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The influence of existing bidding zones on electricity markets

Consultation document

Undertaken in the context of the joint initiative of ACER and ENTSO-E for the early implementation of the Network Code on Capacity Allocation and Congestion Management (CACM) with respect to the review of bidding zones

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This consultation document is issued to invite comments in the context of the joint initiative of ACER and ENTSO-E for the early implementation of the Network Code on Capacity Allocation and Congestion Management (CACM) with respect to the review of bidding zones in some parts of Europe.

This consultation is open to all interested stakeholders, who are invited to submit their comments by:

30 September 2013
24.00 hrs (CET)

by sending them to the following address:

consultation2013E04@acer.europa.eu

This document contains a number of specific questions for consultation. Stakeholders are invited to address the issues raised in the questions, as well as to provide any other comment, which they may have. In order to identify your response, please include the following contact information on the top of your answer sheet: Name, Company, Address, Contact email, Phone and Country.

Following the public consultation period, ACER will publish all answers received from stakeholders. Stakeholders should also consider that confidential answers should be used in a limited way. ACER advises stakeholders to claim confidentiality only on commercially sensitive information and to ensure that a non-confidential version is also submitted.

Related documents

- Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0001:0014:EN:PDF>
- Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross border exchanges in electricity and repealing Regulation (EC) No 1228/2003
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0015:0035:EN:PDF>
- Framework Guidelines on Capacity Allocation and Congestion Management for Electricity, 29 July 2011, FG-2011-E-002
[http://www.acer.europa.eu/portal/page/portal/ACER_HOME/Public_Docs/Acts%20of%20the%20Agency/Framework%20Guideline/Framework_Guidelines_on_Capacity_Allocation_and_Congestion_M/FG-2011-E-002%20\(Final\).pdf](http://www.acer.europa.eu/portal/page/portal/ACER_HOME/Public_Docs/Acts%20of%20the%20Agency/Framework%20Guideline/Framework_Guidelines_on_Capacity_Allocation_and_Congestion_M/FG-2011-E-002%20(Final).pdf)
- Network Code on Capacity Allocation and Congestion Management (CACM), ENTSO-E's final proposals, 27 November 2012
<https://www.entsoe.eu/major-projects/network-code-development/capacity-allocation-and-congestion-management>
- Terms of Reference for the early implementation of the NC CACM concerning a Bidding Zone Review in CWE (Belgium, France, Germany, Luxembourg, the Netherlands), Denmark-West, CEE (Austria, Czech Republic, Germany, Hungary, Poland, Slovenia, Slovakia) Switzerland and Italy, October 2012
http://ec.europa.eu/energy/gas_electricity/doc/forum_florence_electricity/20121123_023_meeting.zip

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1 Introduction

This consultation document is issued in the context of the joint initiative of the Agency for the Cooperation of Energy Regulators (Agency) and ENTSO-E for the early implementation of the Network Code on Capacity Allocation and Congestion Management (CACM) with respect to the review of bidding zones in some parts of Europe.

On 30 August 2012, the Agency invited ENTSO-E to initiate a pilot project on the bidding zone review process described in the draft CACM Network Code. This process concerns the geographical area consisting of the Central-West Europe (CWE) region (i.e. Belgium, France, Germany, Luxembourg, the Netherlands), Denmark-West, the Central-East Europe (CEE) region (i.e. Austria, Czech Republic, Germany, Hungary, Poland, Slovakia, Slovenia), Switzerland and Italy.

According to the Terms of Reference (ToR) presented by ENTSO-E at the Florence Forum in November 2012, this review process consists in four core activities:

- Activity 1: **Technical report.** The involved TSOs shall draft a Technical Report as foreseen in the draft CACM NC. The Technical report shall analyse technical aspects of congestion management such as physical congestions, physical flows, operational security and application of remedial actions.
- Activity 2: **Market report.** The involved National Regulatory Authorities (NRAs), under the coordination of the Agency, shall evaluate the influence of bidding zones on the market, which may also include the evaluation of market structure and possible market power issues.
- Activity 3: **Decision to launch a review of bidding zones.** The decision must be made by the involved NRAs or by the Agency, however, the Agency's invitation to ENTSO-E from 30 August 2012 is considered as an invitation to perform the whole process and thus the decision to launch a bidding zone review (activity 3) may be considered as already made.
- Activity 4: **Review of bidding zones.** The involved TSOs will carry out the full review process by comparing different bidding zone configurations with respect to the overall market efficiency (as foreseen in the draft CACM NC).

This consultation document and questionnaire aim to help NRAs and the Agency to perform the assessment required for the Market report (Activity 2), which may also include the evaluation of market structure and market power issues, and may include quantitative as well as qualitative analysis.

For this purpose, all interested stakeholders are invited to submit their feedback to this questionnaire by 30 September 2013. This document explains the context of the bidding zones review process and contains a number of specific questions for consultation. All stakeholders, even those not active in the geographical scope of this pilot project, are invited to participate. Stakeholders are asked to specify which specific zones they are considering when responding, and may provide different responses for different areas or regions.

Stakeholders should note that the early implementation of the CACM NC provisions concerning the bidding zone review is challenging, on the one hand, for the novelty of the process and, on the other hand, for the novelty of the content. Comments are therefore welcome on both aspects.

It should be understood that the bidding zone review process based on a legally binding network code could be initiated only once the comitology process is completed and the CACM NC enters into force. Moreover, it is evident that any amendments made to the code during the comitology

process cannot be taken into consideration in the present early implementation of the bidding zones review process.

2 The influence of bidding zones on the functioning of electricity market

In the context of this consultation the functioning of electricity markets is being looked at from the perspective of the structure of bidding zones, which is an important element defining how the market works on a regional or European level. This chapter describes different market designs and advantages and disadvantages of the zonal design in various forms.

2.1 Zonal market model

Electricity is not a standard commodity. The currently limited and very costly storage capacity, the requirement of a continuous balance of generation and demand, the laws of physics that govern the flows of electricity and the available infrastructure have a strong influence on market organisation and design.

In general, congestions and capacity allocation limit the trading possibilities and competition in the market. In particular, due to the laws of physics, the share of electrical flows through the network depends upon the physical location of injections in and withdrawals from the network. Operational security constraints and the physical limits characterising the transmission network restrict possible combinations of injections and withdrawals in the network.

Due to limited transmission infrastructure, the flow of electricity from generators to loads may cause problems related to operational security (such as overloading of network elements). To avoid these problems, congestion management aims at managing the limited transmission capacity.

There are different congestion management designs. The zonal design defines limited geographical areas (zones) within which trading between generators and loads is unlimited. However, to cope with operational security constraints of the network, trading between these areas is limited by transmission capacity based on capacity calculation and allocation process. An extreme implementation of this approach would result in one large bidding zone (copper plate) without capacity allocation and where all operational constraints are tackled via remedial actions. The nodal design considers all trades between generators and loads as equal in terms of using the infrastructure. While in nodal design the bid price and quantity of each generator and load is weighed against its influence on the physical network, in zonal design only the import or export of electricity in each bidding zone is weighed against its influence on the physical network.

In the zonal design, congestion management methods consist of preventive and in curative methods. Preventive methods define ex-ante limitations to trade by calculating the cross zonal capacities and allocating them efficiently to market players so that they can decide on how to dispatch generators and loads. Curative methods aim at modifying this initial dispatch when operational security is endangered with methods such as redispatching or countertrade. These can also be classified as non-costly (e.g. topology switching, positioning the phase shifting transformers – PSTs) or costly (e.g. redispatching and countertrading).

The costs of undertaking costly remedial actions are often socialised on all consumers of a bidding zone through transmission tariffs. In general, the larger the zone, the larger the proportion of congestions managed by redispatching; however, this also depends on the strength of the network within the zone. In other words, the aggregation of nodes into zones may have a

side effect on the quantity of remedial actions the TSO needs to apply in order to ensure operational security.

The European Target Model foresees a zonal approach implying the implementation of a mainly preventive way to tackle congestions between properly defined bidding zones by calculating and allocating cross-zonal capacities. Remaining (mainly inside zones) congestions shall be managed by curative measures such as redispatching or countertrade.

2.2 *Loop flows*

The two basic assumptions linked to the zonal design are the absence of limitation to trading inside each bidding zone and the absence of influence of trading inside a zone on neighbouring zones. In reality however, trading inside one zone causes flows that have an impact on other zones (i.e. loop flows) and have a priority over cross-zonal trading. As loop flows are not controlled by capacity calculation and allocation, the TSOs can only control them by applying remedial actions.

While market participants in large zones benefit from high liquidity and competition and the same price over a large area, this can create loop flows in neighbouring bidding zones, which, if violating security limits, may result in increased redispatching costs in these zones and in the reduction of cross-zonal capacities on some borders. In particular, large bidding zones induce higher uncertainty in capacity calculation, which may result in higher reliability margins and reduction of cross-zonal capacity given to the market.

There are two possible approaches to tackle this problem. On the one hand, a proper bidding zone configuration may balance the potential discrimination between market participants in different zones through decreasing the amount of loop flows, via introducing limited capacity and congestion management mechanisms on the borders between zones. On the other hand, the amount of loop flows can also be reduced by investing in the network and improving the topology of the network.

2.3 *Market liquidity*

At first glance, the larger the zone, the higher the volume (liquidity) of trade cleared into the zone. A reduction in the size of the zone may be interpreted as a reduction in the liquidity of the short-term (day-ahead, intraday) markets inside this zone. This is, however, a too simplistic view, since the liquidity of the market is not only influenced by trades inside the zone, but also by trades between the zones. Thus, an important parameter here is the overall liquidity of all zones covering a given territory. In particular, when trading between zones is organised through implicit auctions or market coupling, the volume (liquidity) of cross-zonal trade will add to the liquidity of trading inside the zones and the overall liquidity in the power exchanges can increase.

2.4 *Price hedging*

Market players are normally interested to hedge themselves well ahead of the delivery of electricity against the uncertainty arising from the volatility of prices in different bidding zones. Therefore, having the same price in the bidding zone has the positive effect that all market participants, regardless of where their generation or load is located within the bidding zone, can use the same hedging instrument (e.g. forwards and futures) to hedge the price in the bidding zone. This enables trading with such hedging instruments and the bigger the bidding zone the

higher the liquidity of these hedging instruments. Nevertheless, liquidity of hedging instruments in smaller zones is usually poor. In Continental Europe, Physical Transmission Rights or Financial Transmission Rights may be used as a hedge against congestion costs and they may help the liquidity of the forward hedging market. These transmission rights could bridge between a zone with liquid hedging products and a zone with illiquid hedging products.

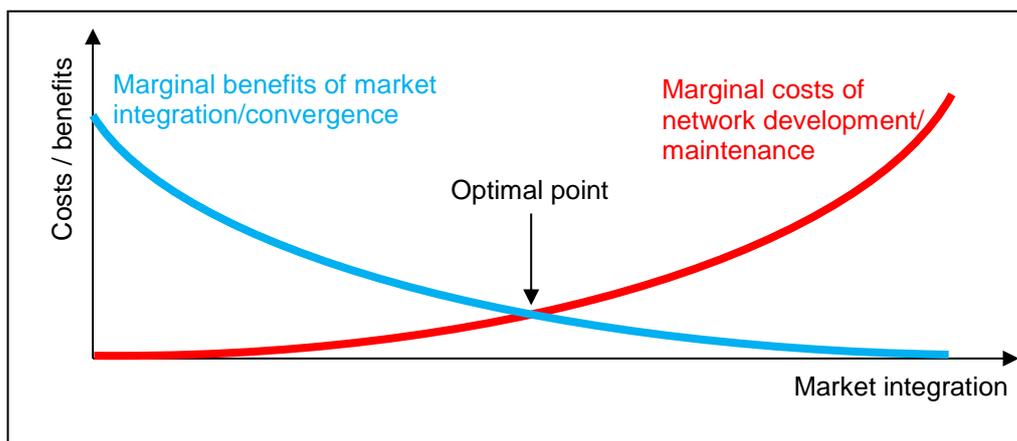
Nevertheless, there are designs of hedging instruments, which enable liquidity in the forward market even in the presence of smaller bidding zones (e.g. Nordic countries).

In addition, while there are several instruments to hedge against the volatility of energy prices, there are no such tools on the market to hedge the costs of ancillary services.

2.5 Investment signals

The configuration of bidding zones impacts economic signals for investments. The more the bidding zones configuration reflects the physical network constraints, the more efficiently the congestion rents provide economic signals for cross-zonal network development and the price signal for generation investments.

It is often perceived that the most efficient market is the one where no congestion exists and that the network should be developed to the degree that, for example, the whole of Europe would be one bidding zone. While this is certainly true with respect to the efficiency of the market, the overall efficiency of electricity delivery is not just about the efficient competition between generators and loads and efficient price formation, but also efficient operation and development of the networks. Hence, in theory, one should strengthen the network only to the point where the marginal costs of network development, maintenance and operation are equal to the marginal benefits of further market integration and price convergence. The picture below illustrates that a full copper plate in Europe would not be efficient as this would entail investments costs, which would far exceed the benefits of price convergence.



Nevertheless, given the timeframe expected to implement a new bidding zone configuration, the future network development needs to be taken into account. Moreover, a new review of the bidding zones may be needed once the network is significantly changed due to new investments.

The review of the bidding zones configuration may have impacts on investments in generation and consumption. In particular, in case the review process leads to a new configuration, some generators may be called to participate to the capacity allocation and congestion management process with previously unforeseen costs and risks.

2.6 Market power

Market power is defined as the ability of a firm to profitably increase market price above the competitive level, by reducing its output or directly raising its price. Market structure and limitations to trade imposed by the transmission network, which affect the definition of the relevant market, are key elements for the appraisal of competition in electricity. In this section we tackle general market power, when some market players are dominant in the market to the degree that they can alone influence prices, and locational market power, when certain generators or loads are located very close to network elements that are frequently congested and are often needed to solve congestions.

The relation between market power and the size of the bidding zone is not straightforward. On the one hand, it may be argued that the larger the bidding zone, the lower the market power that any market player may exert in the day-ahead market, due to the increased liquidity in the bidding zone. On the other hand, it may be argued that due to a better appraisal of network congestions and the increase of transmission capacities, the reduction of zone size allows for an increase of cross-zonal competition¹.

Redispatching is very often organised in a non-market based way and this induces further costs (i.e. loss of social welfare), which are not visible within the day-ahead market coupling. Competition in redispatching is weaker than competition in the day-ahead market coupling. Therefore, with an increase of redispatching linked to zone size, it may be argued that the decrease of general market power in larger zones may be counterbalanced by the increase of (locational) market power of some market players in the redispatching market. However, the magnitude of market power effects (i.e. price increase and volume of energy affected) can be quite different in both markets (i.e. day-ahead and redispatching).

Locational market power is inherently present in the electricity market regardless of zonal or nodal design, because some generators and loads are inherently more suitable to solve the congestion in specific locations in the network.

Nevertheless, the locational market power can be mitigated to some degree. In the case of smaller zones or nodal pricing, remedial actions are more likely replaced by day-ahead market coupling, solving the congestion based on the bids from all generators and thus the generator with locational market power is faced with more competition in solving the congestion. On the other hand, in larger zones, congestions are more often solved by redispatching, where a cost-based or market based activation is implemented.

3 Consultation questions

In responding to the public consultation, please specify whether the answer is general or whether it is related to a specific bidding zones (please specify which one). Wherever possible, please justify your opinion with qualitative or quantitative arguments or some references. In particular, we welcome any comments on the following questions:

- 1) How appropriate do you consider the measure of redefining zones compared to other measures, such as, continued or possibly increased application of redispatching actions or

¹ Scott M. Harvey and William W. Hogan, Nodal and Zonal Congestion Management and the Exercise of Market Power, January 10, 2000

increased investment in transmission infrastructure to deal with congestion management and/or loop flows related issues? What is the trade-off between these choices and how should the costs attached to each (e.g. redispatching costs) be distributed and recovered?

- 2) Do you perceive the existing bidding zone configuration to be efficient with respect to overall market efficiency (efficient dispatch of generation and load, liquidity, market power, redispatching costs, etc.) or do you consider that the bidding zone configuration can be improved? Which advantages or disadvantages do you see in having bidding zones of similar size or different size?
- 3) Do you deem that the current bidding zones configuration allows for an optimal use of existing transmission infrastructure or do you think that existing transmission infrastructure could be used more efficiently and how? Additionally, do you think that the configuration of bidding zones influences the effectiveness of flow-based capacity calculation and allocation?
- 4) How are you impacted by the current structure of bidding zones, especially in terms of potential discrimination (e.g. between internal and cross-zonal exchanges, among different categories of market participants, among market participants in different member states, etc.)? In particular, does the bidding zones configuration limit cross-border capacity to be offered for allocation? Does this have an impact on you?
- 5) Would a reconfiguration of bidding zones in the presence of EU-wide market coupling significantly influence the liquidity within the day-ahead and intraday market and in which way? What would be the impact on forward market liquidity and what are the available options to ensure or achieve liquidity in the forward market?
- 6) Are there sufficient possibilities to hedge electricity prices in the long term in the bidding zones you are active in? If not, what changes would be needed to ensure sufficient hedging opportunities? Are the transaction costs related to hedging significant or too high and how could they be reduced?
- 7) Do you think that the current bidding zones configuration provides adequate price signals for investment in transmission and generation/consumption? Can you provide any concrete example or experience where price signals were/are inappropriate/appropriate for investment?
- 8) Is market power an important issue in the bidding zones you are active in? If so, how is it reflected and what are the consequences? What would need to be done to mitigate the market power in these zones? Which indicator would you suggest to measure market power taking into account that markets are interconnected²?
- 9) As the reporting process (Activity 1 and Activity 2) will be followed by a review of bidding zones (Activity 4), stakeholders are also invited to provide some expectations about this process. Specifically, which parameters and assumptions should ENTSO-E consider in the review of bidding zones when defining scenarios (e.g. generation pattern, electricity prices) or alternative bidding zone configurations? Are there other aspects not explicitly considered in the draft CACM network code that should be taken into account and if so how to quantify their influence in terms of costs and benefits?

² This information would be primarily useful for ENTSO-E when performing the bidding zone review process (Activity 4)

- 10) In the process for redefining bidding zones configuration, what do you think are the most important factors that NRAs should consider? Do you have any other comments related to the questions raised or considerations provided in this consultation document?



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