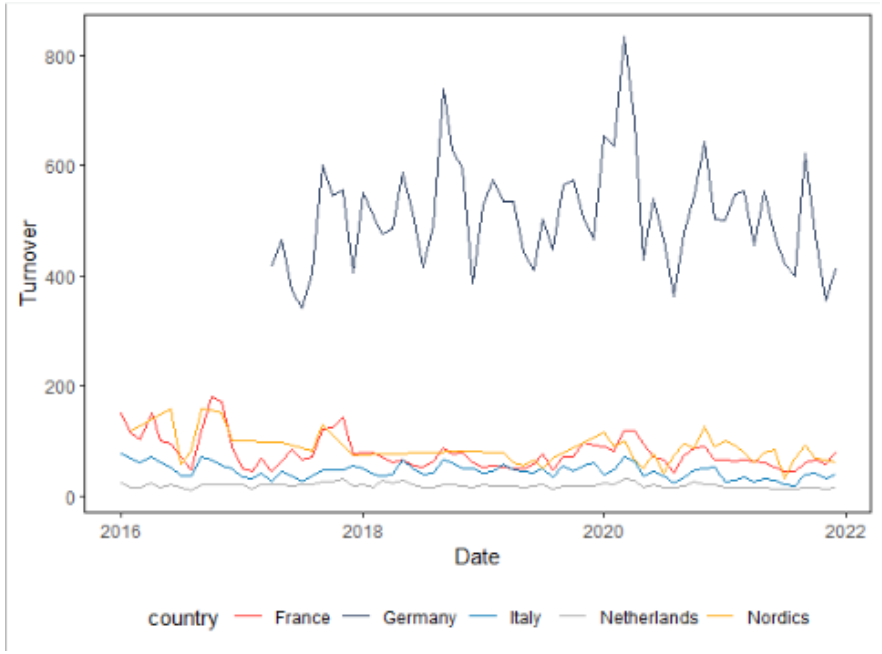
Long-term products for the German BZ are the most traded in Europe. The bid-ask-spread metric points towards a high level of liquidity for Nordic system price futures as well.

- **Germany is the largest futures market,** with turnover about 8 times higher than the next largest market area
- In line with turnover, **Germany shows the lowest bid-ask spreads**, closely followed by the Nordic Y+1 future, then France and Italy.
- Liquidity for long-term products has been fairly constant apart from monthly fluctuations and the effect from the recent price increase.
- Liquidity of the French market has been qualified as “low” by ESMA.[1]

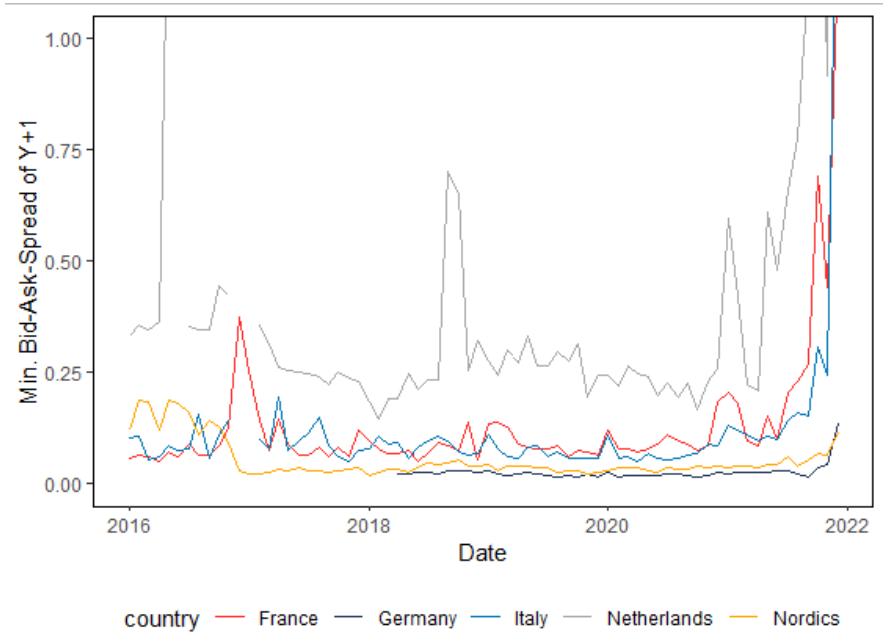
Long-term product traded volumes*

(monthly aggregate, TWh)



Min. Bid-ask-spreads of Y+1 futures**

(monthly average, EUR/MWh)



*Notes: * German products are considered as of available DE-LU products on EEX (as of then, all OTC volumes are considered DE-LU only); ** Nordics Y+1 corresponds to the minimum BAS of the EEX or NADSAQ traded Nordic system future. All others correspond to minimum BAS of EEX base load year ahead (Y+1) futures*

Sources: Compass Lexecon analysis of EEX, NADSDAQ, ICE, and LEBA data, [1] ESMA 2019

General considerations for model determination

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The relationship between liquidity and other market metrics shall be substantiated through regression analysis that identifies the presence of structural relationships in historic data.

Dependent Variable

Which variables are used to indicate liquidity?

Traded volume (for all)
- (Demand + supply) / 2 (coupled markets); and across products

Churn Ratios (for all)
- Traded volume / total load

Bid-Ask Spreads (for futures)
- (ask price – bid price) for all new events on a given day
- Min., unweighted avg., max. across a day of all BAS
- Product-specific → min., avg., max across products for selected products

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Explanatory Variables

Which variables are assumed to impact the dependent variable?

Market Size
- Total Load (hourly or aligned with the respective long-term product)

Share of Variable Generation
- Generation or capacity from RES / total gen.

Market Concentration
- HHI values

Seasonality
- Avg. Temperature

Cross-border participation
- Avg. price correlation to connected BZ weighted by XB-trade

+

Controlling for Noise

What should be expected as how the missing information is distributed?

Time
- Time trends
- auto-correlation

Location
- Country fixed effects
- Separate regressions for different markets

Functional form

What is the expected relationship between explanatory variable and dependent variable
- Linear, log-linear, non-linear relationships?

Liquidity relationships in the short-term markets

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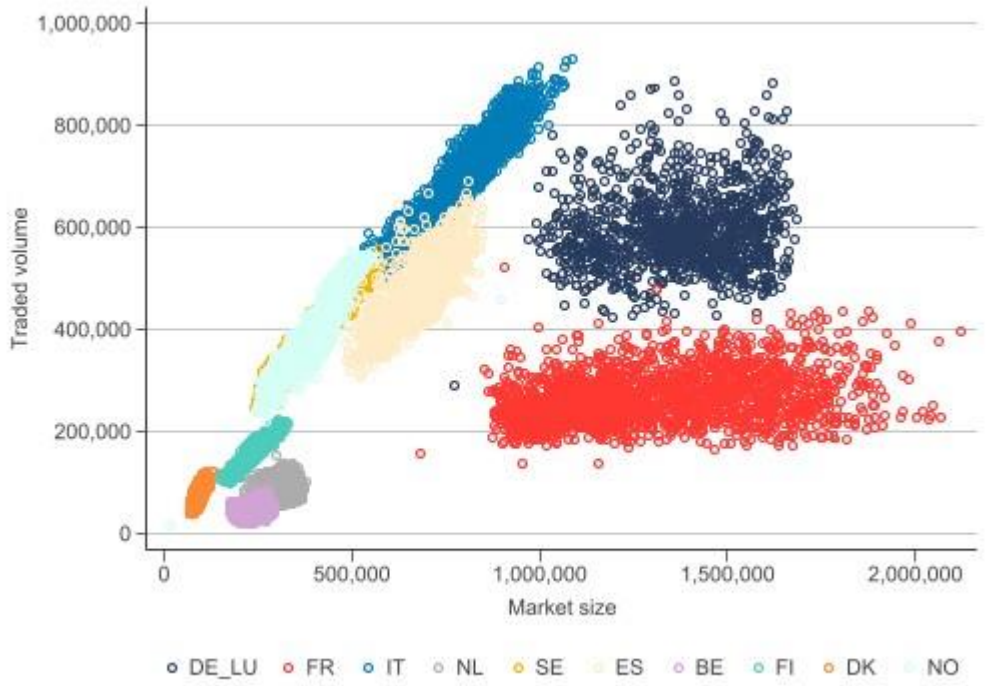
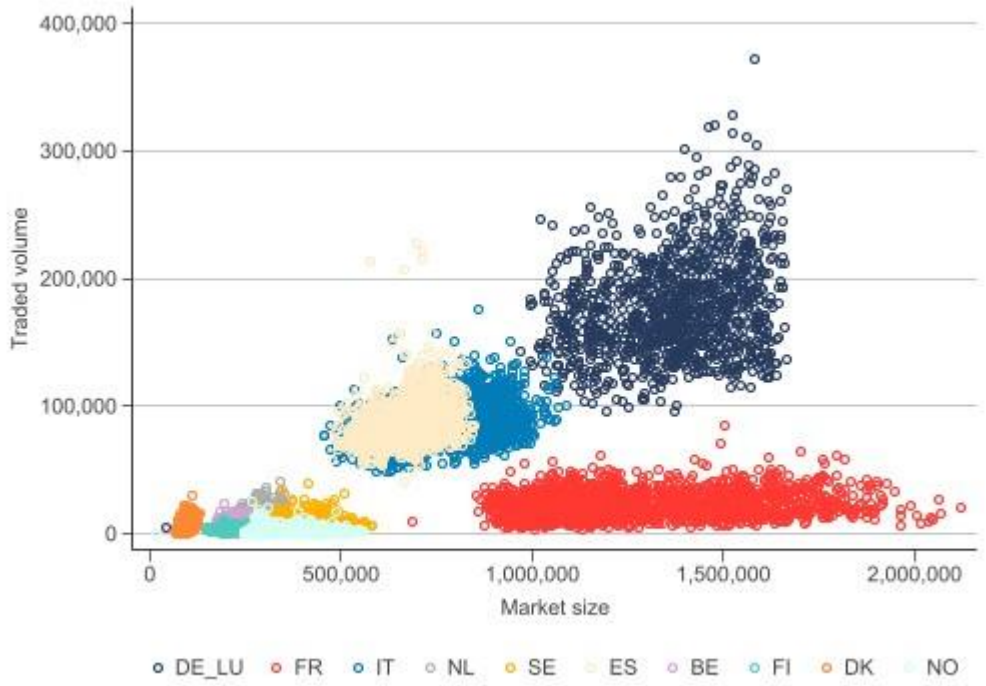
The relationship between traded volume and market size is most pronounced for smaller DA-markets.

Market size (daily load) and DA daily traded volume by country (in MWh)



Market size (daily load) and ID daily traded volume by country (in MWh)



Liquidity relationships in the long-term markets

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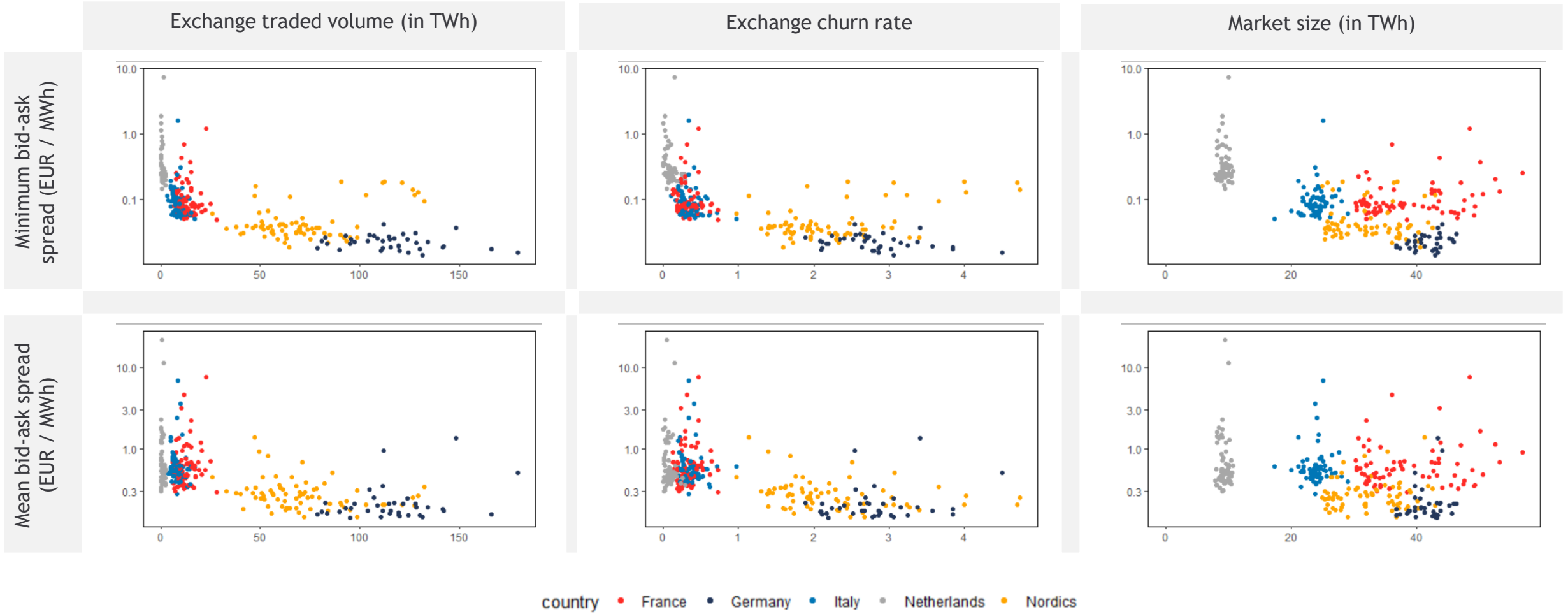
Bid-ask spreads tend to have a log-linear relationship to volumetric indicators.



Analysis of simulated reconfigurations

Methodological approach

The analysis of the state of liquidity in the proposed alternative BZ configurations is based on simulated market parameters that have shown a correlation to liquidity metrics in historical data.

1. First, we **analyse the simulated data** provided to us by the TSOs and identify specifications of the market characteristics.
2. Then, we assess the identified **implications for the alternative configurations** in light of the likely relationship between liquidity metrics and the parameters as provided by the TSOs.
3. We derive, where possible, **expectations on changes to liquidity metrics** from the proposed alternative configurations.

Market size

- Approximated by the parameters generation and load volume as provided by the TSOs
- Based on the results of the historical analysis, we consider **increases in market size** as, ceteris paribus, **increases of liquidity metrics** both for the short- and long-term markets

Market concentration

- Portrayed by HHI values for the Nordics and RSI and PSI[1] values for Central Europe
- An **increase in the HHI** and a **decrease in RSI or PSI** indicates an **increase in market concentration**, which tends to imply a **decreased level of liquidity metrics** both for short- and long-term markets

Price correlation

- Calculated as the market size-weighted average of price correlation across directly connected BZ to the BZ in question[2] and can take values between -1 and 1.
- Based on the results of the historical analysis, we consider **increases in price correlation** are, ceteris paribus, **liquidity enhancements** for short-term markets.

Note: [1] The RSI and PSI values are provided in three instances to account for uncertainty of available import capacity. These instances each assume different correction factors (i25, i50, i75) for the assumed available import capacity. The higher the correction factor, the higher the assumed available import capacity. [2] We have assessed the robustness of the correlations by computing the parameter twice: First, only including neighbouring BZ that are also part of the CORE region. Then including all neighbouring BZ, i.e. also those that assume a NTC border in the model. We conclude that the model simplification used for NTC borders does not impact the robustness of the parameter.

Overall results and observations

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We have assessed the likely effect on liquidity metrics for the alternative configurations based on identified historic relationship between market characteristics and liquidity metrics.

Countries	ACER identifier	Market concentration	Price correlation	Market size	Assessment of liquidity metrics of short-term markets	Assessment of liquidity metrics of long-term markets
Sweden	8	Mostly decreasing	Decreasing, but only to a small extent	Mostly increasing	Tendency to **improvement**	Tendency to **improvement**
Sweden	9	Mostly decreasing	Decreasing, but only to a small extent	Mostly increasing	Tendency to **improvement**	Tendency to **improvement**
Sweden	10	Mostly decreasing	Mostly decreasing, but only to small extent	Decreasing	Tendency to **impairment**	Tendency to **impairment**
Sweden	11	Limited change	Decreasing, but only to small extent	Two-sided	**Inconclusive** due to limited changes in market characteristics	**Inconclusive** due to limited changes in market characteristic
Germany; Luxembourg	2	Mostly decreasing	Mostly increasing, but only to a small extent	Decreasing	Tendency to **impairment**	Tendency to **impairment**
Germany; Luxembourg	12	Mostly decreasing	Mostly increasing, but partially to a small extent	Decreasing	Tendency to **impairment**, with potential exceptions for a subset of BZs due to potentially offsetting changes	Tendency to **impairment**
Germany; Luxembourg	13	Mostly decreasing	Mostly increasing	Decreasing	Tendency to **impairment**, with potential exceptions for a subset of BZs due to potentially offsetting changes	Tendency to **impairment**
Germany; Luxembourg	14	Mostly decreasing	Mostly increasing	Decreasing	Tendency to **impairment**, with potential exceptions for a subset of BZs due to potentially offsetting changes	Tendency to **impairment**
France	5	Mostly decreasing	Increasing	Decreasing	**Inconclusive** due to potentially offsetting changes	Tendency to **impairment** in line with market size changes
Northern Italy	6	Mostly decreasing	Two-sided	Decreasing	Tendency to **impairment**	Tendency to **impairment**
Netherlands	7	Decreasing	Increasing, but only to a small extent	Decreasing	Tendency to **impairment**	Tendency to **impairment**

- Market size **decreases** for most BZs reconfigurations.
- Market concentration as measured by the simulated HHI and RSI is **decreasing** in most cases or at least remains below critical levels such as RSI values below 1.
- Price correlation tends to **increase** for the reconfigured BZs.

Note: The BZ liquidity and its metrics materialising after a BZ reconfigurations may significantly differ from the expectations formed in a "ceteris paribus" analysis such as this one.

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Questions?
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Link to the report:

https://consultations.entsoe.eu/markets/public-consultation-on-bidding-zone-review/user_uploads/240719_entso-e_market_liquidity_and_transacation_cost_report_vf_for_p-consultation.pdf

Pan-EU studies: transition costs study

Agenda

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1. Liquidity and transaction cost study
    i. Scope of the Study
    ii. Literature Review
    iii. Analysis of the State of Liquidity
    iv. Analysis of simulated reconfigurations

2. **Transaction cost study**
    i. Scope of the study
    ii. Methodology
    iii. Data basis
    iv. Results

Scope of the study

Transition costs: Questionnaire and Feedback

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The methodology outlines mandatory and optional aspects for consideration in the bidding zone review process.

Transition cost definition

*Transition costs refer to the **one-off costs expected to be incurred** in case the BZ configuration is amended.*

*Shall relate to **adaptations** that are inherently and unambiguously **related to a specific BZ configuration change**.*

[…]

*Shall **not relate to adaptations** that are, in general, **necessary to ensure sufficient flexibility** of the systems to cope with a variable number of BZs due to a potential amendment of the BZ configuration in the future.*

Aim of the Study

*In order to identify and possibly estimate transition costs, a study shall be jointly performed for all BZRRs. The study shall aim to **provide an overview of necessary adaptations and possibly a range of related cost estimates**. The study shall also consider stakeholders' replies to the public consultation conducted pursuant to Article 17.4.*

*The resulting estimates shall be considered to **calculate the minimum 'lifetime'**, in years, of a BZ configuration, as described in Step 4 in Article 13.1(d)*

Methodology

Step 1 - Define group of market participants

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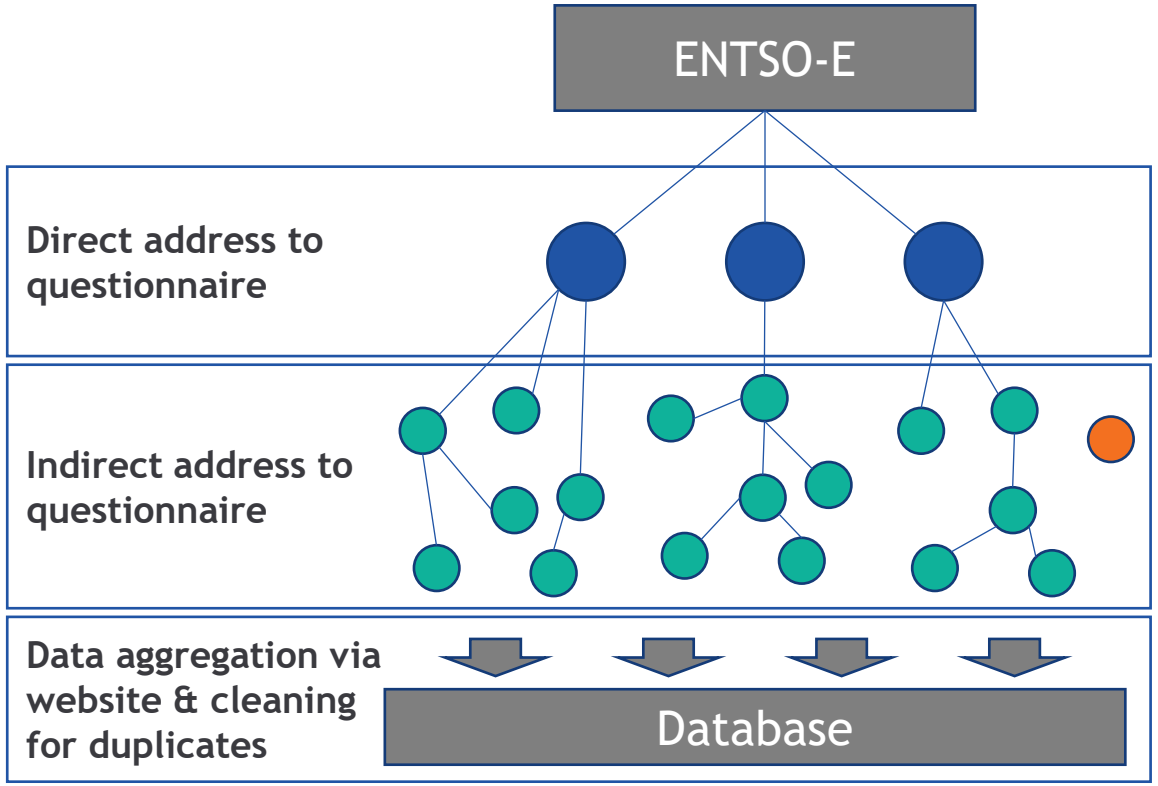
The data for the transition cost study is aggregated through a publicly available questionnaire, distributed in the industry.



Stakeholder group	Explanation of characteristics
Wholesale / retail market participants	▪ Stakeholders that **directly participate** in the wholesale market by buying or selling electricity (energy traders, generators, retailers, large-scale industrial customers, storage operators), and ▪ Stakeholders that, in addition to participating in the wholesale market, directly participate in the retail market by buying or selling electricity (retailers)
Market infrastructure providers	▪ Stakeholders that provide services to enable or facilitate market access (NEMOs, derivative exchanges, clearing houses)
Network operators	▪ Transmission and Distribution System Operators
Others	▪ Other stakeholders, in particular regulatory authorities and ministries

Step 2 - Develop questionnaire

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The cost categories were identified by ENTSO-E and the steering committee and discussed with the consultative group.

Cost category	Definition	Transition cost examples

Changes to internal business processes and IT systems	Costs incurred by changes to organization and coordination specifically attributable to BZ re-configuration	• Adapting existing IT systems to specific BZ configurations
		• Costs associated to the efforts (FTE) linked to changing of processes like for example:
		  • splitting or merging teams that are responsible for a specific BZ
		  • changing trading or algorithmic trading processes
		  • going through the process of revaluating assets
		  • adopting portfolio optimisation processes
		  • adopting processes around the payment of renewable subsidies like feed-in-tariffs
		  • testing changed processes
		  • informing employees about the changed processes
		• changes to other ongoing exchanges between market participants and TSOs and public bodies, for example balancing and electricity balancing accounts

Adjustment to or termination of contracts and regulation	Costs incurred by amending existing contracts to BZ re-configuration including. legal costs	• Re-negotiation, or termination of contracts, depending on their complexity. Particularly, if the reference location of price changes or is not accepted by contract parties anymore (incl. GOs, PPAs, legal arrangements) • Re-drawing of legislation, for instance contracts/legislation that refer to a single bidding zone, that does not exist anymore after a BZ reconfiguration • Possible costs, because electricity sold forward is affected (will apply mainly in case of shorter lead times)
Adjustments of processes with NEMOs, TSOs and public bodies	Costs incurred by adapting interaction with NEMOs, TSOs or public bodies	• Reporting obligations that must be adjusted to be specific for each new BZ
Additional costs	Any costs directly related to the BZ configuration not covered by any of the categories above	

Step 3 - Method for cost estimation and data quality check

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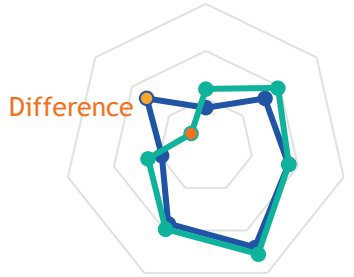
The cost estimates are aggregated and checked for quality and robustness. Below, a high-level excerpt is provided.

Quality checks

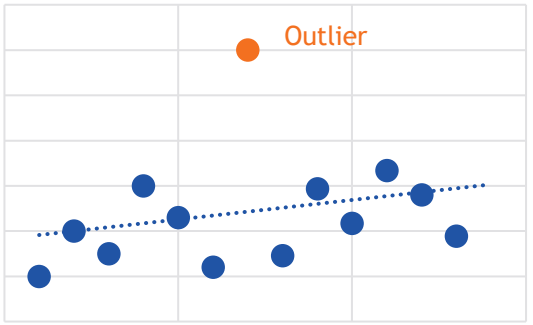
- Depending on the sample size, different quality checks will be applied to:
  - **Identify the best method** for finding total transition costs
  - Estimate the **expected error** and transition cost range
  - Clean the data for data entry errors
- **Typical checks** that will be applied are:
  - Model specificities test
  - Matching tests (see top right)
  - Outlier tests (see bottom right)
  - Estimates against benchmarks
  - Calculation of the regression power
- The results of the quality check give indication to where a close **examination of the explanation of the cost estimates** is most important

Example matching Analysis



- Two entries of similar companies are compared.
- Differences between them are analysed for plausibility.
- This approach is used for small data sets

Example outlier Analysis

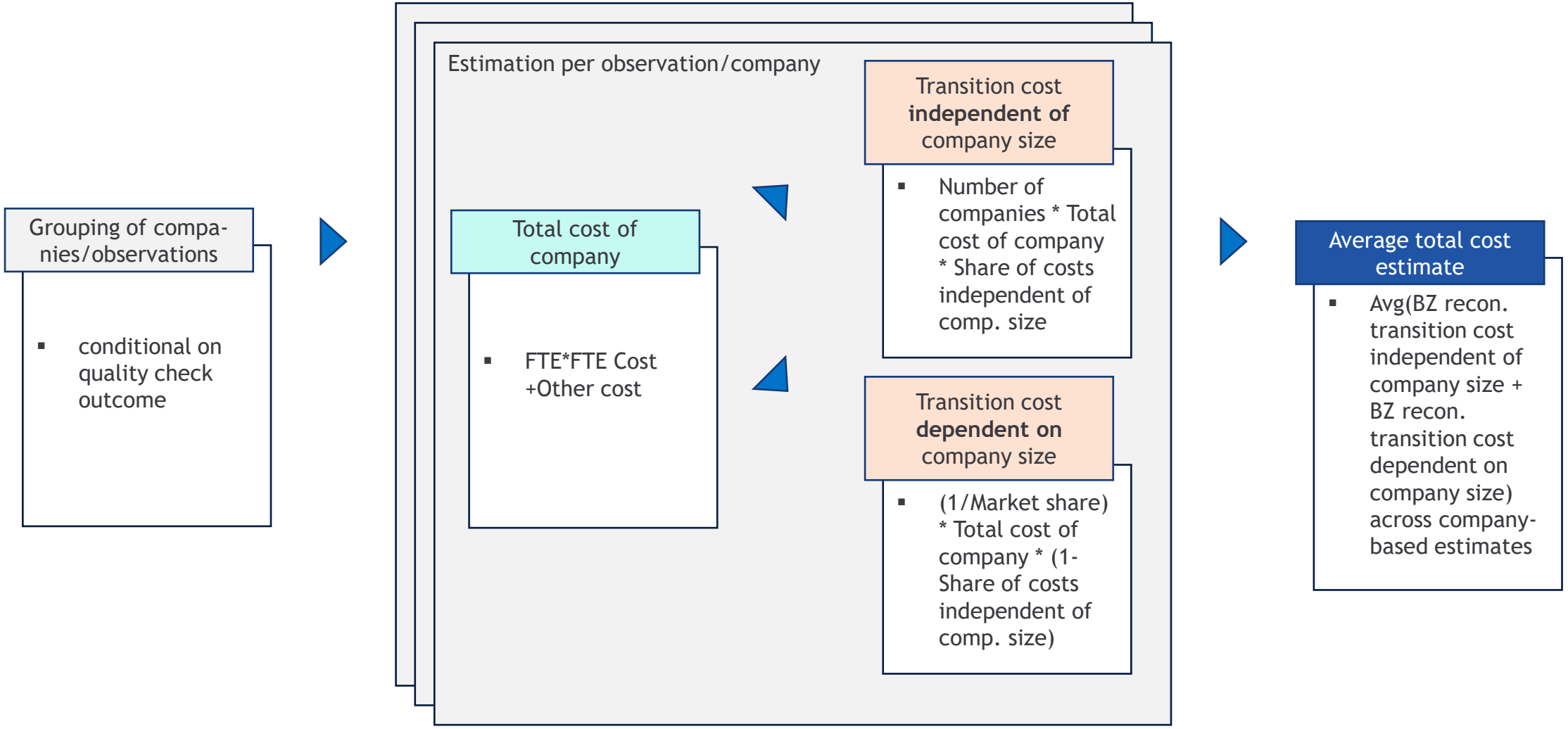


- A trend between entries of all or many companies is identified through statistical methods.
- Outliers are analysed for plausibility.
- This approach is used for large data sets.

The number and completeness of responses was limited such that outlier testing was essentially reduced to the analysis of the explanation of the transition cost estimates. Remaining outliers were discussed, but not excluded, where relevant.

Data set and cost extrapolation

Total cost extrapolation follows a scaling approach and results in a bandwidth of costs per BZ reconfiguration.



Note: Many participants submitted only cost estimates without stating (a) the share independent of company size and (b) their market share. To account for (a), CL has additionally constructed "checks" where different assumptions on the share of costs independent of company size were made. To account for (b), market shares have been researched by CL where possible.

Limitations

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The answers received after two surveys and a round of interviews result in significant limitations for the transition cost estimation.

Many participants insisted that the pending BZ-reconfiguration implies costs that are not covered by the transition cost definition set out in this study.

Data quality

The data used for the calculation of transition costs has been collected from stakeholders, who participated in the survey and **provided cost estimates voluntarily**. Also, we were not mandated to subject the data to an audit beyond normal plausibility tests.

Therefore, the collected data may show a **degree of heterogeneity** because of **differing interpretations** of the cost definitions. There may also be heterogeneity due to **local or other idiosyncratic factors**. The quality of submitted cost estimates may **differ in accuracy**, for example due to different or **limited availability of resources, the understanding of the questions asked, or biases**. The heterogeneity of estimates highlights the significant uncertainty prevalent in transition cost estimates for BZ configurations.

To mitigate this limitation ENTSO-E, TSOs and Compass Lexecon have **conducted a public webinar** for the first questionnaire. For the second questionnaire, we directly approached selected market participants, to **explain the questionnaire** and discuss the participant's transition costs. Additionally, we **reached out to participants** in case of unclear cost estimate explanations. Notwithstanding, we were limited in auditing the data such that the dataset may not be representative.

Number of responses and aggregation of organisation type

From the two initiated surveys, we received answers from 42 stakeholders, some of them incomplete. Given the number of countries involved, and the various organisation types, this is a limited number.

Participants regularly stated in their responses to be part of **multiple organisation types at the same time**.

Because of that, and in order to increase the number of data points within each organisation type, the TSOs and Compass Lexecon decided to **aggregate cost estimates of selected organisation types** by the criterium that the company bears or may bear **balancing responsibility**. Hence, we combined generators, retailers, aggregators, traders, etc. into one group. This has the disadvantage, that the **heterogeneity of the group increases**.

Overall number of responses

We received **42 answers overall**, some of them incomplete

To increase the number of data points, we conducted a **second questionnaire** and distributed the call for participation widely across the industry by contacting **industry associations** and organisations.

To further increase the number of data points, and thereby the explanatory power of the computed cost estimates, we **checked the plausibility** of these results by computing total transition costs with all data provided – **also with those estimates that were incomplete** (we then applied additional assumptions where input was missing)

Nonetheless, the scaled transition cost calculation should, if at all, only be considered as a **ballpark range** of transition cost as per the definition. As such, the provided ranges are **not completely conclusive**, and must be considered a ballpark area. Because of the relatively limited number of data points and the way in which the ranges were calculated (scaling), they should not be interpreted as an error margin, but rather as differing estimates.

Data basis

Answers to questionnaires – completeness

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The responses we received do not cover all types of organisations and not all countries.

Number of responses per organisation type and country with complete data (with partially usable data / data used as check)

	France	Germany	Italy	Netherlands	Sweden
Wholesale / retail	1 (8)	3 (10)	0 (6)	2 (9)	0 (4)
TSO	1 (0)	5 (0)	0 (0)	1 (0)	1 (0)
DSO	0 (1)	3 (2)	0 (0)	0 (0)	0 (0)
Market infrastructure providers*	1 (0)	1 (0)	0 (0)	1 (0)	2 (0)
Public Administration	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

*Note: * One company, excluded here, verbally provided preliminary cost estimates that are considered when discussing total transition cost range estimates for market infrastructure providers. They are else excluded.*
Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

Answers to questionnaires – ability to scale

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Most data points received concern costs associated with changes to busines processes and IT systems.

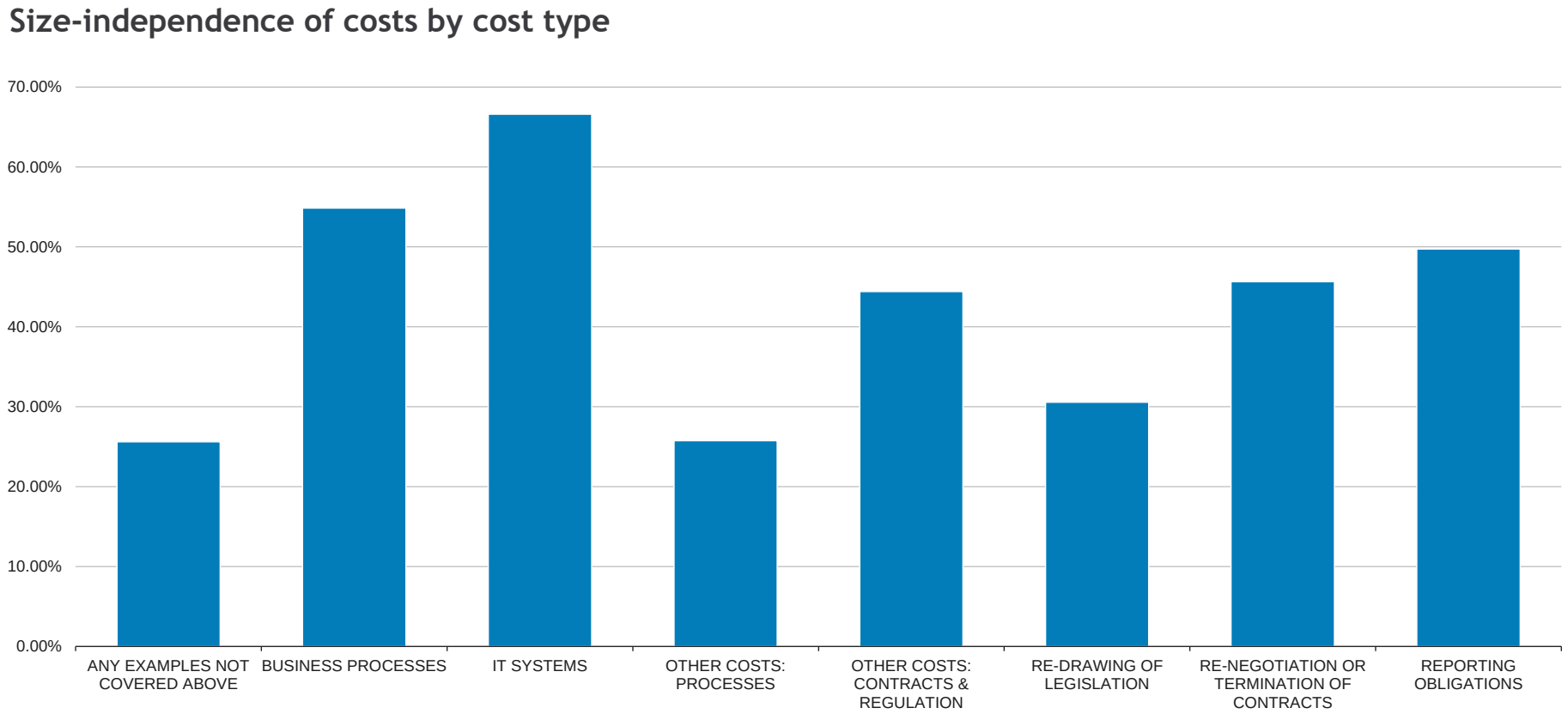
Number of data points for cost independent of company size and (size-adjusted) cost dependent on company size (size-independent | size-dependent)

	Wholesale / retail	TSO	DSO	market infrastructure provider	Public Admin.
Business processes	46 | 15	Not relevant for scaling	12 | 12	Not relevant for scaling	No data received
IT systems	51 | 15		12 | 12		
Reporting obligations	45 | 14		12 | 12		
Re-negotiation / termination of contracts	44 | 9		12 | 12		
Re-drawing of legislation	24 | 6		12 | 12		
Other: adjustment to or termination of contracts and regulation	38 | 6		12 | 12		
Other: processes with TSOs and public bodies	31 | 10		12 | 12		
Any examples not covered above	31 | 10		12 | 12		
No cost type differentiation	0 | 0		0 | 0		

Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

Answers to questionnaires – size independence of data points

Overall, most types of costs are predominately dependent on company size, except for business processes and IT costs.



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

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Results

Analysis of received cost estimates – Size-independent cost

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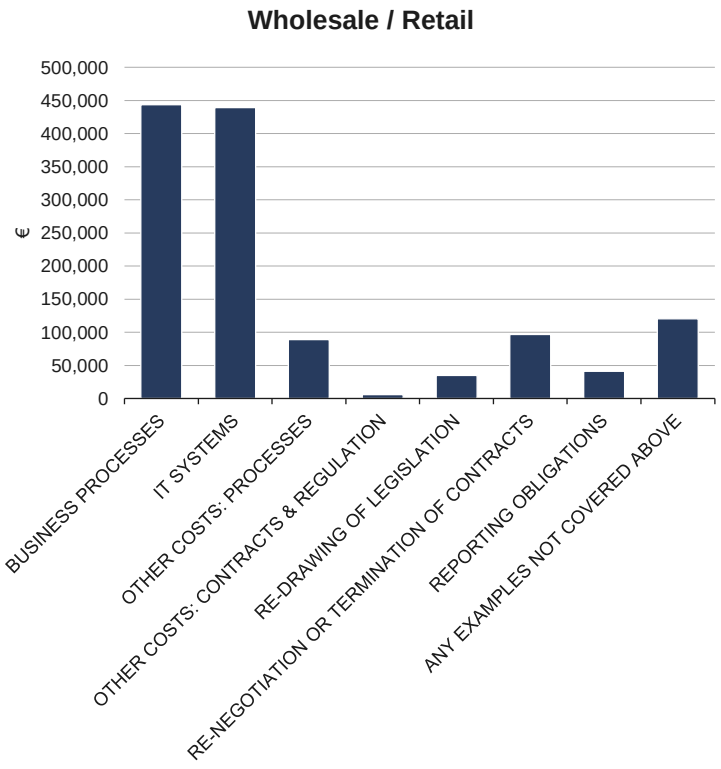
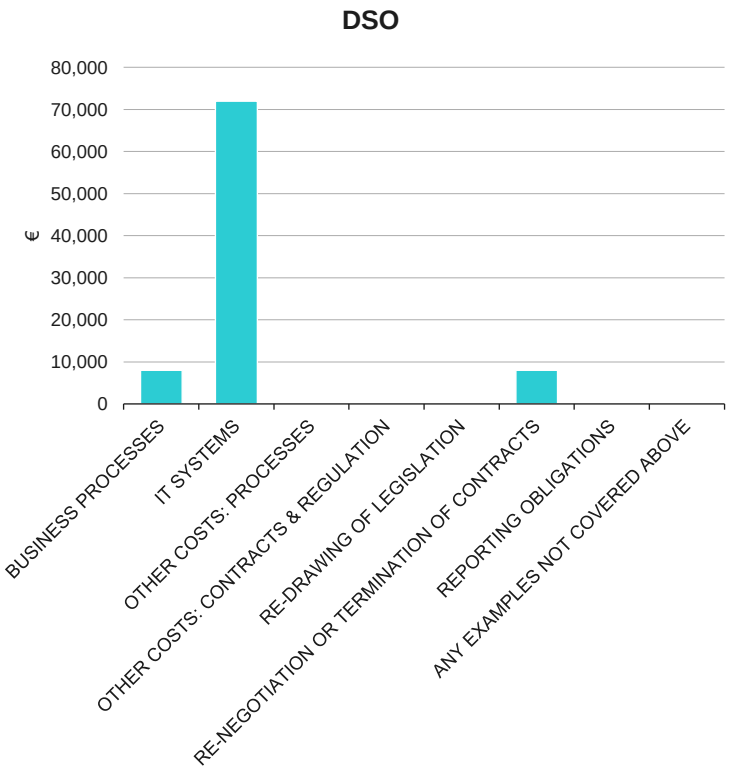
The received estimates show that size-independent cost are mostly for business process and IT system changes.

Average size-independent costs by cost type and organisation type





Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

Analysis of received cost estimates – Size-dependent cost

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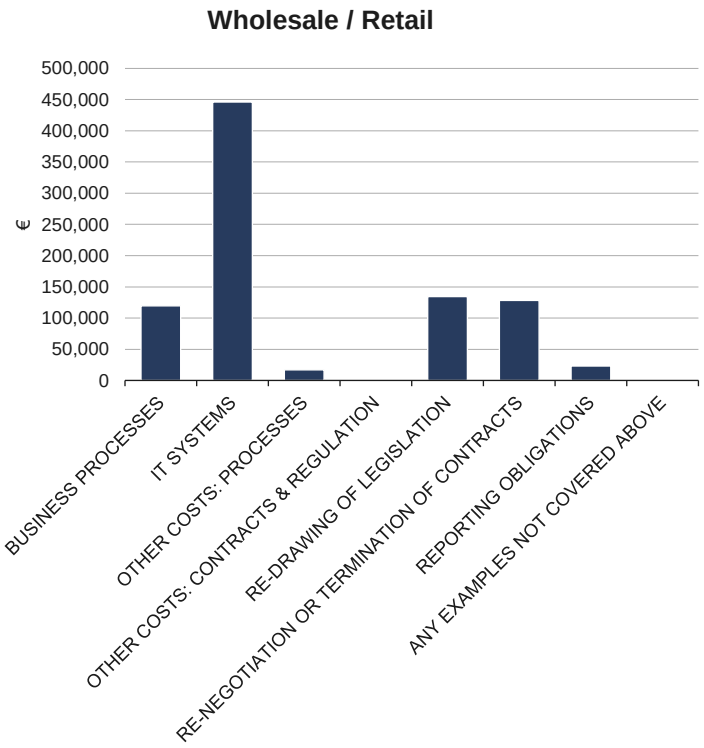
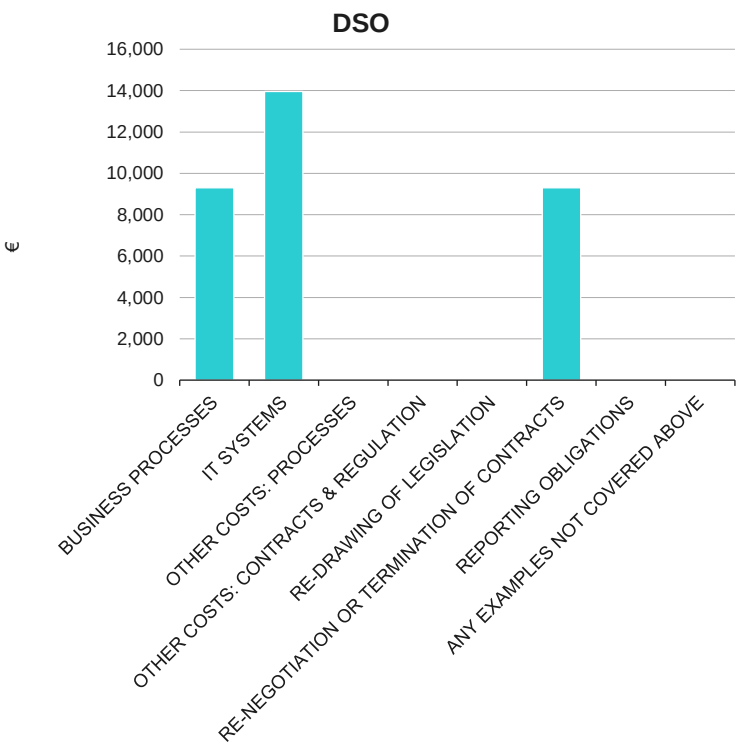
The received estimates show that cost depedent on company size are highest for IT system changes.

Average size-dependent cost by cost category (per 1% scaling factor)

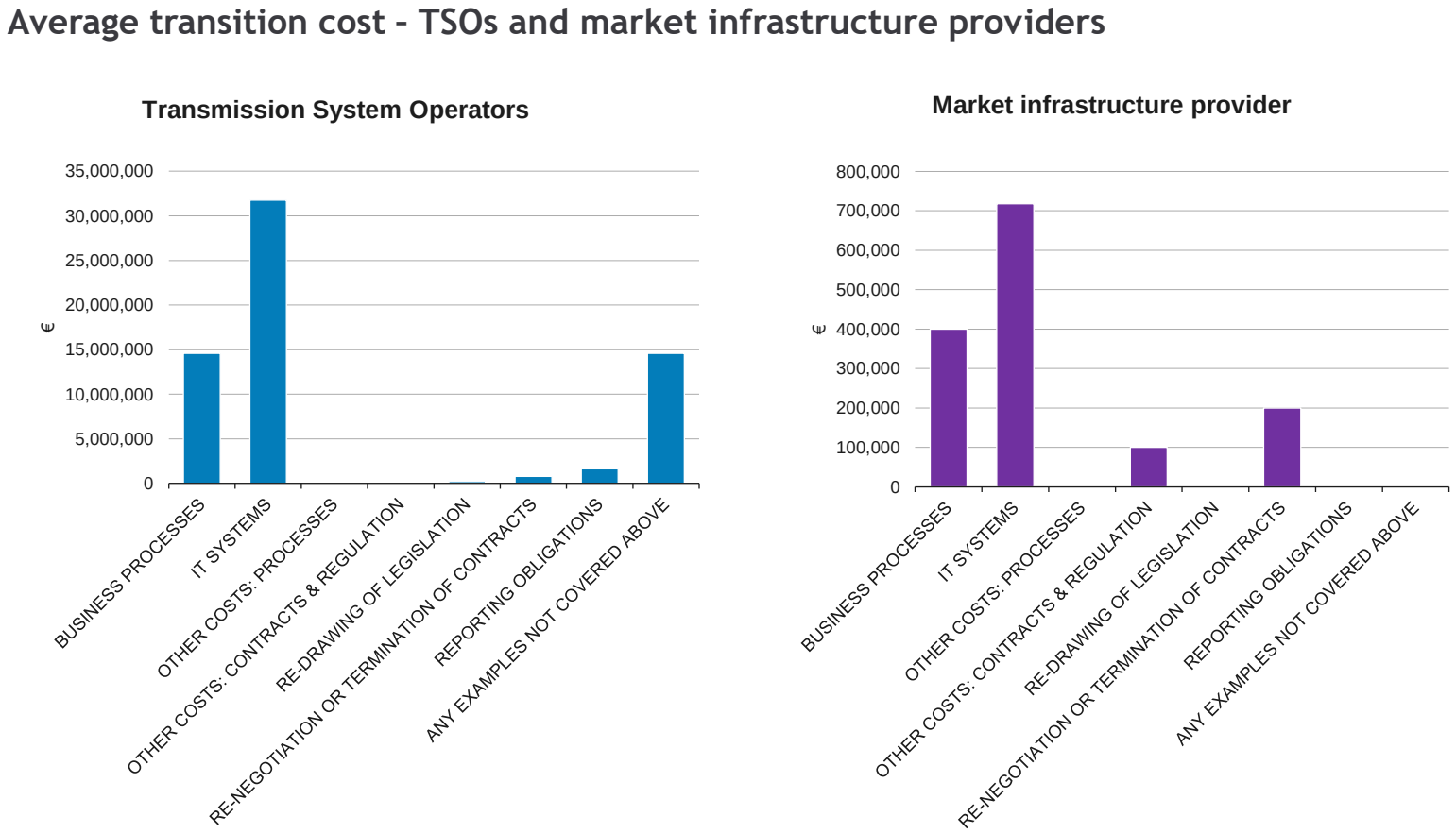




Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

Average transition cost – TSO and market infrastructure provider

The provided cost estimates show for TSOs and market infrastructure providers that they face primarily IT system change costs.



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

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Total transition cost estimates

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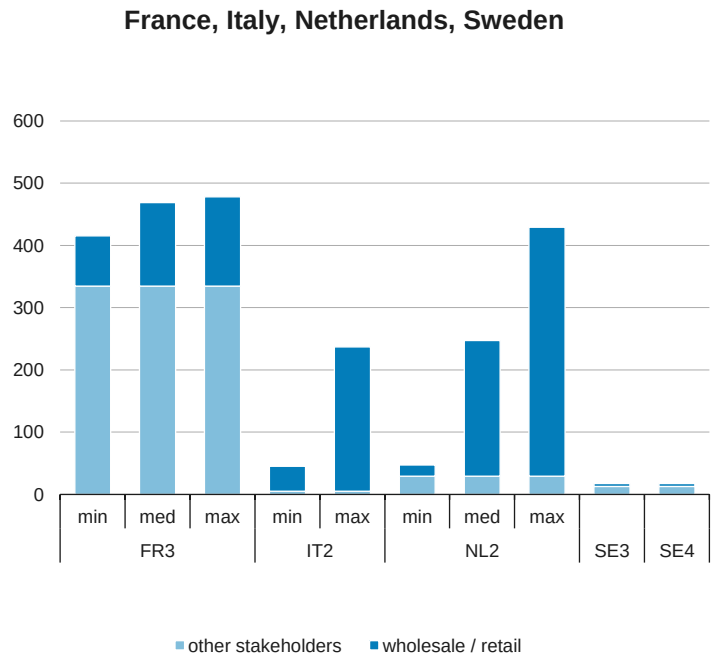
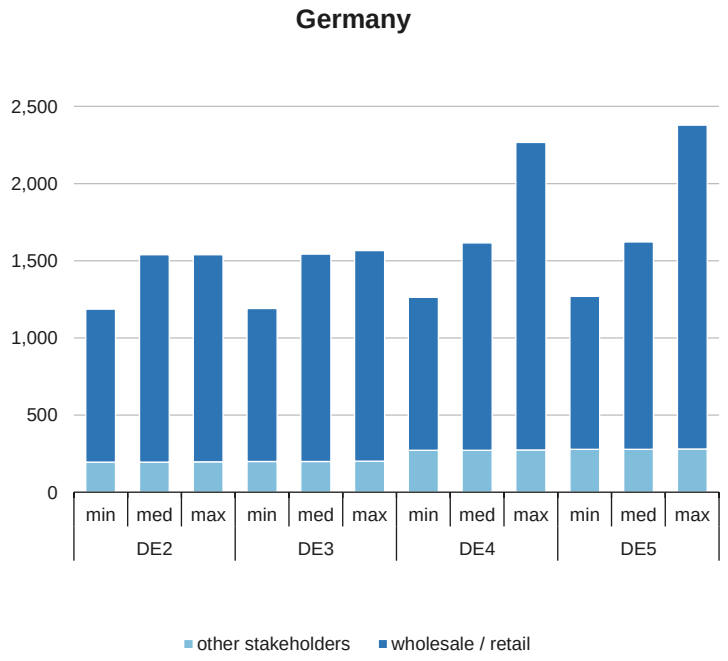
The calculated total transition cost are largely dependent on the submitted data. They are hence subject to the individual company, the type of organisation, and the estimation of the relevance of company size.

Total Transition Cost Ranges per number of zones in a country (in mn EUR)





Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

Note: One submitted estimation was excluded as outlier as it would have resulted in scaled transition costs of over EUR 10 bn.

Questions?
Submit them through slido.com using code #3054122 or scan QR code

Link to the report:

https://consultations.entsoe.eu/markets/public-consultation-on-bidding-zone-review/user_uploads/240719_entso-e_transition_costs_report_vf_for_p-consultation.pdf

Public consultation process

Public Consultation on Bidding Zone review - Scope

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The public consultation covers both the Nordic and the Central Europe BZRRs simultaneously.

The public consultation includes questions that cover the following topics:

1. Market liquidity and transaction costs
2. Transition costs
3. Measures to mitigate negative impacts
4. Practical implementation considerations

The public consultation is split into three parts, one regarding each report, and a third with further questions.

The questions in the public consultation relate to the current versions of the two document that are consulted upon: the report on Liquidity and Transaction costs and the report on Transition costs.

Both reports are the result of studies executed by Compass Lexecon at the request of ENTSO-E.

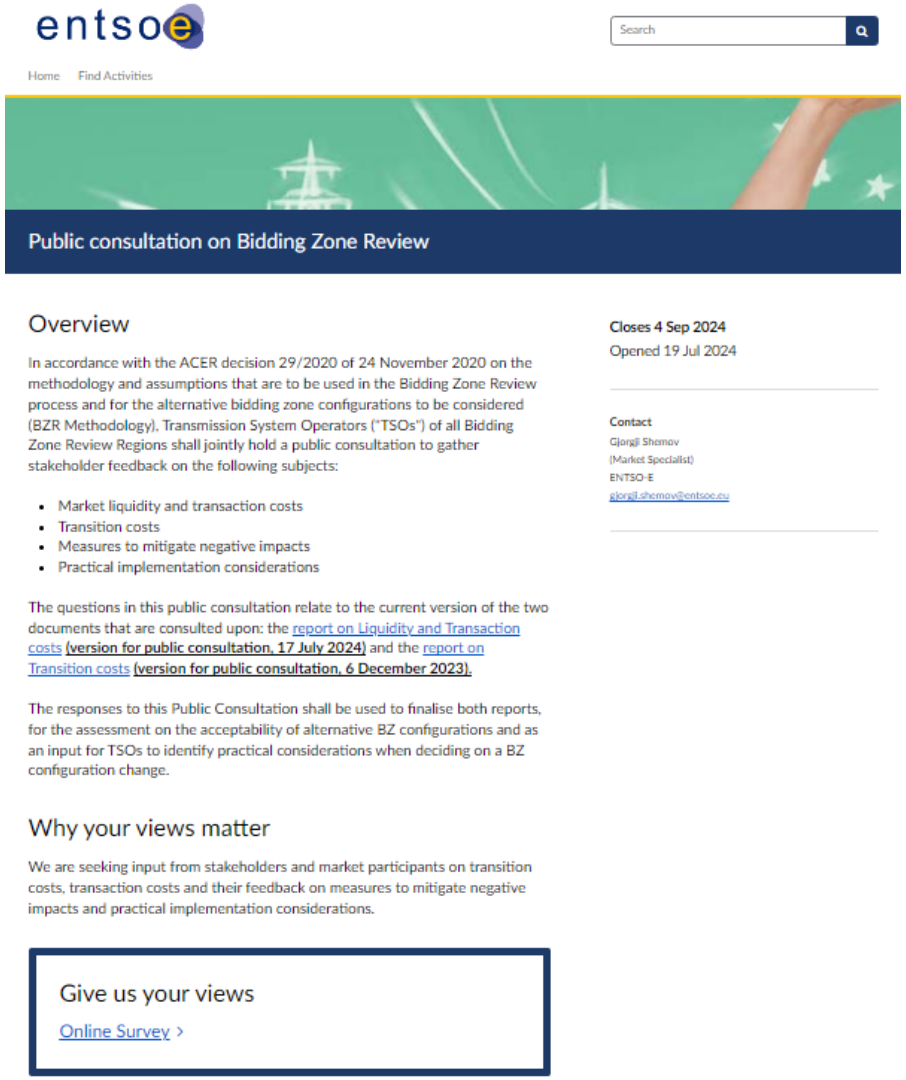
Network security	Market efficiency	Stability & robustness of BZs	Energy transition
1. Operational security 2. Security of supply 3. Uncertainty in cross-zonal capacity calculation	4. Economic efficiency 5. Firmness costs 6. Market liquidity & transaction costs 7. Market concentration & market power 8. Effective competition 9. Price signals for building infrastructure 10. Accuracy & robustness of price signals 11. Transition costs 12. Infrastructure costs 13. Market outcomes in comparison to corrective measures 14. Adverse effects of internal transactions on other BZs 15. Impact on operation and efficiency of balancing	16. Stability & robustness of price signals over time 17. Consistency across capacity calculation time frames 18. Assignment of generation and load units to BZs 19. Location and frequency of congestion, market and grid	20. Short-term effects on carbon emissions 21. Short-term effects on RES integration 22. Long-term effects on low-carbon investments

Public Consultation on Bidding Zone review - Process

post your questions on **slido.com** using code **#3054122** or scan QR code

The Public Consultation will be open for more than 6 weeks to take into account the holiday period.

- **Launch** of the Public Consultation was on the **19th of July.**
- **Deadline** for responses is **4th of September** 10am CEST.
- **The recording of this public webinar** will be published on the ENTSO-E website together with the answers to the questions raised.
- Please provide one response per representative organisation.
- Respondents have the option to have their answers remain anonymous, or not published at all.



Link to the Public Consultation

Public Consultation on Bidding Zone review – Next steps

Update both reports

Assessment of indicators

BZR Report

The responses relating to liquidity and transaction costs, transition costs and mitigation measures will be considered when creating the final versions of both reports.

Based on these final reports, TSO's will assess the performance of the indicators *6. Market liquidity & transaction costs* and *11. Transition costs* for the alternative configurations. This assessment will be part of the final report that will be published in December 2024.

The responses relating to practical considerations shall be used as an input for TSOs to identify practical considerations during the assessment of all other criteria (Step 2, Article 13.1(b)iii.3 BZR Methodology).

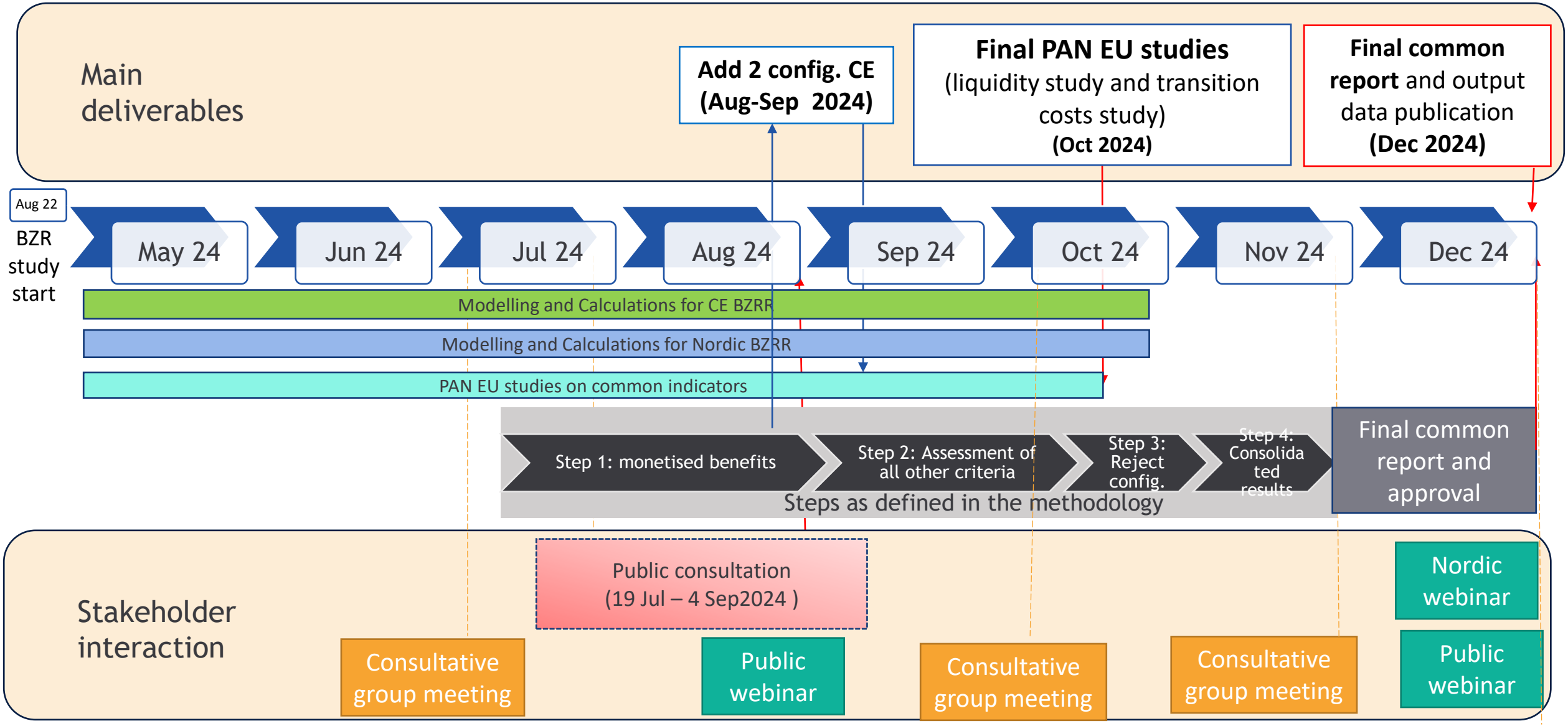
Q&A on the Public Consultation:
Submit your questions on slido.com using code #3054122 or scan QR code:

Conclusive remarks

BZR General Timeline

Next steps

post your questions on **slido.com** using code **#3054122** or scan QR code



ENTSO-E Mission Statement

Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the **association for the cooperation of the European transmission system operators (TSOs)**. The 42 member TSOs, representing 35 countries, are responsible for the secure and coordinated operation of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E **brings together the unique expertise of TSOs for the benefit of European citizens** by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the **security of the interconnected power system in all time frames at pan-European level and the optimal functioning and development of the European interconnected electricity markets**, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

Our vision

ENTSO-E plays a central role in enabling Europe to become the first **climate-neutral continent by 2050** by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires sector integration and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources. ENTSO-E acts to ensure that this energy system **keeps consumers at its centre** and is operated and developed with **climate objectives** and **social welfare** in mind.

ENTSO-E is committed to use its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

ENTSO-E Mission Statement

Our values

ENTSO-E acts in solidarity as a community of TSOs united by a shared responsibility.

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by optimising social welfare in its dimensions of safety, economy, environment, and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and innovative responses to prepare for the future and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with transparency and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

Our contibutions

ENTSO-E **supports the cooperation** among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its **legally mandated tasks**, ENTSO-E's key responsibilities include the following:

- Development and implementation of standards, network codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy;
- Assessment of the adequacy of the system in different timeframes;
- Coordination of the planning and development of infrastructures at the European level (Ten-Year Network Development Plans, TYNDPs);
- Coordination of research, development and innovation activities of TSOs;
- Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in **the implementation and monitoring** of the agreed common rules.

ENTSO-E is the common voice of European TSOs and provides expert contributions and a constructive view to energy debates to support policymakers in making informed decisions.

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

EXCELLENCE

We deliver to the highest standardss. We provide an environment in which people can develop to their full potential.

TRUST

We trust each other, we are transparent and we empower people. We respect diversity.

INTEGRITY

We act in the interest of ENTSO-E

TEAM

We care about people. We work transversal and we support each other. We celebrate success.

FUTURE THINKING

We are a learning organisation. We explore new paths and solutions.

We are ENTSO-E