COMPASS LEXECON

TRANSITION COSTS OF BIDDING ZONE RECONFIGURATIONS

A STUDY FOR ENTSO-E

6 December 2023

Non-confidential

Final report for public consultation

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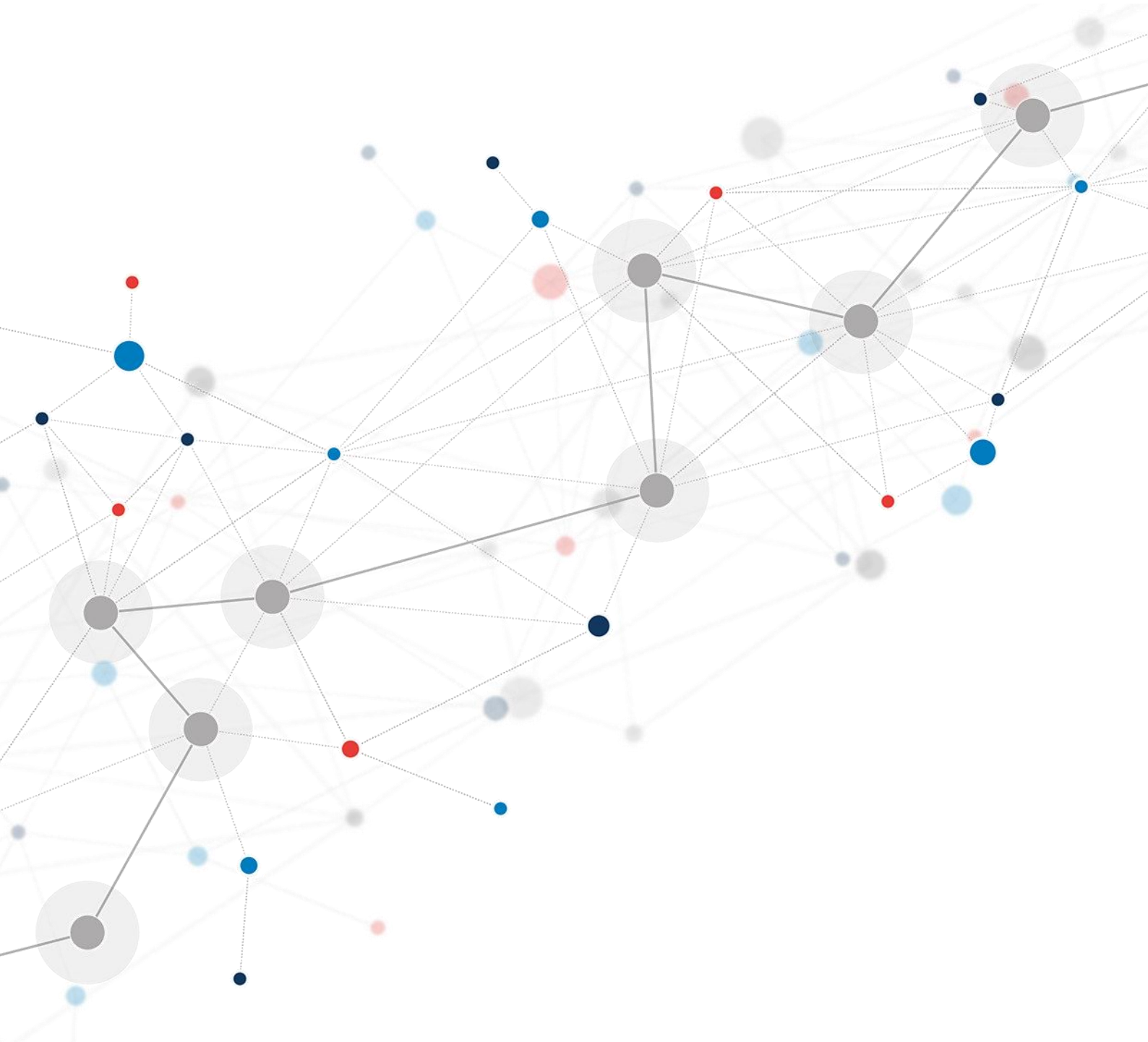

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GLOSSARY

ACER	European Union Agency for the Cooperation of Energy Regulators
BZ	Bidding Zone
BZR	Bidding Zone Review
BZRR	Bidding Zone Review Region
DEP cost	Transition cost estimates dependent on company size
DSO	Distribution System Operator
ENTSO-E	European Network of Transmission System Operators for Electricity
FTR	Financial transmission rights
IND cost	Transition cost estimates independent of company size
NRA	National Regulatory Authority
NEMO	Nominated Electricity Market Operator
TSO	Transmission System Operator

1 INTRODUCTION

Context: the bidding zone review process

The European electricity wholesale market is a zonal market. It is organised by bidding zones (hereafter BZs) and cross-zonal capacities (interconnections) between BZs. BZs are defined in Regulation (EU) 2019/943 as the largest geographical area within which market participants are able to exchange energy without capacity allocation (European Commission, 2019). A uniform electricity price in wholesale markets can thus be determined for the whole BZ. Trade between BZs is possible as long as cross-zonal capacities are available. As a result, the configuration of BZs greatly impacts market functioning and cross-border exchange of electricity.

According to Article 34 of Regulation (EU) 2015/1222, the BZ configuration of European electricity markets must be reviewed regularly (ibid.). Article 14 of Regulation (EU) 2019/943 states that the configuration of bidding zones should "maximise economic efficiency" and "cross-zonal trading opportunities" all while "maintaining security of supply". To achieve this, BZ borders should be defined based on long-term structural congestions and BZs should not contain structural congestions affecting neighbouring zones. According to Article 14 of Regulation (EU) 2019/943, a bidding zone review should analyse different BZ configurations to define an optimal configuration. ACER determined the BZ review methodology in its decision 29/2020 from 24.11.2020 (ACER, 2020) (hereafter the BZR methodology). The BZR methodology specifies 22 criteria that should be assessed. One of these criteria is the *Transition costs*.

Objectives of the report and our brief

ENTSO-E has instructed Compass Lexecon to estimate transition costs of amending the current BZ configurations as defined in ACER decision 11/2022 from 08.08.2022 on the "methodology and assumptions that are to be used in the bidding zone review process and for the alternative bidding zone configurations to be considered" (ACER, 2020). As such, the definition of what transition cost are followed the BZR methodology. In particular the BZR methodology specifies transition costs as "one-off costs expected to be incurred in case the BZ configuration is amended" (ibid., p. 40). Estimated costs shall "reflect the expected implementation timeline for an eventual BZ change" (ibid.). The study shall "be jointly performed for all BZRR" (ibid.).

The assignment pertains to the transition costs criterium as set forth in the BZR methodology. Following our brief, and in agreement with ENTSO-E and the TSOs, we collected cost data by using online questionnaires and processed inputs on transition cost estimates from various market participants. Participation in the questionnaire was voluntary for all the participants. Based on provided data, we computed cost estimates for specific BZ configurations and different types of stakeholders. Throughout the process, we discussed results and methodological questions with ACER and the NRAs.

We had no mandate to compel stakeholders to provide data through the questionnaire and were relying on voluntary participation. Also, we were not mandated to subject the data to an audit beyond normal plausibility tests.

The interim results presented in this report will be joined to the public consultation organised by the Transmission System Operators (hereafter TSOs). The results of the analysis considering stakeholder's reply to the public consultation should ultimately provide an overview of necessary adaptations and a range of related costs estimates for each alternative BZ configuration. Based on these results and according to the BZR methodology, the TSOs will calculate the minimum lifetime, in years, of the BZ configuration that would be needed to pay back the transition costs, in light of the monetised benefits compared to the status quo, and considering a discount rate.

The estimation of transition costs focuses on a subset of European BZs, where alternative configurations have been proposed by ACER. The proposed configurations concern the bidding zones of France, Germany-Luxembourg, Italy, the Netherlands and Sweden; these are summarised in **Table 1.1** (ACER, 2022).

Table 1.1 Summary of proposed and to be evaluated bidding zone configurations in Central Europe and the Nordics as presented in the Annex I to the ACER decision (11-2022)

Configuration identifier according to ACER decision	Region	Member State	Number of bidding zones
2	Central Europe	Germany; Luxembourg	2
5	Central Europe	France	3
6	Central Europe	Italy	2
7	Central Europe	Netherlands	2
8	Nordic	Sweden	3
9	Nordic	Sweden	3
10	Nordic	Sweden	4
11	Nordic	Sweden	4
12	Central Europe	Germany; Luxembourg	3
13	Central Europe	Germany; Luxembourg	4
14	Central Europe	Germany; Luxembourg	5

Definition of transition costs

The overall transition costs estimated are calculated following the definition of transition costs set by ACER in article 15.11 (a) of the BZR methodology (ACER, 2020a). Transition costs:

- Are 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;

- Shall include an estimation of the cost of amending existing contractual obligations incurred by market participants, Nominated Electricity Market Operators (hereby NEMOs) and TSOs. Such estimation should reflect the expected implementation timeline for an eventual BZ change. It should also consider the fact that, when deciding on the implementation date, Member States are required to balance the need for expeditiousness with practical considerations, including forward trade of electricity.

Transition costs arise due to various necessary adjustments following a new BZ configuration, such as changes to business processes, IT adaptions or adjustments of private contracts. These changes and related transition costs are incurred by different types of market participants, including retailers, grid operators, traders or power exchanges.

Approach and limitations

The computation of transition cost estimates is based on three steps (please see chapter 2 for a more detailed explanation of the approach).

- Firstly, in discussions with ENTSO-E, the TSOs, ACER, the NRAs and the BZR consultative group, we identified relevant types of stakeholders that may face transition costs as per the BZR methodology definition.

- Secondly, we addressed a questionnaire to the identified stakeholder groups (in the form of 2 online surveys accessible to all EU stakeholders) to provide input to expected transition costs in case of a bidding zone reconfiguration as set out by ACER.

- Thirdly, we cleaned the provided input on the basis of the provided estimate explanations together with ENTSO-E and the TSOs and in discussion with ACER and the NRAs, controlled it for company size, and scaled it to calculate total transition costs per bidding zone reconfiguration.

Given the restricted dataset available and the uncertainty in cost inputs, the resulting transition costs estimates are subject to significant limitations that are further explained in chapter 2.4.

Chapter 2 describes, in more detail, the methodological approach we followed as well as the inherent limitations of this approach.

Outline of the report

The study is structured as follows:

- After the introduction, chapter 2 explains the methodology used to estimate the transition costs. This includes the definition of necessary data, the collection of the data sample and the approach to analyse and scale the received input.

- Chapter 3 highlights the total cost estimates per bidding zone reconfiguration and puts them into perspective.

- Chapter 4 presents a summary of the findings and the conclusions.

2 METHODOLOGY FOR ESTIMATION OF TRANSITION COSTS

In this chapter, we describe the methodology used to compute transition cost estimates for the different proposed reconfigurations. The description includes, first, the outline of the scope of the study with regard to who may face transition costs (chapter 2.1), where transition costs may be incurred (chapter 2.2), and how they are incurred (chapter 2.3). In addition, we discuss the limitations of the methodology and the steps taken to reduce them in chapter 2.4.

The methodology has been agreed and acted upon jointly by us, ENTSO-E and the TSOs (see also description of our brief above).

2.1 Delineation of the scope of the study of transition costs

The BZR methodology requires that transition costs, defined as the one-off costs incurred by a change in BZ-configuration, must be estimated (ACER, 2020). This estimation should relate to the specific BZ change considered in the analysed BZ reconfiguration, and not to generic BZ changes[2].

Moreover, the study of transition costs should cover the following three aspects sufficiently:

- **Stakeholders:** Different types of stakeholders that a BZ change affects shall be considered.
- **Geographical scope:** Stakeholders that are directly affected by, at least, one of the changes to the BZ configuration shall be considered (i.e. from a BZ under review or from neighbouring BZ). Transition costs for each proposed BZ reconfiguration shall be included in the study.
- **Cost Categories:** The questionnaire presented an overview of the relevant cost categories, including examples and gave respondents the opportunity to add cost that they see as relevant.

Through discussion with ENTSO-E, the TSOs and the BZR consultative group, we have derived a table that sets out the list of stakeholders we approached for the transition costs study. This table was presented and aligned with ACER and the NRAs. Table 2.1 summarises the stakeholder groups and specifies their characteristics.

[2] There exists literature, e.g. Neuhoff & Boyd 2011: International Experiences of Nodal Pricing Implementation – Frequently Asked Questions and FTI consulting 2022: Operation market design: Dispatch and Location, that quantify the transition costs to nodal pricing. It has been suggested that those could be used as an upper bound for the transition cost estimation of this study. However, comparability of the estimations and the expected transition costs for the bidding zone reconfigurations at hand could not be ensured. The latter study is available e.g. here:https://www.ofgem.gov.uk/publications/assessment-locational-wholesale-pricing-great-britain?utm_medium=email&utm_source=dotMailer&utm_campaign=Daily-Alert_30-10-2023&utm_content=Assessment+of+locational+wholesale+pricing+for+Great+Britain&dm_i=1QCB,8G6DV,6WV1E,YW5P9,1

Table 2.1 Stakeholder groups addressed by the questionnaire

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	TSOs and Distribution System Operators (hereby DSOs)
Others	Other stakeholders, in particular regulatory authorities and ministries

Source: Compass Lexecon Analysis, suggestions and discussion with ENTSO-E members

For each of the BZs to be reviewed, the project team, consisting of ENTSO-E, TSOs and ourselves, has defined a list of survey participants that are directly addressed and with whom the survey is shared. In addition, ENTSO-E published the questionnaires on their website for an extended timeframe such that it was publicly available; sharing among stakeholders was encouraged to further broaden the study sample ("snowball survey"). Jointly with the TSOs, we organised an online webinar to present and explain the initial questionnaire to interested parties. Through these measures, the project team aimed for a heterogeneous sample to accurately reflect the population. For example, the production or consumption portfolio of the questioned wholesale or retail market participants in each market should be of a different size and structure. To this end, the team drafted a second questionnaire and reached out to stakeholder groups underrepresented in the first batch of questionnaire results. This questionnaire was, too, made publicly available by ENTSO-E on their website. Between publication of questionnaires 1 and 2, no information on BZ reconfigurations has been relayed by the project team that might alter the questionnaire participant's assumptions under questionnaire 1 on the BZ reconfigurations. Answers for both questionnaires 1 and 2 have therefore been considered in the analysis. The information on the occurrence of the two online surveys has been spread widely across the industry by contacting industry associations and organisations.

2.2 Data collection process

To collect stakeholder input on the defined scope of the transition cost study, we, together with the TSOs, developed two questionnaires that were discussed with the consultative group and later published to collect answers by ENTSO-E on its website between September and November 2022 and March and April 2023.

In addition to asking for the costs, the questionnaires also asked for two further aspects that are qualifying the cost estimates:

- We assumed a reference lead-time of 3 years for implementing changes of a BZ configuration. To study the impact of a different lead-time, the questionnaires inquire how extending or shortening the lead-time by one year might impact cost estimates.

- We also asked if the market participant has experienced previous BZ reconfigurations. This provides additional insights into how learning effects impact transition costs.

In line with the definition of transition costs as set forth in the BZR methodology, the questionnaire stressed that transition costs must "inherently and unambiguously" relate to a specific change of the BZ configuration and not include general costs associated with a potential and indefinite reconfiguration of BZs in the future (ACER, 2020, p. 40). Accordingly, examples of transition costs included restructuring of teams responsible for specific BZs, renegotiation of ongoing contracts and costs associated with potentially arising litigations. IT investments to adjust to potential future reconfigurations irrespective of the specific reconfigurations assessed in the BZR were not included, neither was a devaluation of assets due to price changes. Indeed, in line with the definition of transition costs as set forth in the BZR methodology, the devaluation of assets is not a transition cost, which should not encompass a direct quantification of change in economic welfare. For instance, effects like consumer surplus that should be weighed against reductions in producer surplus due to devaluation are not included either. Including devaluation, therefore, would have been inconsistent and lead to biased results.

Transition costs were broken down into four main categories listed in the Table 2.2 below. The costs are further differentiated between (new) personnel cost and other cost, as well as by dependence on company size.

Table 2.2 Cost categories of questionnaire and description

Cost category	Definition	Example

Changes to internal **business processes and IT systems**	Costs incurred by changes to organisation and coordination, specifically attributable to BZ reconfiguration	• Adapting existing IT systems to specific BZ configurations
		• Costs associated to the efforts linked to changing of processes, 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**	Costs incurred by amending existing contracts to BZ	• Re-negotiation, or termination of contracts, depending on their complexity. Particularly if the reference location of price changes or is not

and regulation	reconfiguration including. Legal costs	accepted by contract parties anymore (incl. GOs, PPAs, legal arrangements) • Re-drawing of legislation, for instance contracts/legislation that refer to a single BZ, that does not exist anymore after a BZ reconfiguration • Possible costs, since electricity sold forward is affected (will apply mainly in case of shorter lead times[3])
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	

Source: Compass Lexecon analysis, suggestions and discussion with ENTSO-E members

The questionnaire also asked about absolute generated, consumed or throughput energy quantities, revenues and company sizes - in financial and energy terms - of each recipient. The two published questionnaires can be found in Appendix A.

2.3 Data treatment and computation of total transition cost ranges

We analysed the input from the questionnaires by reviewing the submitted cost explanations for their compliance with the definition of transition costs as set out in the BZR methodology. In case indicated costs were clearly not transition costs as per the BZR methodology, we, in alignment with ENTSO-E and the TSOs, excluded them from the dataset. In case the explanation was unclear, we approached the respective stakeholder to clarify their cost estimate. The costs were then included, unless they did not correspond to the transition cost definition as determined by the BZR methodology. In addition, ACER and the NRAs were also given the opportunity to review anonymised answers to the questionnaires and to provide comments. Apart from this, in-depth technical audit of the data provided could have been undertaken but has not been conducted for this study.

In the next step, we assessed the provided input for completeness. Complete estimates are those that divide cost estimates into costs independent from and costs dependent on company size as well as provided input to the relative company size.

From the subset of cost estimates that differentiate by size-dependence, we scale those costs that are dependent on company size by using the company's contribution to the market. This contribution is approximated by the share of the company size over the total market size.[4] To harmonise costs dependent on company size, we compare costs for 1% scaling factor, i.e. costs if

[3] "Lead time" is the time to adjust between the announcement of the reconfiguration and the actual adaption of the reconfiguration.

[4] For DSOs, the distribution network length of the respective DSO has been used as a proxy for company size.

For retailers and wholesale market participants, the choice of proxy depended on data availability. If respondents have provided data on generated or consumed volumes, those have been compared to the countries' annual total load or total traded volumes to compute scaling factors. If no data has been provided by the respondent, data on the company size has been searched on public re-sources. For utilities that have not provided market information and where public sources were not obtainable, their thermal capacity has been retrieved and compared to total thermal capacity from a Compass Lexecon internal database.

the company size was 1% of the total market size. We use the number of market participants to scale the costs independent of company size. The total transition costs per organisation type, cost type and BZ configuration are the sum of the scaled costs dependent and independent of company size. By scaling all company observations individually, we compute a range of potential total transition costs that spans from scaling the estimate with the lowest unit costs to the scaling of the estimate with the highest unit costs. The ranges were computed per organisation type, cost type, and BZ configuration.

There were difficulties due to the differences between respondents allocating costs to cost dependent or independent of company size. Furthermore, since only a subset of data input differentiated between cost dependent and independent of company size, the reliability of costs estimates has been difficult to ensure when scaling was necessary. Therefore, we computed hypothetical total transition costs per our dimensions by assuming 100% and 0% cost dependence on company size for all available observations. Depending on the outcome of these checks, we infer from the initial range estimates, that the values that are closer to the ranges from the checks are more likely to delineate total transition costs. For instance, if the initial cost range was 100 to 300 and the hypothetic total transition costs were 300 when assuming full cost-dependence on company size and 1000 when assuming full cost-independence on company size. From this we infer that total costs in the range of 300 are more likely to be realistic.

This differentiated approach is not required for organisation types where all relevant companies or none (or too little) of the companies have shared their estimates.

Finally, we compute the total transition cost estimates per BZ configuration as the sum across organisation type and cost type for the respective BZ configuration.

2.4 Limitations to the methodology

The methodology outlined above faces at least four limitations that should be taken into consideration when interpreting or using the results from the total transition costs computation:

Data quality

- Firstly, 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 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.

Transition cost definition

- Secondly, the collected data and information is, per BZR methodology, constraint to a specific definition of transition costs. Therefore, not all expected costs from a BZ reconfiguration are included in the study. In the conducted interviews, some market participants have questioned the definition provided and stated that the transition cost as per definition constitute only a subset of cost emanating from the BZ reconfiguration. Changes to asset value, uncertainty and regulatory risk for investment decisions, and opportunity cost are not included in the transition cost calculation, but may be considered relevant by some stakeholders.[5]

Number of responses and aggregation of organisation type

- Thirdly, 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 (please see chapter 3.1. for a detailed overview of the received data points).

- 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

- Finally, as stated above we received 42 answers overall, some of them incomplete. So the data available for the estimation of total transition costs is limited. Therefore, the representativeness of the estimates is not necessarily given (please see chapter 3 for a detailed explanation of the data).

- 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 costs 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

[5] The study at hand cannot reconcile these differences in transition cost definitions. This suggests that the concept of transition costs may be discussed in the BZR consultation process.

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.

3 DESCRIPTIVE ANALYSIS OF PROVIDED TRANSITION COST ESTIMATES

The descriptive analysis aims to develop a clear understanding of the structure of the data received through the questionnaires. It includes the general availability of data and a comparative analysis of individual data points including the reasoning for the transition costs estimates provided by stakeholders.

This analysis supports the computation of total transition costs estimates by contextualizing the total transition costs ranges and illustrating the individual costs estimates that constitute the basis for the scaling.

This section is structured as follows:

- We start with an outline of the received data points on organisation level and cost estimate level.
- Then, we assess individual data points by comparing them within organisation types, cost categories and BZ configurations.
- Finally, we conclude the descriptive analysis based on the received data.

3.1 Outline of received data points

In total, 42 stakeholders provided answers in at least one of the two questionnaires. The first and second questionnaires received 23 and 25 responses, respectively. Six stakeholders provided data in both questionnaires.

We restricted the analysis to a subset of proposed BZ reconfigurations and organisation types, because we have not received sufficient data. Table 3.1 illustrates the distribution of respondents across organisation types and countries. Each company has a unique organisational type, however one company can be active and incur costs in multiple countries.

Wholesale / retail organisations, especially active in Germany, provided a majority of the responses. In contrast, public administrations, e.g. national regulatory authorities, did not provide any answers. Furthermore, data from stakeholders in Italy and Sweden is very limited. The number of TSOs expecting transition costs due to a German BZ reconfiguration exceeds the number of TSOs with control area responsibility active in Germany, because the TSO of a neighbouring country is expecting transition costs due to the German BZ reconfiguration and submitted estimates in the survey.

Table 3.1 Number of respondents per organisation type and country

	France	Germany	Italy	Netherlands	Sweden
Wholesale / retail	9	14	6	11	4
TSO	1	5	0	1	1
DSO	1	5	0	0	0
Market infrastructure providers*	2	2	0	2	3
Public Administration	0	0	0	0	0

Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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.

The applied scaling methodology sets out requirements for the completeness of the provided data. These requirements further constrain the size of the analysed dataset. Table 3.2 indicates the number of responses that are fully or partially usable for scaling. For all countries, most responses can be used for scaling only partially and under additional assumptions. Partially usable data lacks the differentiation between company size-dependent cost (hereafter DEP cost) and company size-independent cost (hereafter IND cost) or information on the size of the company. This is especially prevalent in the wholesale / retail segment. In contrast, the data provided by TSOs is complete for all the responses. For these types of organisations, scaling is not needed, because either all or none of the TSOs per country have provided data. Hence, it does not require a differentiation regarding size-dependence of transition cost.

Table 3.2 Number of respondents 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)

Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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.

We have asked stakeholders to categorize their expected transition costs into 8 cost types. Most of them have provided cost estimates for business process costs, IT system costs and costs associated with renegotiation or termination of contracts. Still, there is considerable variation in the distributions of cost estimates across organisation types. Table 3.3 shows this variation by reporting the number of cost estimates per cost category and organisation type. For market infrastructure providers, the provided cost estimates concentrate on IT system costs. Conversely, provided cost estimates of DSOs are distributed more evenly across the 8 cost categories. Finally, the categorization of costs is imperfect for TSOs. Some TSOs have provided cost estimates for combinations of cost categories or without differentiating between cost categories.

Table 3.3 Number of cost estimates as provided by stakeholders per organisation type and cost category (and as a percentage of the total number of cost estimates per organisation type)

	Wholesale / retail	TSO	DSO	market infrastructure provider *	Public Admin.	Sum
Business processes	93 (15.6%)	26 (23.2%)	29 (17.4%)	1 (7.1%)	No data received	149 (15.6%)
IT systems	104 (17.4%)	33 (29.5%)	29 (17.4%)	11 (76.6%)		177 (18.5%)
Reporting obligations	85 (14.2%)	11 (9.8%)	16 (9.6%)	0 (0%)		112 (11.7%)
Re-negotiation / termination of contracts	87 (14.6%)	33 (29.5%)	28 (16.8%)	1 (7.1%)		149 (15.6%)
Re-drawing of legislation	50 (8.3%)		16 (9.6%)	0 (0%)		99 (10.3%)
Other: adjustment to or termination of contracts and regulation	54 (9%)		16 (9.6%)	1 (7.1%)		104 (10.9%)
Other: processes with TSOs and public bodies	70 (11.7%)	0 (0%)	16 (9.6%)	0 (0%)		86 (9%)
Any examples not covered above	55 (9.2%)	1 (0.9%)	17 (10.2%)	0 (0%)		73 (7.6%)
No cost type differentiation	0 (0%)	8 (7.1%)	0 (0%)	0 (0%)		8 (0.8%)

Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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.

A subset of the provided cost estimates can be split into DEP costs (size-adjusted) and IND costs. Table 3.4 depicts the number of cost estimates available in each of those two categories. The number of size-adjusted DEP and IND cost estimates differs where information about the size of the company (i.e. the scaling factor) is missing. In these cases, if public data on company sizes is unavailable, respondents differentiated the cost estimates into DEP and IND costs, but only IND costs could be scaled. Up to ¾ of the relevant cost estimates in the retail/wholesale segment lack the scaling factor, but all of the relevant cost estimates of the DSOs, however, can be scaled to their respective size.

Table 3.4 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 infrastruc-ture 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

3.2 Comparison of data points

Data points for a given BZ reconfiguration, organisation type and cost type can vary along two dimensions – (i) the estimated costs and (ii) the share of these costs that is independent of company size. For DSOs and the wholesale / retail segment, respondents have provided estimates of size-

dependence of transition costs and the provided differentiation is relevant for the scaling of these costs. In contrast, the majority of cost estimates provided by TSOs and market infrastructure providers does not differentiate by size-dependence. Consequently, the comparison of data points of these organisation types does not take into account size-dependence.

3.2.1 Size-independent costs

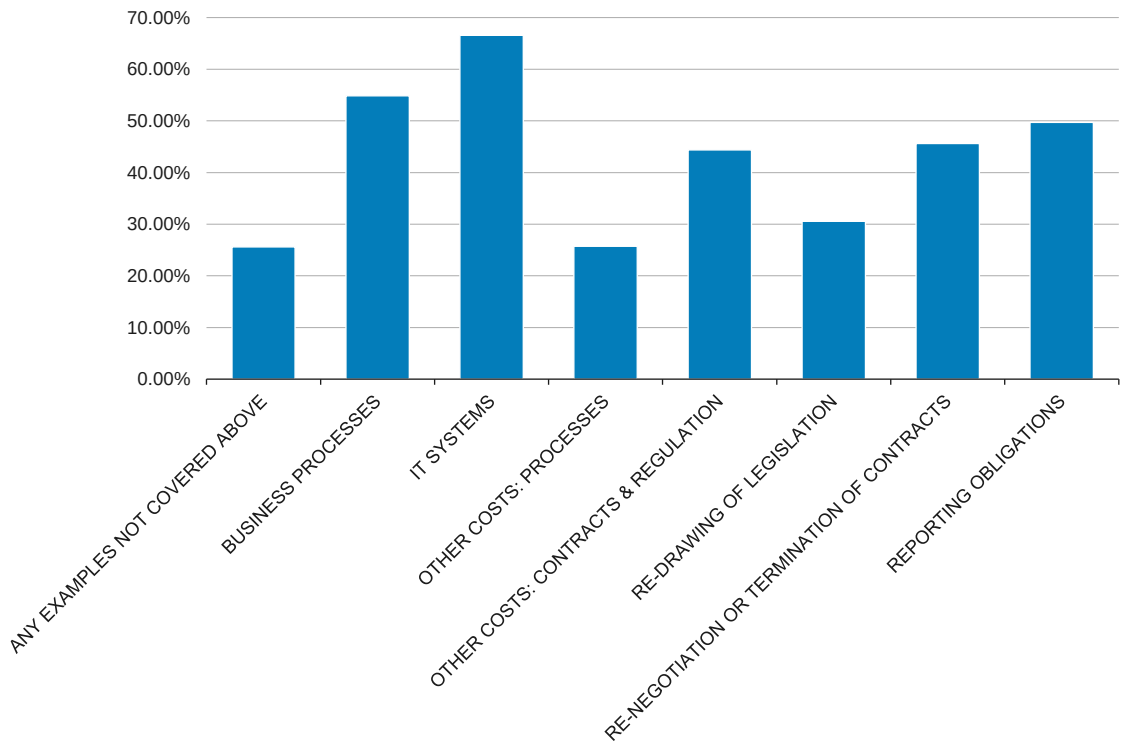
IND costs are costs that any market participant in their market segment bears equally, whatever its size.[6] Therefore, within a market segment, these costs can be compared directly. In contrast, DEP costs need to be adjusted to the size of the respective respondent to ensure comparability. Therefore, we have controlled DEP cost for the company size by multiplying the stated DEP cost with the share of the company size over the market size, assuming linearity of DEP cost to company size.[7] Chapter 3.2.1 further describes the approach and results for DEP costs.

On average, respondents estimate most of their IT system costs and business process costs to be independent of company size. Figure 3.1 presents the average size independence for each cost category. The average reported share of costs independent of company size ranges between 25% and 67% for the different cost types. While IT system and business process costs place at the upper end of that range, stakeholders expect costs relating to adapting to new legislation – in particular legal advise on the impact of changes of legislation – and the adjustment of processes with TSOs and other public bodies to be largely dependent on company size.

[6] Note that market segments are approximated by organisation types.

[7] The linearity assumption follows from two opposing lines of argumentation for progressive and degressive relationships. On the one hand, the complexity of the systems that must be transitioned increases with company size. On the other hand, economies of scale may imply degressive transition costs with increasing company size. Therefore, the linearity assumption has been communicated for the questionnaires. The received data and interviews have not refuted this assumption.

Figure 3.1 Size-independence of costs by cost type

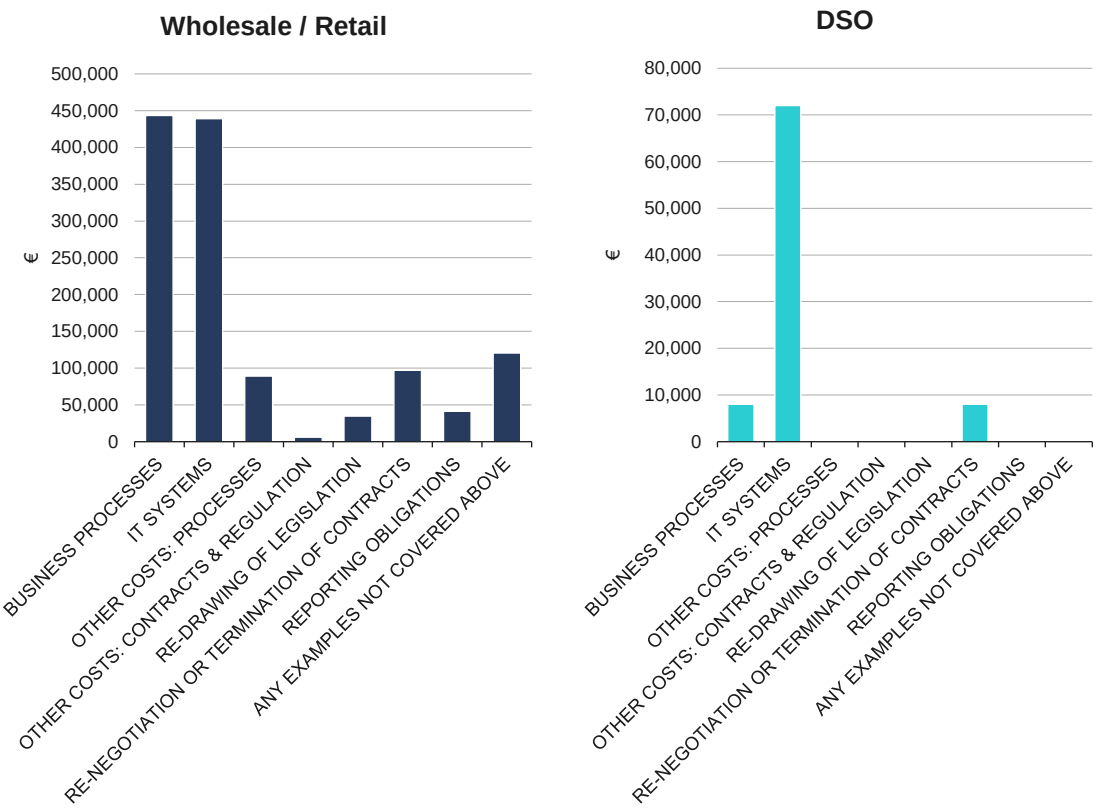


Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

For the wholesale / retail segment, the adjustment of business processes and IT systems stands out as the cost categories for which market stakeholders expect the highest IND costs. As shown in Figure 3.2, stakeholders in the wholesale / retail segment expect more than 300k EUR of IT system cost and business process cost on average. Relatively lower costs are expected for all other cost categories. Average expected size-independent costs in these categories are below 100k EUR.

The majority of size-independent transition costs are expected in the adjustment of IT systems. Furthermore, DSOs expect transition costs only in the adjustment of IT systems and business processes as well as the re-negotiation or termination of contracts. Figure 3.2 shows that DSOs on average expect size-independent IT system costs of around 70k EUR. Average cost estimates in the remaining categories are below 10k EUR.

Figure 3.2 Average size-independent costs by cost type and organisation type



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

There is limited consistency in the estimates of IND costs among stakeholders with cost estimates between 0 and 5mn EUR for a single cost category. Focusing on the two cost categories with the highest expected costs (business process costs and IT systems costs), Figure 3.3 and Figure 3.4 present all available estimates (wholesale / retail segment and DSOs) of size-independence and the resulting IND costs. The left axis corresponds to the value of IND costs, the secondary axis on the right indicates the share IND costs. The x-axis differentiates between company estimate and BZ reconfiguration.

IND costs range between 0 EUR and about 5mn EUR for business process cost and between 0 EUR and 2.8mn EUR for IT system cost. For both cost types, estimates of stakeholders active in Germany are the most heterogenous. In France, Italy, Netherlands and Sweden, outliers are less extreme. For Germany, most of the cost estimates are independent of the specific number of zones per configuration. One stakeholder expects additional transition costs of 1mn EUR in business process and 500k EUR in IT system for each additional BZ without however providing detailed information on the reasons of such differences.

The heterogeneity of the reported size-independence of costs is very large for all the BZ configurations. Although some stakeholders estimate values close to the averages (55% for business processes and 67% for IT systems), the values of most observations are either very high (close to or equal to 100%) or low (20% or lower). The highest cost estimates (> 1mn EUR) all coincide with an estimated size-independence of 100%. Some discrepancy may be explained by the difference in company size which leads to different shares of cost-independence of total individual transition costs. However, the discrepancy nonetheless calls for a cautious interpretation when scaling the cost estimates and computing total transition costs.

Stakeholders in the wholesale / retail segment state a wide range of business processes that need to be adjusted to a new BZ configuration. This range includes pricing strategies, trading strategies, dispatching, invoicing, forecasting, risk management and consulting costs, many of which are expected by multiple stakeholders. Most of the provided reasoning focuses on various aspects of trading processes. Responses highlighting costs for forecasting and risk management tend to expect relatively low IND cost of around 50k EUR. Respondents with a focus on dispatching, invoicing and consulting expenses estimate substantially higher IND costs (> 1 mn EUR). These stakeholders also expect the costs to be entirely size-independent. One stakeholder points out that business process costs depend on whether the company's assets are split by BZ configurations. In that case, additional adjustments to intraday systems would be required.

In the wholesale / retail segment, IT systems that would be affected by a change of BZ configurations include trading systems, settlement systems, customer relationship management, pricing systems, portfolio management, balancing systems and invoicing. There is variation in how the stakeholders plan to implement these changes. Some companies plan to engage external providers or consultants to facilitate the implementation of IT system adjustments, other companies plan to hire additional employees. If the implementations are done externally, stakeholders are involved in the testing of the adjusted systems.

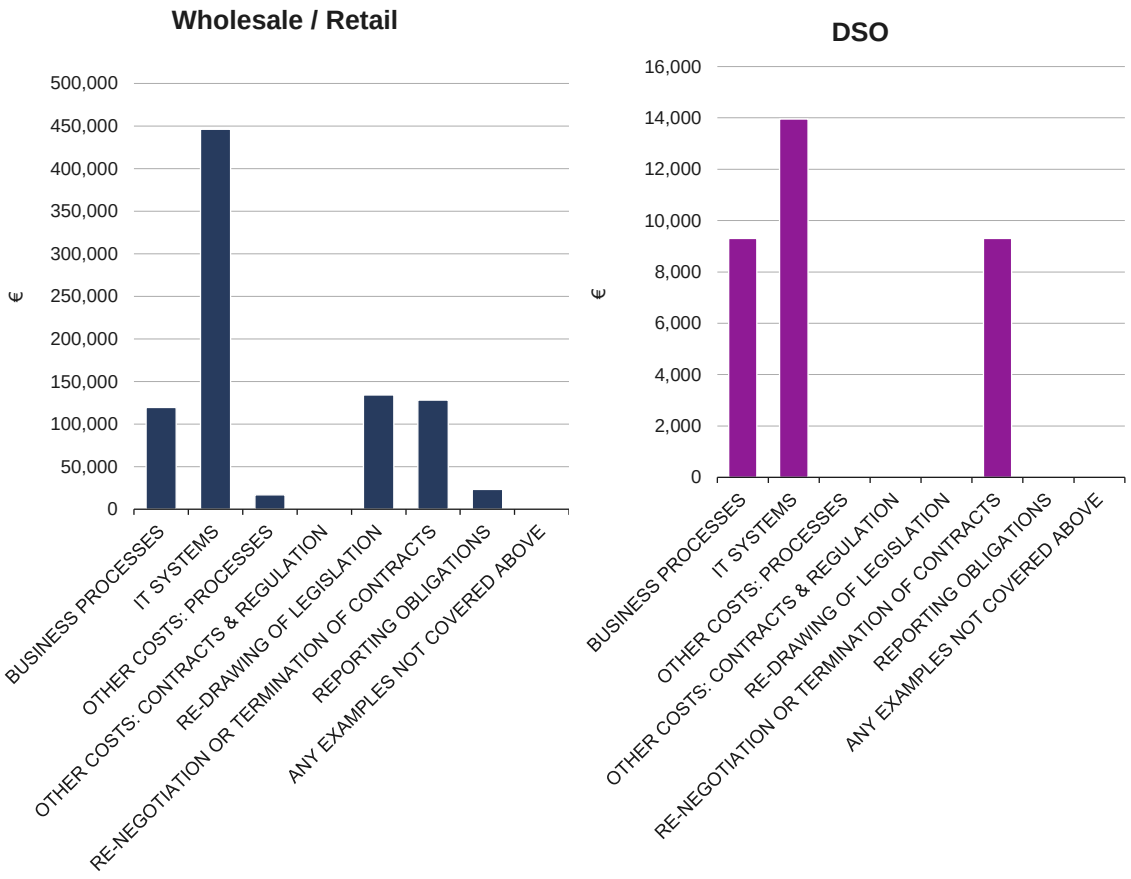
DSOs highlight general process testing as the driver of business process cost. IT system costs are related to the upgrading of portfolio management software and adjustments to scheduling.

3.2.2 Size-dependent costs

Similar to IND costs, IT system costs and business process costs are among the largest cost items of DEP transition costs in the wholesale / retail segment. Figure 3.3 shows that per 1% scaling factor, average IT system costs amount to more than 440k EUR, followed by business process costs, re-negotiation or termination of contracts and re-drawing of legislation (all around 120k EUR). Compared to IND costs, the role of re-drawing of legislation and renegotiation or termination of contracts is relatively larger for DEP costs.

DSOs report to expect DEP costs only for business processes, IT systems and renegotiation or termination of contracts. Average cost estimates for these three categories range between 9k EUR and 14k EUR per 1% scaling factor (Figure 3.3). Hence, DEP costs are less concentrated on IT system costs than IND costs.

Figure 3.3 Average size-dependent cost by cost category (per 1% scaling factor)



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

Analysing individual estimates of DEP costs and estimated size-dependence reveals a large variation, especially of the cost estimates. DEP costs range between 0 EUR and about 400k EUR for business process costs and between 0 and about 600k EUR for IT system cost. While estimates of size-dependence of business process costs tend to be considerably larger than 50%, most of the estimates for IT system costs are below 50%. These figures also highlight a lack of data for stakeholders outside of Germany.

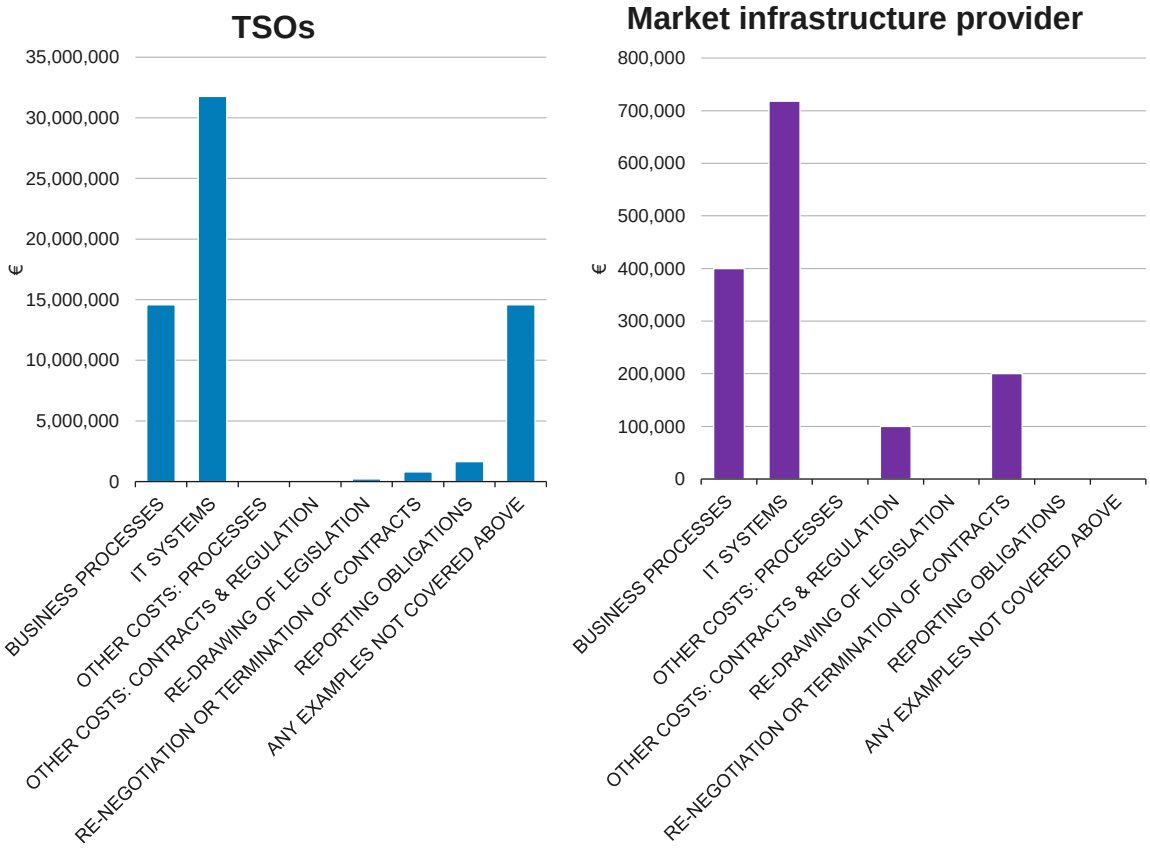
3.2.3 Cost estimates without need for differentiation by size-dependence

For TSOs and market infrastructure providers, the size-dependence of costs is less relevant for scaling. This is due to the limited number of stakeholders in the respective segment, and also unavailable data. Hence, the comparison of data points focusses on the total, not size-differentiated transition cost.

TSOs expect the majority of transition costs in the adjustment of business processes and IT systems. Also, cost estimates in the residual categories are high. Figure 3.4 presents average transition cost estimates of TSOs by cost category. On average, TSOs estimate IT system cost of around 30mn EUR. Business process costs and residual costs ("Any examples not covered above") amount to around 15mn EUR on average. According to the reasoning provided, these costs cover necessary training and change management.

The general structure of transition costs expected by market infrastructure providers is similar to TSOs, but cost estimates are significantly lower. As shown in Figure 3.4, around 700k EUR (300k EUR) of transition costs are expected in the adjustment of IT systems (business processes).[8] Other reported costs relate to contracts and regulation, but are considerably smaller.

Figure 3.4 Average transition cost – TSOs and market infrastructure providers



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

[8] The cost estimates provided verbally by the market infrastructure provider that has not submitted its estimates via the template are similar to the stated estimates here. The estimate was the incursion of above 2mn EUR in IT system change costs and above 2mn EUR in business process change costs, irrespective of the specific BZ reconfiguration and mostly irrespective of company size.

Individual transition costs estimated by the TSOs are between 200k EUR and 48mn EUR for business process costs and between 100k EUR and 285mn EUR for IT system costs.

The described changes of business processes and IT systems of TSOs concern arguably tools used for forecasting, redispatch, balancing, congestion management, grid operation / planning and settlement of ancillary services. Furthermore, trainings of employees, configuration and integration of equipment and measuring devices, prospective modelling (R&D software), capacity calculations and the evaluation of new grid maps are expected to create transition costs.

One TSO noted that transition costs will be particularly costly if the new BZ configuration splits 110 kV network groups.

3.3 Conclusion on the descriptive analysis of received data

The received data limits the scope of the computation of total transition costs estimates. It is not possible to calculate total transition costs estimates that cover all the relevant organisation types for all BZ reconfigurations of interest. Responses for Germany and France include data points allowing to aggregate or scale up costs for system operators, market infrastructure providers and the wholesale / retail segment. However, public organisations have not provided data. Data on the Netherlands and Sweden does not allow calculations of total transition costs for public organisations and DSOs. Only stakeholders active in the wholesale / retail segment have provided costs estimates for Italy.

Apart from this, the descriptive analysis highlights a) the heterogeneity of expected transition costs and b) the difference in perceived relevance of cost-dependence.[9] The large variation of costs estimates within costs and organisation types underlines that total transition cost ranges reflect a high level of uncertainty around these costs estimates. Furthermore, the variation in expected size-dependence prompts the question to which degree these discrepancies are related to differing methods of operations in companies or general high uncertainty when estimating size-dependence.

[9] Note that no clear indication was identified when differentiating between companies that have been previously affected by a bidding zone reconfiguration and those who have not. From the interviews, we follow that this is mainly due to the different impacts that bidding zone reconfigurations may have and the ability of market participants to anticipate potential bidding zone reconfigurations irrespective of having been affected by previous ones.

4 ESTIMATION OF TOTAL TRANSITION COSTS

This section presents a range of estimates for total transition costs for the proposed BZ reconfigurations in France, Germany, Italy, Sweden and the Netherlands. The purpose of these ranges is to develop an understanding for the order of magnitude of total transition costs than can be expected based on the available stakeholder input.

This section is structured as follows:

- We start by presenting total transition costs ranges up front.
- Then, we describe and interpret the resulting total transition costs ranges for different types of stakeholders in greater detail.

4.1 Ranges of total transition cost estimates

As described in Chapter 2, total transition costs ranges are calculated as the sum of the scaled or aggregated transition costs of DSOs, TSOs, market infrastructure providers and stakeholders in the wholesale / retail segment.

- Given that all (with one exception) of the relevant national TSOs have reported cost estimates, total transition costs of TSOs are calculated as the sum of the individual estimates.
- The sum of received estimates of market infrastructure providers is considered the lower bound of total cost estimates, since the lack of sufficient data points prohibits scaling the estimates.
- Costs of DSOs and stakeholders in the wholesale / retail segment are scaled under consideration of the reported size-dependence of costs. Therefore, data on market size, the number of market participants and scaling factors for the company responses is compiled from public sources and stakeholder input in the questionnaires.[10]

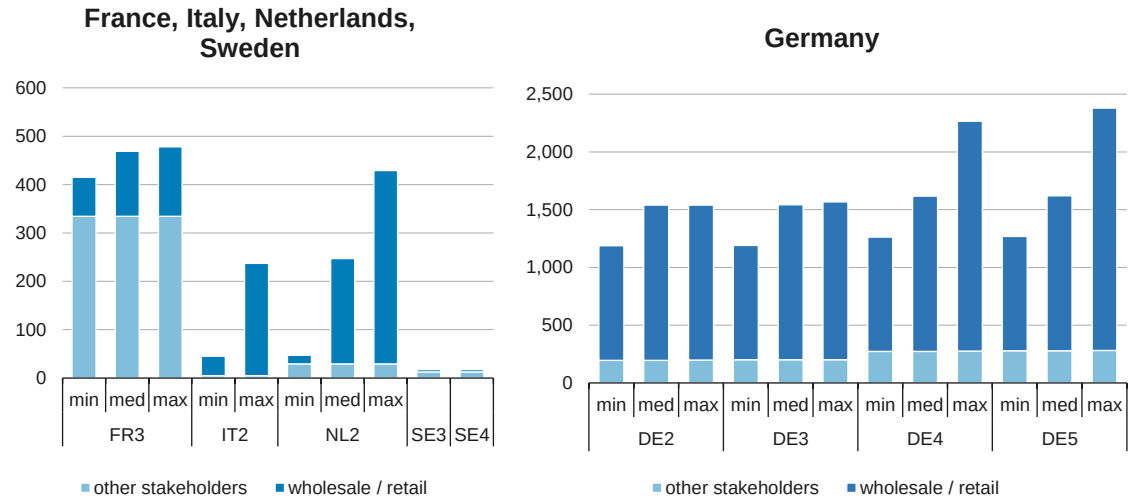
When applying the scaling methodology, both the magnitude and the ranges of total transition costs are very heterogenous across countries. While scaling results in very large transition cost ranges for some countries (Germany, Netherlands, Italy), the difference between minimum estimate and maximum estimate is small or zero for France and Sweden. This difference follows from the available cost inputs as well as the segment sizes and structures of the respective countries. The magnitude of estimated total transition costs for German BZ configurations is many times higher than analogous values for the other countries.

Figure 4.1 presents total transition cost ranges based on the minimum, median and maximum observations. If only one or zero scaled observations are available for an organisation type, checks are included to create a range of estimates. This is the case for French DSOs, and the wholesale /

[10] Public sources include the number of BRP from TSO websites: (50 Hertz, 2023) (Amprion, 2023) (eSett, 2023) (RTE, 2023) (TenneT, 2023a) (TenneT, 2023b) (Terna, 2023) (Transnet bw, 2023), market size approximations from (ENTSO-E, 2023), (European Commission, 2022b) on German traded volumes, (European Commission, 2022a) for the Dutch retail market size, and others for company-specific details.

retail segment of France, Italy and Sweden. Furthermore, each estimate is subdivided into the wholesale / retail segment and the sum of other stakeholders. For Germany and France, these other stakeholders include DSOs, TSOs and market infrastructure providers. Other stakeholders in the Netherlands and Sweden include TSOs and market infrastructure providers. For Italy, other stakeholders include only market infrastructure providers.

Figure 4.1 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: 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, "max" costs are the scaled costs of the relatively highest cost estimate; for Germany they are highest costs apart from the outlier.

Estimates for German BZ reconfigurations are substantially higher than estimates for configurations in the remaining countries. For German BZ configurations, values range from 1 to 2.5 bn, while the values for the other countries remain below 500mn EUR. In addition, taking into account an outlier-observation would result in maximum estimates for Germany of EUR 7 to 18 bn. Apart from this outlier, costs are relatively stable across different reconfigurations. Nevertheless, the high estimates for Germany can be partially explained by the fact that the number of wholesale / retail companies, approximated by the number of balance responsible parties, is about 10-30 times higher in Germany than in other countries; further, market participants in Sweden and Italy may expect lower cost, because they are experienced in handling multiple bidding zones.[11] To a lesser degree, the high total transition costs estimates can also be explained by the data availability for the relevant stakeholders. For example, data on the Italian TSOs and DSOs is missing so that a comparison of total transition costs estimates across countries is generally difficult.

In terms of lead time to the BZ reconfiguration, about half of the respondents expect transition costs to increase, if the lead time was to decrease; the other half expects the costs to stay the same. If more time was available until the BZ reconfiguration, most respondents expect no change to the transition costs. 5 of 23 respondents expect decreasing cost and two participants indicated increasing costs with increasing lead time. The main line of argumentation across the participants concerned the impact of contract duration and the need to re-negotiate as well as the need of external resources if the adaptation was to be realised in a shortened timeframe.

[11] The number of balance responsible parties considered are 1400 for Germany, 190 for France, 151 for Italy, 121 for the Netherlands, and 41 for Sweden. BRP in Germany have not been counted twice if they are active for more than one TSO. The data has been derived from the TSO websites and eSett.

4.2 Transition cost ranges per organisation type

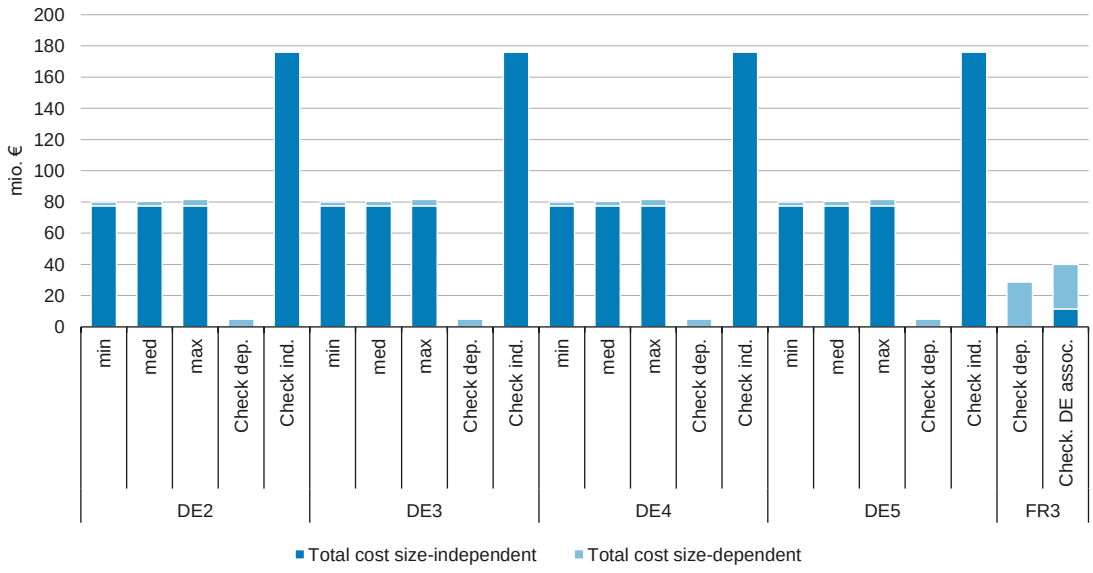
4.2.1 Distribution System Operators

German DSOs have provided data that appears suitable for scaling. For these observations, the DSOs' individual shares of the German distribution grid length (as reported by the DSOs) are used as scaling factors. For the scaling of IND costs, a number of 880 DSOs is assumed for Germany.[12]

For the German DSO segment, estimated total transition costs amount to around 80mn EUR for all the German BZ configurations. The majority of the estimated total transition costs is independent of company size. Figure 4.2 presents the computed cost estimates for all available scenarios and BZ configurations. The variation in total transition costs between the minimum and the maximum scenario is very small. This is a consequence of identical cost estimates provided by all German DSOs. Hence, variation within a given BZ configuration arises only in IND costs as these costs are adjusted by the individual size of the respective companies. Notably, cost estimates are also identical for an increasing number of BZs in a BZ configuration.

The provided data for the French DSO segment does not differentiate cost estimates by size-dependence. Consequently, assumptions are necessary to calculate estimated total transition costs. When assuming full size-dependence of transition costs, the resulting estimate for the French DSO segment is smaller than the estimates for the German segment, but within the range of the checks for German DSOs. When assuming that French DSOs face the same IND cost as German DSOs, the computed total transition cost estimate for the French DSO segment sporting would be circa 40 mn EUR.[13] The check we did assuming full size-independence, gets us to an extremely high result (circa 4 bn EUR), which is therefore omitted in Figure 4.2.

Figure 4.2 Total Transition Cost Estimates for DSOs (in mn EUR)



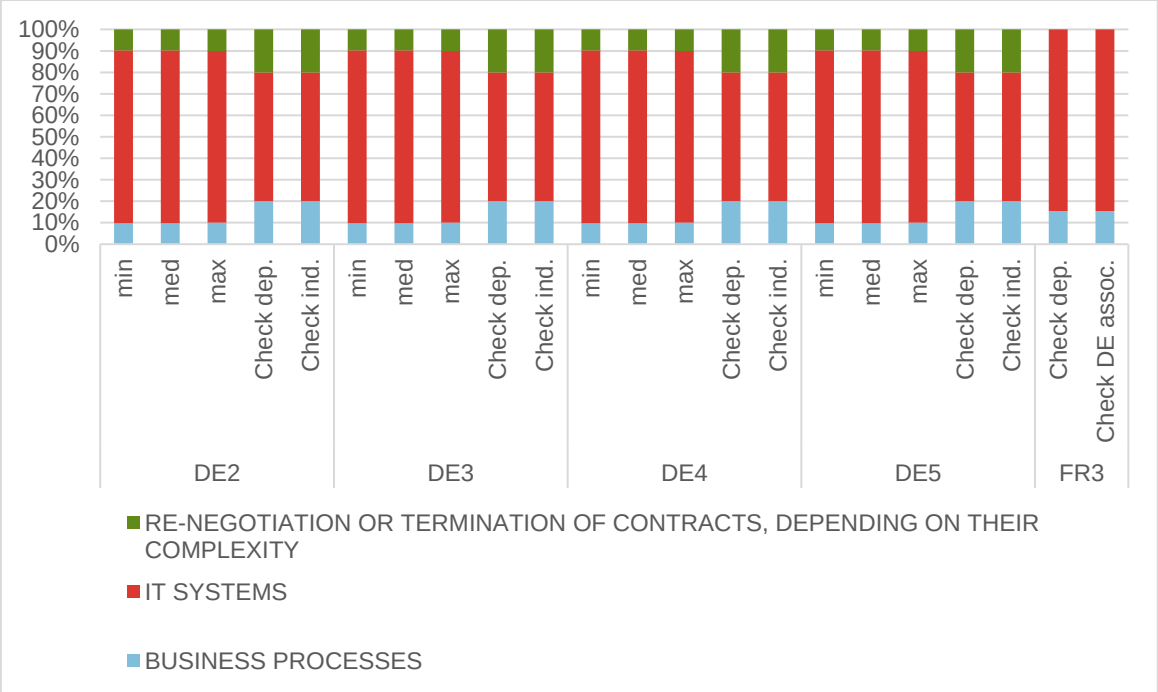
[12] See (CEER, 2022)

[13] We assumed 143 French DSOs and scaled DEP cost based on the market share stated by the DSO who submitted estimates.

Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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, "max" costs are the scaled costs of the relatively highest cost estimate, "Check dep" ("check ind.") costs are scaled median costs assuming that all cost estimates provided are 100% dependent (independent) on company size. "Check. DE assoc." assumes that individual size-independent costs are the same in France as in Germany.

Between 60% and 85% of estimated total transition costs in the segment of DSOs are related to the adjustment of IT systems. Figure 4.3 illustrates the distribution of costs across cost types in all the available scenarios. The cost structure of French and German DSOs is similar. For both countries, the majority of estimated transition costs is related to IT systems. Only 10% to 20% of estimated transition costs are business process cost. In contrast to the French DSO segment, some of the transition costs in the German DSO segment are related to re-negotiation or termination of contracts.

Figure 4.3 Share of total transition costs per cost type – DSOs



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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, "max" costs are the scaled costs of the relatively highest cost estimate, "Check dep" ("check ind.") costs are scaled median costs assuming that all cost estimates provided are 100% dependent (independent) on company size.

4.2.2 Transmission System Operators

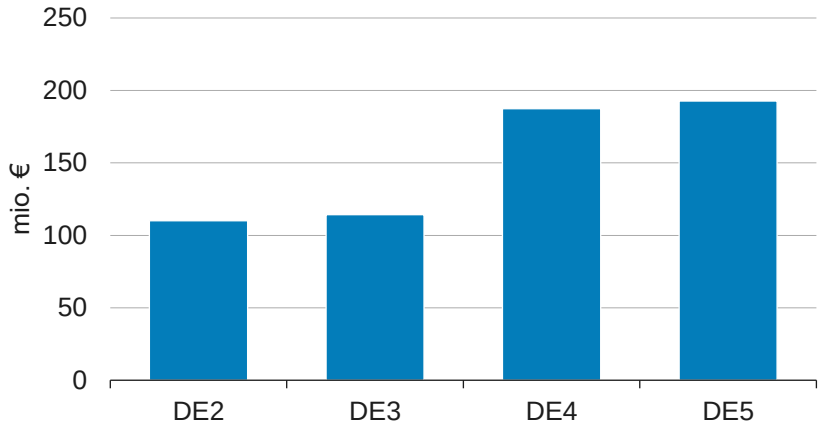
Total transition cost estimates of TSOs are the sum of individual transition cost estimates within a BZ configuration and across cost types. For France, the Netherlands and Sweden, this sum consists of the estimates of only one TSO.[14] These estimates carry less uncertainty than the transition cost estimates of other organisation types, because the data points did not require scaling.

Total transition cost estimates for TSOs affected by German BZ configurations range between 100mn EUR and 200mn EUR, increasing with the number of BZs per configuration. Figure 4.5 presents estimated total transition costs for the German BZ configurations. The sharp rise for an increasing number of BZs is not driven homogenously by all stakeholders. Instead, all but one TSO

[14] To keep these individual company responses confidential, for these countries, this section focusses only on the relative importance of the cost types. However, total transition cost estimates are analysed for Germany.

report stable or only slightly increasing transition costs for an increasing number of zones. The reasoning for the high cost estimates from one TSO is not directly related to the number of BZs, but rather to the individual configuration of borders between zones. Specifically, the stakeholder states that configurations that split a control area, respectively the 110 kV network groups cause exceptionally higher implementation costs.

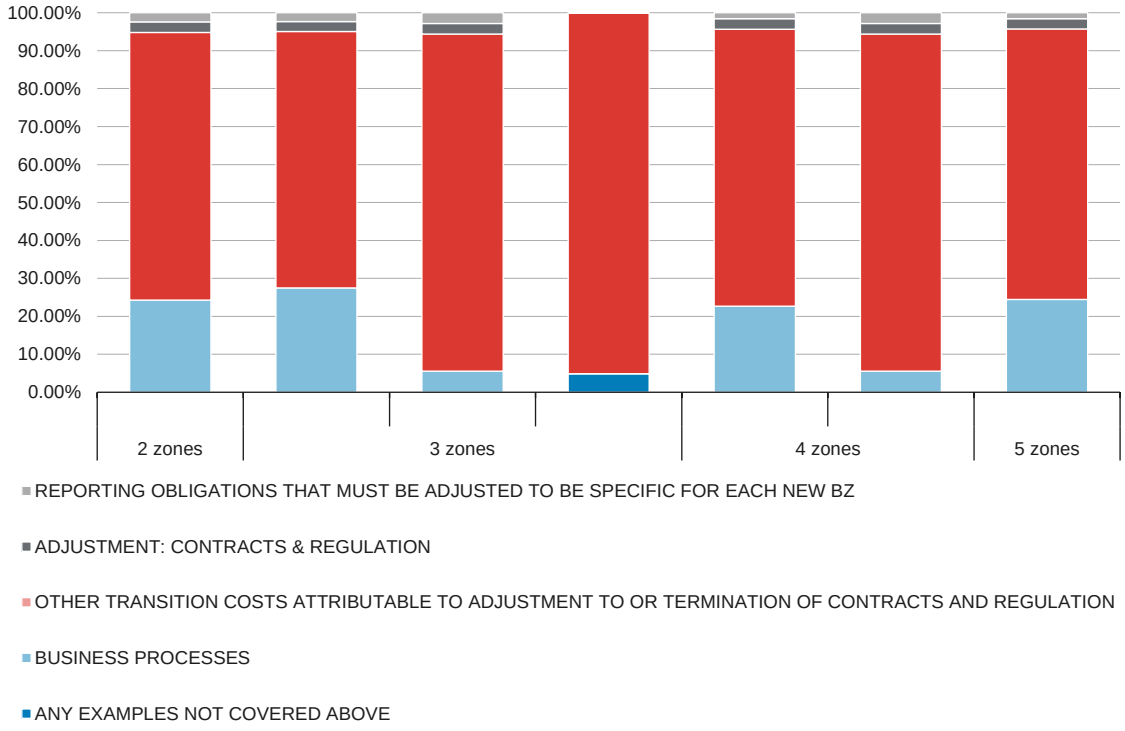
Figure 4.4 Total transition costs per BZ configuration - German TSOs (in mn EUR)



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

Across all BZ configurations, there is agreement that changes to IT systems drive transition costs of TSOs. Figure 4.5 reports the share of transition costs per cost category for all the BZ configurations. Between 67% and 95% of the transition costs of TSOs are expected to be related to IT systems. The remaining costs are mostly associated with the adjustment of business processes. Only small shares of the total estimated transition costs result from adjustments of reporting and contracts, or the adjustment to regulations. There is no apparent relationship between the relative importance of cost types and the number of BZs per BZ configuration.

Figure 4.5 Share of total transition costs per cost type – TSOs



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires

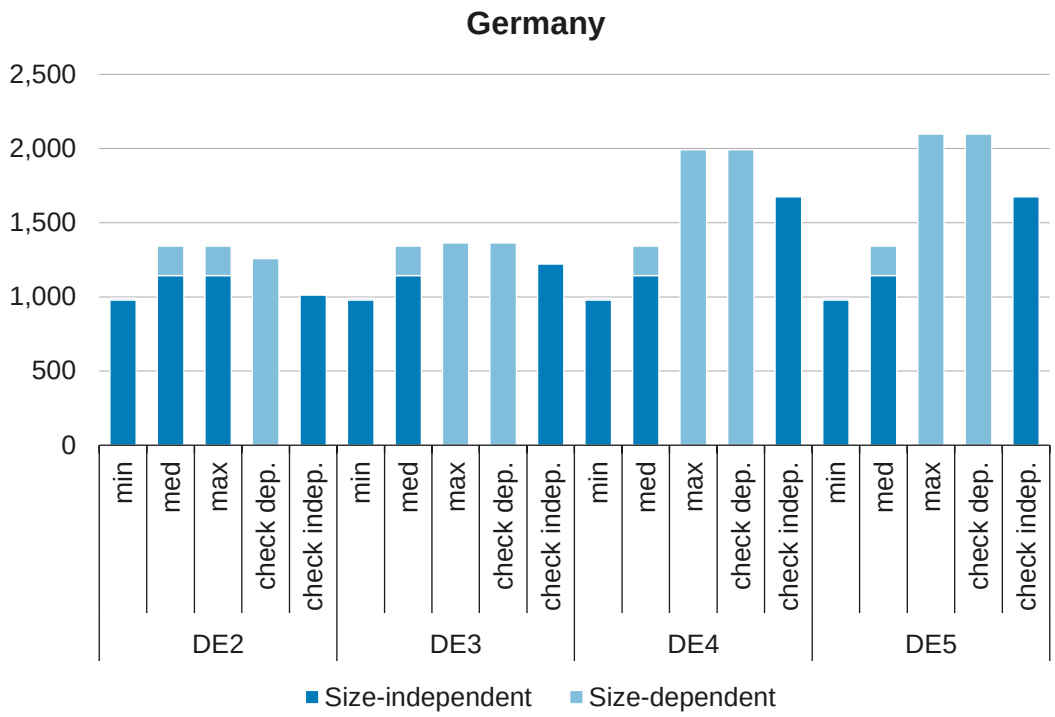
4.2.3 Wholesale / Retail Market Participants

Scaling of transition costs in the wholesale / retail segment is performed for all countries of interest, i.e. France, Germany, Italy, the Netherlands and Sweden. The number of market participants is approximated by the number of balance responsible parties in each of the countries. These values are publicly available and published by the TSOs of each country. Scaling factors for market participants reflect the companies' shares in the countries' thermal generation capacities, retail volume or total load depending on data availability and main company activity. This information was provided by stakeholders on generation capacity or generated volumes in previous years and other public information on company and market sizes. Due to the heterogeneity of companies discussed in this segment, the use of these scaling factors constitutes a substantial assumption and limit to the representativeness of the resulting cost estimate computations.

For all countries, availability of data is limited. Only a fraction of the size-dependent and size-independent cost estimates explored in section 3 can be used, because company sizes were not possible to obtain. Except for the checks, total transition cost estimates can only be computed from companies that report their individual costs with differentiation by size-dependency.

When excluding an extreme outlier observation, transition cost estimates for the German wholesale / retail market are in the order of magnitude of around 1 bn EUR. Figure 4.5 depicts all the available estimates for the German BZ configurations. In addition, an outlier-estimate exists that is not included in the figure. It is caused by two factors. Firstly, the underlying observation estimates the entirety of transition costs to be independent of company size. Therefore, the individual costs are multiplied by the number of balance responsible parties in Germany. Secondly, the individual cost estimates are the highest estimates reported in the wholesale / retail segment.

Figure 4.6 Transition cost estimates for the German wholesale / retail market (in mn EUR)

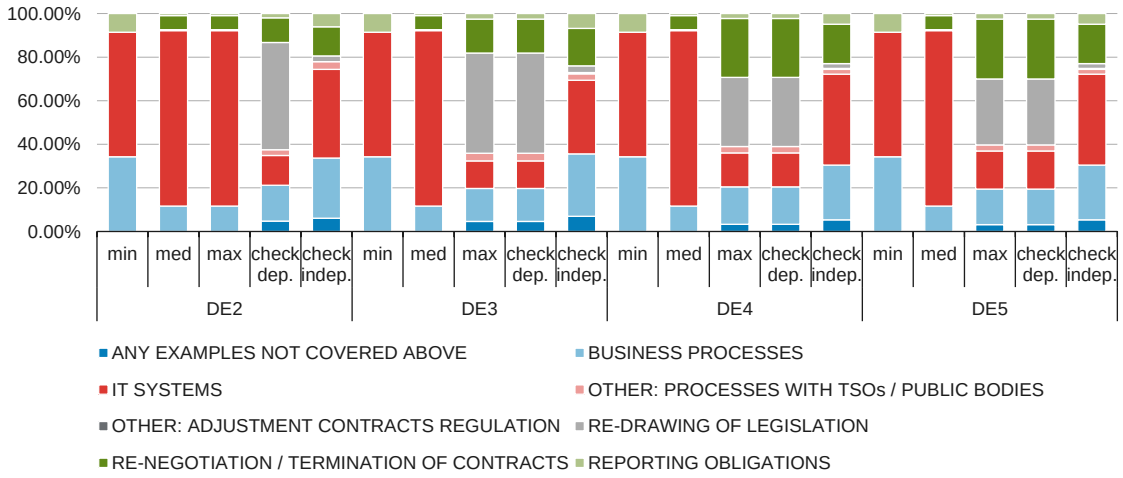


Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
Note: The "min" costs are based on the scaled cost of the relatively lowest cost estimate, "med" costs are based on the scaled costs of the median cost estimate, "max" costs are the highest cost estimate (from checks or complete estimates) net of the outlier. "Check dep" ("check indep.") costs are scaled median costs assuming that all cost estimates provided are 100% dependent (independent) on company size.

The cost types that drive transition costs in the German wholesale / retail market are IT system costs, business process costs, and to a lesser extend costs associated with the re-negotiation or termination of contracts.

Figure 4.6 shows the composition of the available total transition cost estimates for the German wholesale / retail segment by cost type. Companies that estimate low or medium transition cost expect to incur cost primarily from changes to the IT system followed by adjustments of business processes. In contrast, the company that estimates the highest costs, the outlier, expects primarily costs for business process adjustments, but generally expects costs in more categories than the other questionnaire participants. This further supports the exclusion of the provided estimate as outlier, as it may not be representative for the entire market segment. Other cost categories such as the adjustment to reporting obligations or the re-drawing of legislation contribute only small shares to the total transition cost estimates.

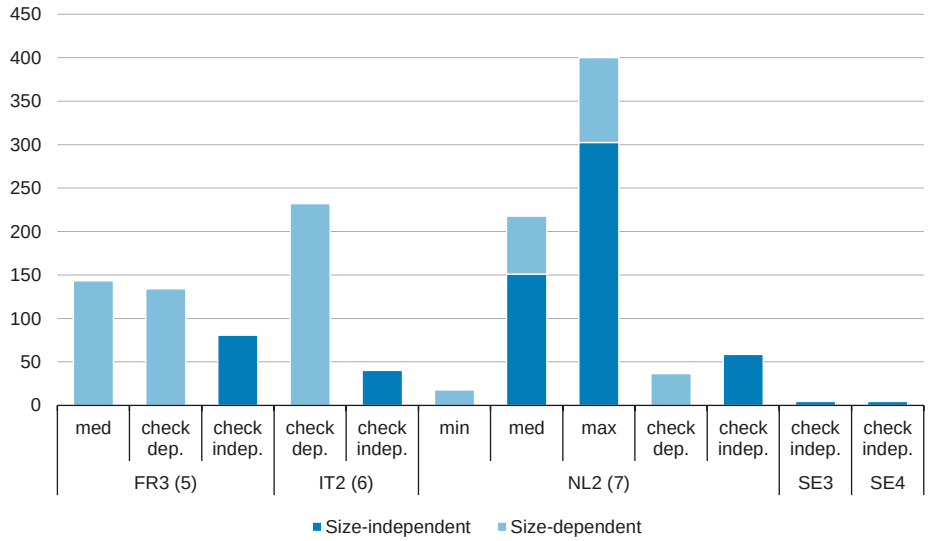
Figure 4.7 Composition of transition cost estimates for the German wholesale / retail market by cost type



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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, "max" costs are the scaled costs of the relatively highest cost estimate, unless the max estimate related to the output. In that case, it relates to the second-highest overall estimate. "Check dep" ("check indep.") costs are scaled median costs assuming that all cost estimates provided are 100% dependent (independent) on company size.

The order of magnitude of the total transition cost estimates for the wholesale / retail segments of France, Italy, Netherlands and Sweden is about a few hundreds of million euros or less. Figure 4.7 shows all the available estimates for these markets. There are no complete observations for Italy and Sweden. Hence, only checks are presented. For France, there is only one observation that can be scaled individually. The values for France, Italy and the Netherlands are relatively similar. The results of the checks for Sweden are noticeably lower than values in the other countries. It is possible that the previous experience with multi-zone configurations limits expected transition costs of market participants. However, it is also possible that the calculation of the check is not based on a representative market participant. Further, compared to Sweden, estimated transition costs for Italy are substantially higher, however Italy is already split into multiple BZs as well.

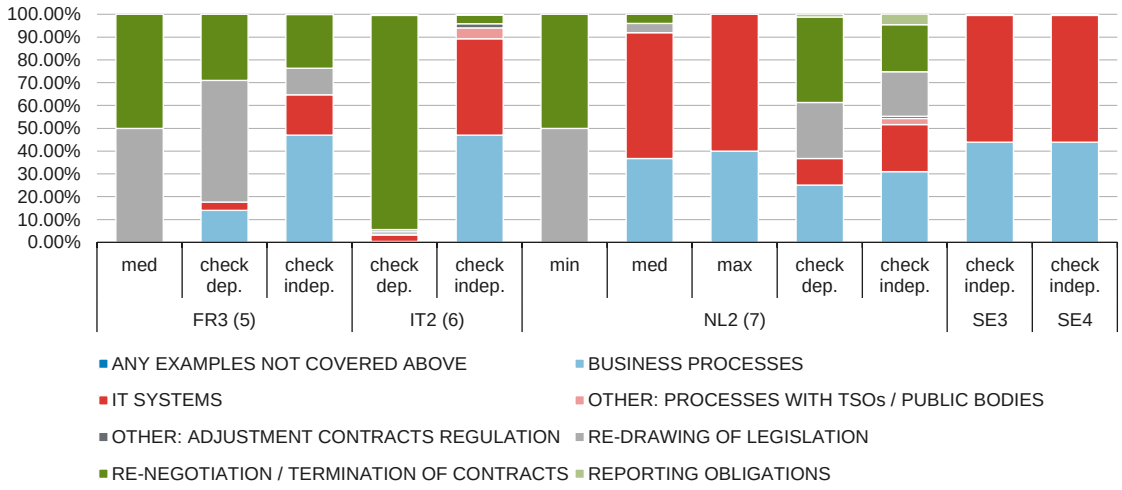
Figure 4.8 Transition cost estimates for the French, Italian, Dutch and Swedish wholesale / retail market (in mn EUR)



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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, "max" costs are the scaled costs of the relatively highest cost estimate, "Check dep" ("check indep.") costs are scaled median costs assuming that all cost estimates provided are 100% dependent (independent) on company size.

There is little to no regularity in the composition of total transition cost estimates by cost type. Figure 4.8 plots the relative importance of cost types for all the calculated total transition cost estimates. The most important cost categories tend to be re-negotiation or termination of contracts, re-drawing of legislation, adjustment of IT systems and adjustment of business processes. However, distribution between these cost types is not consistent within or across countries. For example, the size-dependent check of Italy consists primarily of costs relating to re-negotiation or termination of contracts. However, the importance of this cost type is almost negligible for the size-independent check of the Italian BZ configuration.

Figure 4.9 Composition of transition cost estimates for the French, Italian, Dutch and Swedish wholesale / retail market by cost type



Source: Compass Lexecon analysis of stakeholder input provided in questionnaires
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, "max" costs are the scaled costs of the relatively highest cost estimate, "Check dep" ("check indep.") costs are scaled median costs assuming that all cost estimates provided are 100% dependent (independent) on company size.

4.2.4 Market infrastructure providers

The segment for market infrastructure providers is not scaled, because (i) the number of directly affected companies, i.e. NEMOs, the main derivative exchanges and brokers, is limited, (ii) secondarily affected companies, i.e. data providers, are manifold, and (iii) the available cost estimates cannot represent the heterogeneity between these providers. Hence, the computed cost range, calculated as the sum across provided cost estimates, constitutes a minimum total cost estimate.

When including the written and verbally provided data, total minimum transition costs for market infrastructure providers range from 3mn EUR to 7mn EUR. Notably, cost estimates have been provided by directly affected stakeholders such that this minimum cost range covers substantial parts of the total transition costs, unless costs are independent of company size and the type of services provided to the electricity market infrastructure. The bulk of costs may be attributed to adjustments to the IT systems and business processes. Re-negotiation and termination of contracts has been considered the third ranked transition cost type.

In terms of lead time, stakeholders highlighted that a longer lead time may lead to higher transition costs. Indeed, when introducing new products or mechanisms, market infrastructure providers may need to implement those changes in both systems, i.e. those with the old BZ configuration and those with the new configuration. Extending the lead time would multiply the occurrences of such situations and therefore the costs. Alternatively, market infrastructure providers could postpone the introduction of new mechanisms and products. This would incur opportunity costs that are not within the stated definition of transition costs, but which could be substantial.

5 CONCLUSION ON TRANSITION COSTS

In the context of the bidding zone review of the EU power markets, in application of the Regulation (EU) 2019/943, TSOs should analyse different BZ configurations to define an optimal configuration. As set out in the BZR methodology, one of the criteria is to assess transition costs.

The computation of transition cost estimates is based on three steps (please see chapter 2 for a more detailed explanation of the approach).

- Firstly, in discussions with ENTSO-E, the TSOs, ACER, the NRAs and the BZR consultative group, we identified relevant types of stakeholders that may face transition costs as per the definition set forth in the BZR methodology.

- Secondly, we addressed a questionnaire to the identified stakeholder groups (in the form of 2 online surveys accessible to all EU stakeholders) to provide input to expected transition costs in case of a bidding zone reconfiguration as set out in the BZR methodology.

- Thirdly, we cleaned the provided input on the basis of the provided estimate explanations together with ENTSO-E and the TSOs and in discussion with ACER and the NRAs, controlled it for company size, and scaled it to calculate total transition costs per bidding zone reconfiguration.

Main findings

Given the restricted dataset available and the uncertainty in cost inputs, the resulting transition cost estimates are subject to significant limitations that are further explained in chapter 2.4.

From the data obtained, we were able to compute ranges of total transition costs for the different BZ reconfigurations. 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.

The reconfigurations in Germany are expected to see the highest transition costs in the range of 1-2.5 bn EUR. This range is based on the lower bound of potential transition costs. Indeed, one respondent provided significantly higher costs and assumed them to be independent of his company size, and clearly appears as an outlier. If we took into account those costs and considered them representative for all market participants, then the upper estimate would be significantly higher. No consensus exists on the aspect whether costs increase with an increase in the number of zones. While most respondents estimate constant costs across all reconfigurations, others stated that costs would increase with an increase of the number of bidding zones in Germany.

The transition costs estimated on the basis of provided data – which arguably differs from one country to another – for reconfigurations in France rank second with total computed costs below

500 mn EUR. The potential reconfigurations in the Netherlands and Italy could lead to a large range of transition costs with estimates spanning between 50 mn EUR and 450 mn EUR for the Dutch reconfiguration and 50 mn EUR and 250 mn EUR for Italy.[15] However, the Italian case might be underestimated, as it refers to a sub-regional split that has never been adopted before. The transition costs estimated for reconfigurations in Sweden are lowest among all reconfigurations with total costs of about 15-20 mn EUR and indicate little variation across the different reconfigurations.

Nonetheless, comparability across countries is difficult, because the computation of total transition cost estimates is, depending on the country, only possible for a subset of affected types of organisations. Furthermore, the lack of respondents and market share estimates could lead to an underestimation or to an overestimation (i.e. high adjustment of dependent costs) of the transition costs and significantly alter the numbers and the range of transition costs computed in the study.

In terms of lead time, the study indicates that increasing the lead time to more than three years has little effect on transition costs while about 50% of the respondents expect increasing transition costs if the lead time was shortened.

Significant uncertainty persists with regard to expected transition cost and also about the role of the driving factors. While most respondents expect to incur most costs in changing IT systems and adjusting business processes**, there is no consensus if these costs are borne to a similar level by all market participants or if they are proportional to the company size. This uncertainty underlines that the transition costs - once realised - may significantly deviate from the ranges computed here.**

[15] Thereby, we would like to state that the Dutch, Swedish and Italian estimates do not contain DSO transition costs, and the Italian estimate further does not contain TSO transition costs. This is due to a lack of data.

6 BIBLIOGRAPHY

50 Hertz. (2023). *Bilanzkreiskunden*. Retrieved from https://www-qa.50hertz.com/de/Vertragspartner/Bilanzkreiskunden

ACER. (2020, November 24). *ACER Decision on the methodology and assumptions that are to be used in the bidding zone review process and for the alternative bidding zone configurations to be considered.* Retrieved from acer.europe.eu: https://eepublicdownloads.entsoe.eu/clean-documents/cep/ACER_Decision_%2B_Annexes.pdf

ACER. (2022, August 8). *Decision on the alternative bidding zone configurations to, ANNEX1, List of alternative bidding zone configurations to be considered for the bidding zone review.* Retrieved from acer.europe.eu: https://www.acer.europa.eu/Individual%20Decisions_annex/ACER%20Decision%2011-2022%20on%20alternative%20BZ%20configurations%20-%20Annex%20I.pdf

Amprion. (2023). *Bilanzkreise*. Retrieved from https://www.amprion.net/Strommarkt/Bilanzkreise/

CEER. (2022). *Report on Regulatory Frameworks For European Energy Networks 2021.*

ENTSO-E. (2023). *Transparency Platform*. Retrieved from https://transparency.entsoe.eu/

eSett. (2023). *Balance Responsible Parties*. Retrieved from https://opendata.esett.com/brp

European Commission. (2019). *Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity.*

European Commission. (2022a). *COMMISSION IMPLEMENTING DECISION (EU) 2022/1286 of 15 July 2022.*

European Commission. (2022b). Quarterly report on the European electricity market. *Volume 15*. Retrieved from https://energy.ec.europa.eu/system/files/2023-05/Quarterly%20Report%20on%20European%20Electricity%20Markets%20Q4%202022%20v2C_0.pdf

RTE. (2023). *Mecanismes de marches activite de responsables dequilibre*. Retrieved from https://bilan-electrique-2020.rte-france.com/mecanismes-de-marches-activite-des-responsables-dequilibre/?lang=en

TenneT. (2023a). *BRP Registry*. Retrieved from https://www.tennet.eu/markets/balansverantwoordelijken-brps/brp-registry#13875

TenneT. (2023b). *Bilanzkreise*. Retrieved from https://www.tennet.eu/de/strommarkt/strommarkt-deutschland/bilanzkreise

Terna. (2023). *EIC Codes*. Retrieved from https://www.terna.it/it/sistema-elettrico/mercato-elettrico/eic-codes

TransnetBW. (2023). *Bilanzkreise und Bilanzkreisvertrag*. Retrieved from https://www.transnetbw.de/de/strommarkt/bilanzierung-und-abrechnung/bilanzkreise-und-bilanzkreisvertrag

A APPENDIX: QUESTIONNAIRES

QUESTIONNAIRE ON TRANSITION COSTS

Final version

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Non-Confidential

1 Introduction

The methodology for the bidding zone review process[1] (hereafter Methodology) asks for the evaluation of the transition costs occurring from a bidding zone reconfiguration. This questionnaire establishes a quantitative basis for the estimation of the market participants' transition costs. As set out in the methodology, it does so for each bidding zone and bidding zone reconfiguration. As such, it informs the bidding zone review *transition cost* criterium.

Relevant bidding zone configurations

As established in the ACER decision 11-2022[2] on the alternative bidding zone configurations from August 8th 2022, the following reconfigurations must be evaluated[3] for the first step:

Identifier	BZRR	Number of BZs per Member State	Source (ACER's algorithm/TSOs)	Reference in ACER decision 2022-11 (Annex I)
1	CE	DE2	k-means	p. 4
2	CE	DE2	Modified version of Spectral P1	p. 5
3	CE	DE3	Spectral P1	p. 6
4	CE	DE4	Modified version of Spectral P1	p. 7
5	CE	FR3	Spectral P1	p. 8
6	CE	IT2	k-means	p. 9
7	CE	NL2	Spectral DIRC	p. 10
8	Nordic	SE3	Spectral P1	p. 11
9	Nordic	SE3	Modified version of Spectral P1	p. 12
10	Nordic	SE4	Spectral P1	p. 13

[1] ACER 2020: Methodology and assumptions that are to be used in the bidding zone review process in accordance with Article 14(5) of the Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity

[2] ACER 2022: ACER's Decision on the alternative bidding zone configurations to be considered in the bidding zone review process

[3] Please see here for a detailed depiction of the reconfigurations:

https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER%20Decision%2011-2022%20on%20alternative%20BZ%20configurations%20-%20Annex%20I.pdf

11	Nordic	SE4	Modified version of Spectral P1	p. 14
12	CE	DE3	Fallback configuration for configuration 3	p. 15
13	CE	DE4	Fallback configuration for configuration 4	p. 16
14	CE	DE5	Fallback configuration for configuration 1	p. 17

Those 14 different BZ-configurations can be found in the cost-table to be filled out on page 4 of this questionnaire.

The combinations for central Europe to be analysed in a second step as set forth in ACER decision 11-2022 are not known yet and cannot be found in the cost table to be filled out.

What do we mean with transition costs

The definition of transition costs is set forth in article 15.11 (a) of the Methodology. Transition costs:

- Are 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;
- Shall include an estimation of the cost of amending existing contractual obligations incurred by market participants, NEMOs and TSOs. Such estimation shall reflect the expected implementation timeline for an eventual BZ change, and the fact that when deciding on the implementation date, Member States are required to balance the need for expeditiousness with practical considerations, including forward trade of electricity.

Transition costs arise for different reasons, such as changes to business processes or adjustment of private contracts, and they are incurred by different actors, such as retailers, grid operators, traders or power exchanges. The purpose of this questionnaire is to gather empirically estimates of the different transition costs from different stakeholders. In subsequent steps these estimates will be analysed and extrapolated based on the received information to quantify transition costs for the reconfiguration of bidding zones.

Examples of transition costs include:

- re-structuring of teams responsible for specific bidding zones;
- re-negotiation of on-going contracts; and
- costs of adapting existing IT processes to specific BZ configurations.

Transition costs do **not include**:

- IT investments necessary to introduce flexibility of the IT systems in general; or
- a devaluation of assets due to price changes.

Why we are asking for different lead times

The level of transition costs, in particular costs of amending contracts, will likely depend on the lead-time between the legally binding announcement of a reconfiguration and its full implementation. For estimates in this questionnaire, we assume a **lead-time of three years** as a reference point, unless otherwise mentioned meaning recipients have three years between the decision of BZ reconfiguration and the reconfiguration itself for adjusting their operations. In order to estimate the impact of lead times on the transition costs, estimations for a lead time of two and four years are also gathered through the questionnaire.

How we are going to treat and process the data

The transition cost evaluation used in the assessment of BZ configurations will greatly depend on the results of this questionnaire as the cost estimates are based on the cleaned data from this questionnaire. Specifically, the data from the questionnaire is checked for robustness by standard methods like a comparison to benchmarks, matching techniques and statistical techniques. Please note that some of the questions are included to control for and test confounding factors and are not included as transition costs themselves. The total cost per market participant group, bidding zone and bidding zone reconfiguration is then extrapolated by scaling the cost estimates using market share and revenue data. Due to the remaining uncertainty following from this approach, the cost estimates are depicted as a range. In addition, the relative importance of the different transition cost categories are evaluated and the impact of a change in lead time for the different market participants is analysed. Therefore, all responses are highly appreciated, and additional written remarks are requested.

We would like to make the respondents aware that the **data submitted will not be shared with any market participant**. However, **anonymised versions** of this questionnaire might be shared with the responsible national regulatory authorities and/or ACER.

The next section will provide an overview of the cost categories used for the questionnaire. Afterwards, the questionnaire itself is structured as follows: The first sub-section enquires about the background and market role of the recipient. The second section covers the actual cost estimates. The third and last section addresses the effects of intra-company transactions on liquidity, a topic not directly related to transition costs, but relevant for the overall BZ review.

In case of questions, please contact Gjorgji Shemov (gjorgji.shemov@entsoe.eu).

2 Cost categories

The table below provides an overview of the different cost categories assessed and provides several practical examples to facilitate filling out the questionnaire.

You can also open this table to a new tab to facilitate filling out the questionnaire on the following pages.

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	▪ Any examples not covered above

3 Questionnaire

3.1 General questions

1. Please provide your company name, address, as well as contact details for questions (e-mail and telephone number).
   Name: _____
   Company name: _____
   Address: _____
   Contact details, e-mail: _____
   Contact details, phone: _____

2. As what kind of organisation do you qualify?

   ☐ Generator or storage operator
   ☐ Large-scale industrial consumer
   ☐ Energy trader
   ☐ Retailer
   ☐ Aggregator
   ☐ NEMO, derivative exchange or delegated operator
   ☐ Clearing house
   ☐ Ministries or National Regulatory Authority
   ☐ TSO
   ☐ DSO
   Other: _____

   a. In case you qualify as a generator or storage operator, consumer, energy trader or retailer/aggregator, what are your generated, consumed or throughput quantities in 2021 in TWh per BZ?

      _____

   b. In case you qualify as a generator, consumer, energy trader or retailer/aggregator, what is your annual turnover per BZ?

      _____

   c. In case you qualify as a generator or storage operator, what is your installed capacity per BZ?

      _____

3. Have you been affected by a past BZ reconfiguration in a way that incurred transition costs?
   ☐ Yes ☐ No

a. If yes, please note the specific reconfiguration that affected you:

_____

b. If yes, was your main area (the area where you are most active in in terms of generated/ traded/ throughput/ consumed/ overseen volume) of business subject to re-configuration or have you been affected by a reconfiguration outside your main area of business?

_____

c. If yes, what was the lead-time for this reconfiguration and how did the lead-time affect your transition costs?

_____

4. How large is your market share, differentiated by BZ, business activity and market share metric (e.g. energy, capacity or revenue) if applicable? (response should be based on question 2) (relevant for scaling-up individual results to entire BZ in subsequent steps)

_____

3.2 Estimates of transition costs for BZ reconfiguration

In the file below, please share your estimates of the transition costs per cost category you expect to incur in case of a BZ reconfiguration. You will see that the template contains a separate table for all 14 BZ reconfigurations. **Please fill out the tables for the BZ reconfigurations that are relevant to you** (e.g. in which you are active and for which you wish to provide an estimate). In case you only fill out one sheet, we will assume that your costs are the same for different BZ reconfigurations in your country.

Please specify these **transition costs in terms of full time equivalents (FTEs)** for new and existing staff conditional on the lead time (2, 3, or 4 years until reconfiguration). Please further estimate the **average FTE** cost for the respective cost category. In case no FTE cost is provided, a country standard rate will be assumed. In case you are unable to split the costs into FTEs, please provide a **lump-sum cost estimate** in the column "**personnel costs**". Transition costs that are not personnel costs shall be included in the column "**other cost**".

In the column on the estimate of the share of transition costs independent of company size, please insert your estimation of which share of those costs are **"fixed" costs of a BZ-split**, which are not dependent on company size.

Please provide a clear description of the cost items and corresponding cost estimates in the cell "**description of the cost**" for both personnel costs and other costs.

Any cost item for which a clear description is not provided, may be disregarded.

As an **optional addition to transition costs** as defined, which only cover the costs of the actual transition, and not costs that you incur as a consequence of making your systems and processes flexible, you may provide information on what the **costs of making your systems and processes flexible** are (or were, if you have had a BZ-reconfiguration already).

Please fill out the cost estimates in terms of "**2022 Euros**", meaning that you estimate what your costs would be based on the prices of goods and services in 2022. This means that you do not need to make your own estimation with regards to what the prices of, say, IT services will be in the future. Compass Lexecon will then be using consistent inflation assumptions for the different cost estimates.

Please do not forget to fill out the sheet "**company information**" in the file before uploading it.

Please download the file here. *[link to excel table]*

3.3 Effects of intra-company transactions on liquidity

This section specifically applies to market participants with generation and retail positions that are currently within a single BZ, but which will be spread across different zones after the BZ reconfiguration is implemented.

1. Do you have generation assets or hold retail positions that will be spread across different zones after the BZ reconfiguration?

   ☐ Yes ☐ No

   a. If yes, assuming no changes to today's market and portfolio landscape, how are the shares of generation or retail distributed across reconfigured zones in TWh per year?

   _____

2. Please consider the three exemplary market cases below and briefly explain what kind of decision making you would expect in each example. For your answers, consider a short- to medium-term of 4 to 5 years and a market without implicit BZ third-party access.

   a. After the BZ reconfiguration, 60 MWh of generation are in a bidding zone without a retail position. Will the market participant/you go through the market, which would increase market liquidity, adjust physical production or retail positions, or approach the reconfiguration through other means (such as buying cross-border transmission rights)?

   Positions in BZ 1 and 2 after reconfiguration

	BZ 1	BZ 2
Physical production position	20 MWh	80 MWh
retail position	80 MWh	20 MWh

   _____

   _____

   _____

   b. After the BZ reconfiguration a retail position of 20 MWh has no physical production position in the same BZ. Would the market participant/you withdraw the retail position from BZ 2, rely on the market (and own physical position in BZ 1) to supply the retail position, or approach the reconfiguration through other means (such as buying cross-border transmission rights)?

   Positions in BZ 1 and 2 after reconfiguration

	BZ 1	BZ 2

Physical production position	100 MWh	0 MWh
Retail position	80 MWh	20 MWh

c. After the BZ reconfiguration, a production position of 20 MWh has no corresponding retail position in the same BZ. Would the market participant/you withdraw the production position, sell the generated electricity through the market, or approach the reconfiguration through other means (such as buying cross-border transmission rights)?

Positions in BZ 1 and 2 after reconfiguration

	BZ 1	BZ 2
Production position	20 MWh	80 MWh
Retail position	0 MWh	100 MWh

3.4 Additional remarks

2ND QUESTIONNAIRE ON TRANSITION COSTS

Final version

14 March 2023 – version published
Non-Confidential

1 Introduction

The methodology for the bidding zone review process[1] (hereafter Methodology) asks for the evaluation of the transition costs occurring from a bidding zone reconfiguration. This questionnaire is supplementing the first questionnaire (conducted from 6 September 2022 to 14 November 2022) to collect more data to establish a quantitative basis for the estimation of transition costs. As set out in the methodology, it does so for each bidding zone and bidding zone reconfiguration. As such, it informs the bidding zone review *transition cost* criterium.

Relevant bidding zone configurations

As established in the ACER decision 11-2022[2] on the alternative bidding zone (BZ) configurations from August 8th 2022 and the subsequent decision for the BZ review region Central Europe to analyse the fallback configurations for Germany, the following reconfigurations will be evaluated[3] for the first step of the BZ review:

Identifier (according to ACER decision)	BZRR	Number of BZs per Member State	Source (ACER's algorithm/TSOs)	Reference in ACER decision 2022-11 (Annex I)
2	CE	DE2	Modified version of Spectral P1	p. 5
5	CE	FR3	Spectral P1	p. 8
6	CE	IT2	k-means	p. 9
7	CE	NL2	Spectral DIRC	p. 10
8	Nordic	SE3	Spectral P1	p. 11
9	Nordic	SE3	Modified version of Spectral P1	p. 12
10	Nordic	SE4	Spectral P1	p. 13
11	Nordic	SE4	Modified version of Spectral P1	p. 14

[1] ACER 29-2020: Methodology and assumptions that are to be used in the bidding zone review process in accordance with Article 14(5) of the Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity

[2] ACER 11-2022: ACER's Decision on the alternative bidding zone configurations to be considered in the bidding zone review process

[3] Please see here for a detailed depiction of the reconfigurations:

https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER%20Decision%2011-2022%20on%20alternative%20BZ%20configurations%20-%20Annex%20I%20-%20rectified.pdf

12	CE	DE3	Fallback configuration for configuration 3	p. 15
13	CE	DE4	Fallback configuration for configuration 4	p. 16
14	CE	DE5	Fallback configuration for configuration 1	p. 17

The combinations for central Europe to be analysed in a second step as set forth in ACER decision 11-2022 are not known yet and cannot be found in the cost table to be filled out.

You can also open this table to a new tab to facilitate filling out the questionnaire on the following pages.

What do we mean with transition costs

The definition of transition costs is set forth in article 15.11 (a) of the Methodology. Transition costs:

- Are 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;
- Shall include an estimation of the cost of amending existing contractual obligations incurred by market participants, NEMOs and TSOs. Such estimation shall reflect the expected implementation timeline for an eventual BZ change, and the fact that when deciding on the implementation date, Member States are required to balance the need for expeditiousness with practical considerations, including forward trade of electricity.

Transition costs arise for different reasons, such as changes to business processes or adjustment of private contracts, and they are incurred by different actors, such as retailers, grid operators, traders or power exchanges. The purpose of this questionnaire is to gather empirically estimates of the different transition costs from different stakeholders. In subsequent steps these estimates will be analysed and extrapolated based on the received information to quantify transition costs for the reconfiguration of bidding zones.

Examples of transition costs include:

- re-structuring of teams responsible for specific bidding zones;
- re-negotiation of on-going contracts; and
- costs of adapting existing IT processes to specific BZ configurations.

Transition costs do **not include**:

- IT investments necessary to introduce flexibility of the IT systems in general; or
- a devaluation of assets due to price changes.

How we are going to treat and process the data

The transition cost evaluation used in the assessment of BZ configurations will greatly depend on the results of the two questionnaires on transition costs. Cost estimates are based on the cleaned data from the previous questionnaire, complemented, as the case may be, with the additional responses received with this second questionnaire. Specifically, the data from both questionnaires is checked for robustness by standard methods like a comparison to benchmarks, matching techniques and statistical techniques. Please note that some of the questions are included to control for and test confounding factors and are not included as transition costs themselves. The total cost per market participant group, bidding zone and bidding zone reconfiguration is then extrapolated by scaling the cost estimates based on various market metrics. Due to the remaining uncertainty following from this approach, the cost estimates are depicted as a range. In addition, the relative importance of the different transition cost categories is evaluated and the impact of a change in lead time for the different market participants is analysed. Therefore, all responses are highly appreciated, and additional written remarks are requested.

We would like to make the respondents aware that the **data submitted will not be shared with any market participant**. However, **anonymised versions** of this questionnaire might be shared with the responsible national regulatory authorities and/or ACER.

The next section will provide an overview of the cost categories used for the questionnaire. Afterwards, the questionnaire itself is structured as follows: The first sub-section enquires about the background and market role of the recipient. The second section covers the actual cost estimates. The third and last section addresses the effects of intra-company transactions on liquidity, a topic not directly related to transition costs, but relevant for the overall BZ review.

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Adjustment to or termination of **contracts and regulation**	Costs incurred by amending existing contracts to BZ reconfiguration 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	▪ Any examples not covered above

3 Questionnaire

3.1 General questions

1. Please provide your company name, address, as well as contact details for questions (e-mail and telephone number).
   Name: _____
   Company name: _____
   Address: _____
   Contact details, e-mail: _____
   Contact details, phone: _____

2. As what kind of organisation do you qualify?

   ☐ Generator or storage operator
   ☐ Large-scale industrial consumer
   ☐ Energy trader
   ☐ Retailer
   ☐ Aggregator
   ☐ NEMO, clearing house, derivative exchange or delegated operator
   ☐ Ministries or National Regulatory Authority
   ☐ TSO
   ☐ DSO
   Other: _____

   a. In case you qualify as a generator or storage operator, consumer, energy trader or retailer/aggregator, what are your generated, consumed or throughput quantities in 2021 in TWh per BZ?

      _____

   b. In case you qualify as a generator, consumer, energy trader or retailer/aggregator, what is your annual turnover per BZ?

      _____

   c. In case you qualify as a generator or storage operator, what is your installed capacity per BZ?

      _____

3. Have you been affected by a past BZ reconfiguration in a way that incurred transition costs?
   ☐ Yes ☐ No

   a. If yes, please note the specific reconfiguration that affected you:

_____

b. If yes, was your main area (the area where you are most active in in terms of generated/ traded/ throughput/ consumed/ overseen volume) of business subject to reconfiguration or have you been affected by a reconfiguration outside your main area of business?

_____

c. If yes, what was the lead-time for this reconfiguration and how did the lead-time affect your transition costs?

_____

3.2 Estimates of transition costs for BZ reconfiguration

In the file below, please share your estimates of the transition costs per cost category you expect to incur in case of a BZ reconfiguration. Please indicate whether you expect your costs to vary across countries and the proposed BZ reconfigurations. If this is the case, please provide your cost estimates for each proposed BZ configuration on the following pages.

Please provide a **lump-sum cost estimate** in the column/field "**total personnel costs**". Please specify additionally, if possible, these **transition costs in terms of full time equivalents (FTEs)** for new and existing staff. Please further estimate, if possible, the **average FTE** cost for the respective cost category. In case no FTE cost is provided, a country standard rate will be assumed.,. Transition costs that are not personnel costs shall be included in the column/field "**other cost**".

In the column/field on the estimate of the share of transition costs independent of company size, please insert your estimation of the share of costs that are **"fixed" costs of a BZ-split**, i.e. which are not dependent on company size.

For your cost estimates, please assume a **lead-time of three years**, meaning that affected entities will have three years of time between the announcement of the BZ reconfiguration and the actual reconfiguration to adjust their operations.

Please provide a clear description of the cost items and corresponding cost estimates in the cell/field "**description of the cost**" for both personnel costs and other costs.

Any cost item for which a clear description is not provided, may be disregarded.

Please fill out the cost estimates in terms of "**2022 Euros**", meaning that you estimate what your costs would be based on the prices of goods and services in 2022. This means that you do not need to make your own estimation with regards to what the prices of, say, IT services will be in the future. Compass Lexecon will then be using consistent inflation assumptions for the different cost estimates.

Please see below an overview of all cost estimates and further information that you will be asked to provide on the following pages.

You can also open this table to a new tab to facilitate filling out the questionnaire on the following pages.

		Personnel costs				Other	Estimated share of transition costs independent of company size	Description of the cost
Transition cost category:	**Transition cost sub-category:**	**Total personnel costs** [EUR]	FTE (**existing staff**) [total #] *	FTE (**new staff**) [total #] *	**Cost** per FTE [EUR / #] *	**Other cost** (in total during lead time) [EUR]	[%]	[text]
Changes to internal and external **business processes** and **IT systems**	IT Systems							
	Business Processes							
Adjustment to or termination of **contracts and regulation**	Re-negotiation, or termination of contracts, depending on their complexity							
	Re-drawing of legislation							
	Other transition costs attributable to adjustment to or termination of contracts and regulation							
Adjustments of **processes with TSOs and public bodies**	Reporting obligations that must be adjusted to be specific for each new BZ							
	Other costs attributable to adjustments of processes with TSOs and public bodies							
Additional costs	Any examples not covered above							

* The columns on existing and new number of FTE [#] and cost per FTE [EUR / #] are optional and can be given in addition to total personnel costs [EUR].

Notes: In case the cost sub-category is not applicable to you, please insert "NA".

Please explain the exact costs in the column “description of the cost”.

FTE = Full Time Equivalents

BZ = Bidding Zone

Please answer the following questions

1. Please indicate which of the following proposed BZ reconfigurations (as listed in ACER decision 11-2022 Annex 1) would affect you

☐ DE2 (2)

☐ FR3 (5)

☐ IT2 (6)

☐ NL2 (7)

☐ SE3 (8)

☐ SE3 (9)

☐ SE4 (10)

☐ SE4 (11)

☐ DE3 (12)

☐ DE4 (13)

☐ DE5 (14)

2. If you were affected by proposed BZ changes in more than one country, do you expect to incur different costs across countries?

☐ Yes ☐ No

   a. If yes, please provide a reasoning why costs would be or would not be different depending on the country

   _____

   _____

   b. b. If yes, please fill in the Excel file, enter your cost estimates for each relevant BZ reconfiguration in a separate tab in the file, and upload the file again.

   c. If no, please give your cost estimates for a BZ reconfiguration on the next page

3. If you were affected by more than one proposed BZ reconfiguration within one country, do you expect to incur different costs depending on the specific BZ reconfiguration?

☐ Yes ☐ No

   a. If yes, please provide a reasoning why costs would be or would not be different depending on the BZ configuration

   _____

   _____

b. If yes, please fill in the Excel file, enter your cost estimates for each relevant BZ reconfiguration in a separate tab in the file, and upload the file again.

c. If no, please give your cost estimates for a BZ reconfiguration on the next page

4. Please indicate your estimated costs and further information for **IT systems** per proposed BZ configuration

   a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

   i. number of existing staff [FTEs] (total number)

   ii. number of new staff [FTEs] (total number)

   iii. costs in the amount of [EUR per FTE]

   b. I expect to bear other costs in the amount of [EUR]

   c. I expect a share of transition costs for IT systems to be independent of company size [%]

   d. Please provide a reasoning for the indicated personnel and other costs

_____

_____

5. Please indicate your estimated costs and further information for **business processes** per proposed BZ configuration

   a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

   i. number of existing staff [FTEs] (total number)

   ii. number of new staff [FTEs] (total number)

   iii. costs in the amount of [EUR per FTE]

   b. I expect to bear other costs in the amount of [EUR]

   c. I expect a share of transition costs for business processes to be independent of company size [%]

   d. Please provide a reasoning for the indicated personnel and other costs

_____

_____

6. Please indicate your estimated costs and further information for **re-negotiation or termination of contracts, depending on their complexity**, per proposed BZ configuration

   a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

   i. number of existing staff [FTEs] (total number)

ii. number of new staff [FTEs] (total number)

iii. costs in the amount of [EUR per FTE]

b. I expect to bear other costs in the amount of [EUR]

c. I expect a share of transition costs for re-negotiation or termination of contracts to be independent of company size [%]

d. Please provide a reasoning for the indicated numbers of personnel and other costs

_____

_____

7. Please indicate your estimated costs and further information for **re-drawing of legislation** per proposed BZ configuration (note: questions i, ii, iii are optional)

a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

i. number of existing staff [FTEs] (total number)

ii. number of new staff [FTEs] (total number)

iii. costs in the amount of [EUR per FTE]

b. I expect to bear other costs in the amount of [EUR]

c. I expect a share of transition costs for re-drawing of legislation to be independent of company size [%]

d. Please provide a reasoning for the indicated numbers of personnel and other costs

_____

_____

8. Please indicate your estimated costs and further information for **other transition costs attributable to adjustment to or termination of contracts and regulation** per proposed BZ configuration (note: questions i, ii, iii are optional)

a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

i. number of existing staff [FTEs] (total number)

ii. number of new staff [FTEs] (total number)

iii. costs in the amount of [EUR per FTE]

b. I expect to bear other costs in the amount of [EUR]

c. I expect a share of transition costs for other transition costs attributable to adjustment to or termination of contracts and regulation to be independent of company size [%]

d. Please provide a reasoning for the indicated numbers of personnel and other costs

_____

_____

9. Please indicate your estimated costs and further information for **reporting obligations that must be adjusted to be specific for each new BZ** per proposed BZ configuration

   a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

   i. number of existing staff [FTEs] (total number)

   ii. number of new staff [FTEs] (total number)

   iii. costs in the amount of [EUR per FTE]

   b. I expect to bear other costs in the amount of [EUR]

   c. I expect a share of transition costs for reporting obligations that must be adjusted to be specific for each new BZ to be independent of company size [%]

   d. Please provide a reasoning for the indicated numbers of personnel and other costs

_____

_____

10. Please indicate your estimated costs and further information for **other costs attributable to adjustment of processes with TSOs and public bodies** per proposed BZ configuration

   a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

   i. number of existing staff [FTEs] (total number)

   ii. number of new staff [FTEs] (total number)

   iii. costs in the amount of [EUR per FTE]

   b. I expect to bear other costs in the amount of [EUR]

   c. I expect a share of transition costs for other costs attributable to adjustment of processes with TSOs and public bodies to be independent of company size [%]

   d. Please provide a reasoning for the indicated numbers of personnel and other costs

_____

_____

11. Please indicate your estimated costs and further information for **any examples not covered above** per proposed BZ configuration

   a. I expect to bear total personnel costs in the amount of [EUR]

Total personnel costs under (a.) are broken down into (i, ii, iii); to be answered if possible:

   i. number of existing staff [FTEs] (total number)

ii. number of new staff [FTEs] (total number)

iii. costs in the amount of [EUR per FTE]

b. I expect to bear other costs in the amount of [EUR]

c. I expect a share of transition costs for any examples not covered above to be independent of company size [%]

d. Please provide a reasoning for the indicated numbers of personnel and other costs

_____

_____

12. Please indicate which of the following developments in costs you would expect from a lead time of more than three years until the BZ reconfiguration?

☐ Same costs

☐ Lower costs

☐ Higher costs

a. If you expect higher or lower costs, please provide a reasoning why this would be the case

_____

_____

13. Please indicate which of the following developments in costs you would expect from a lead time of less than three years until the BZ reconfiguration?

☐ Same costs

☐ Lower costs

☐ Higher costs

a. If you expect higher or lower costs, please provide a reasoning why this would be the case

_____

_____

3.3 Effects of intra-company transactions on liquidity

This section specifically applies to market participants with generation and retail positions that are currently within a single BZ, but which will be spread across different zones after the BZ reconfiguration is implemented.

1. Do you have generation assets or hold retail positions that will be spread across different zones after the BZ reconfiguration?

☐ Yes ☐ No

a. If yes, assuming no changes to today's market and portfolio landscape, how are the shares of generation or retail distributed across reconfigured zones in TWh per year?

2. Please consider the three exemplary market cases below and briefly explain what kind of decision making you would expect in each example. For your answers, consider a short- to medium-term of 4 to 5 years and a market without implicit BZ third-party access.

   a. After the BZ reconfiguration, 60 MWh of generation are in a bidding zone without a retail position. Will the market participant/you go through the market, which would increase market liquidity, adjust physical production or retail positions, or approach the reconfiguration through other means (such as buying cross-border transmission rights)?

Positions in BZ 1 and 2 after reconfiguration

	BZ 1	BZ 2
Physical production position	20 MWh	80 MWh
retail position	80 MWh	20 MWh

   b. After the BZ reconfiguration a retail position of 20 MWh has no physical production position in the same BZ. Would the market participant/you withdraw the retail position from BZ 2, rely on the market (and own physical position in BZ 1) to supply the retail position, or approach the reconfiguration through other means (such as buying cross-border transmission rights)?

Positions in BZ 1 and 2 after reconfiguration

	BZ 1	BZ 2
Physical production position	100 MWh	0 MWh
Retail position	80 MWh	20 MWh

c. After the BZ reconfiguration, a production position of 20 MWh has no corresponding retail position in the same BZ. Would the market participant/you withdraw the production position, sell the generated electricity through the market, or approach the reconfiguration through other means (such as buying cross-border transmission rights)?

Positions in BZ 1 and 2 after reconfiguration

	BZ 1	BZ 2
Production position	20 MWh	80 MWh
Retail position	0 MWh	100 MWh

3.4 Additional remarks

Berlin
Kurfürstendamm 217
Berlin, 10719

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23 Square de Meeûs
Brussels, 1000

Copenhagen
Bredgade 6
Copenhagen, 1260

Düsseldorf
Kö-Bogen
Königsallee 2B
Düsseldorf, 40212

Helsinki
Unioninkatu 30
Helsinki, 00100

London
5 Aldermanbury Square
London, EC2V 7HR

Madrid
Paseo de la Castellana 7
Madrid, 28046

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Milan, 20121

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22 Place de la Madeleine
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