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Report

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TSO-TSO-DSO Cooperation: How to align System Operation in Future Power Markets?

Summary Report on Future Power Markets Workshop, held in Berlin on 27 June 2014

Karsten Neuhoff¹, Sophia Ruester², and Sebastian Schwenen³

SUMMARY

With increasing variability of demand and supply, transmission system operators (TSOs) across Europe adapt their internal processes and operational approaches. These processes comprise different interfaces with other market participants (e.g. via balancing markets, reserve procurement or NTC calculation). However, currently internal TSO approaches and market interfaces differ widely among TSOs in Europe. Different methods of reserve procurement, balancing rules, gate closure and algorithms for market clearing prevail. The Target Model aims at improving this situation and therefore is concerned with the definition and alignment of market protocols for these different interfaces. However, currently the focus lies on information exchange and to some extent a standardization of balancing energy products. Placing the core of TSO operation itself, also for system-services and internal market clearing processes, in the center of the debate, could lead to additional benefits both with respect to cross-border network operation as well as cross-border energy trade.

Challenges with horizontal coordination among neighboring TSOs

Horizontal coordination among neighboring TSOs is needed and already undertaken today, as for instance with the calculation of cross-border net transfer capacity. However, with increasing penetration of intermittent renewable energy sources, uncertainty about their real-time feed-in, uncertainty on loop-flows, and thus uncertainty about what conventional units (and where these are located on the grid) will run in real-time will rise in future power markets. This increases the importance of cross-border intraday and balancing trades to operate a balanced network, as well as of an efficient procurement of reserves for balancing. Ultimately, the need for coordination among TSOs will increase with respect to network operation as well as with respect to interfaces to market participants.

However, approaches to system operation differ across the EU, and thus establishing increasing coordination is challenging. Approaches to internal TSO operation differ naturally, as power grids are more or less highly meshed throughout Europe, and some power systems, for instance in the south, face less connections with neighboring systems than for instance the Swiss power system. In addition, power systems throughout the EU rely on different clearing algorithms, ranging from simple bids to different degrees of complex bids (block bids, start-up bids, ...).

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The currently drafted Network Codes (NC) attempt to bridge this gap between different TSO approaches. However, Network Codes rather stay at the surface and try to align the procedures of the different TSOs, that is, information may be shared and standardized. The core of TSO tasks is not considered. For instance, common products for reserve procurement or market clearing algorithms are not addressed, respectively aligned. In this vein, the core operational TSO approaches are kept outside of the Network Codes, and thus market interfaces from each TSO to European power market players remain to diverge. This situation is mirrored by the fact that, on the political level, there is no clear decision on what way to take from the status quo (in order to closely align the underlying processes and market interfaces of TSOs). Instead, the discussion rather focusses on a wide range of technical details (as for instance related to capacity allocation procedures), making an overarching, political picture even more blurred on what way TSO cooperation/regulation could take.

Eventually, responsibilities for further alignment are not clearly defined between regulators, TSOs and market players (including power exchanges). For instance, responsibilities are not clear for deciding on a common market clearing algorithm with, say, complex bids, that a group of neighboring TSOs and power exchanges could agree on and implement. What would the different actors have to deliver to implement such a process? And after all, who could start this process inter-regionally?

That a joint approach offers benefits is mirrored by the fact that utilities demand consistency and even more so, transparency on TSO approaches (for next steps as well as on current practices that are still “hidden” to some degree, as for instance with paradoxically rejected bids, i.e. bids that were in the money but rejected from market clearing). However, TSOs when trying to address transparency concerns again have to double-check required steps with the regulator and to make sure their actions are in line with regulation. Given that across the EU, 27 national regulators and 27+ TSOs exist, such processes face diverse institutional barriers.

To conclude, cooperation is not sufficient, and while the target model clearly offers improvements over the status quo, a convergence in core TSO approaches still needs to be developed.

Challenges with vertical coordination among TSOs and DSOs

Vertical coordination of TSOs and downstream distribution system operators (DSOs) adds further institutional constraints, as DSO ownership and regulation are very heterogeneous across the EU and even within Member States. While in Germany more than 800 DSOs co-exist, of which the vast majority is exempted from unbundling requirements, in the UK for example only 19 DSOs operate, for which no exemptions from unbundling are offered.⁴ Today, hardly any TSO-DSO cooperation takes place, but it will be needed in the future: TSOs start asking for direct connection to Demand Response, Distributed Generation and Demand Side Management resources connected to the distribution level.

This demand for distributed energy resources could even lead to competition among DSOs and TSOs for the same resources that can provide balancing services, but also e.g. help to manage temporary

⁴ See EC SWD (2012) 368: Energy Markets in the European Union in 2011.

congestions in the grid. It therefore can be debated, whether a distinction between DSOs and TSOs is still beneficial. If DSOs and TSOs remain in their current ownership and regulatory structures, a new standardization on their tasks seems to be mandatory along with some standardization on the information provided to each other. If an efficient alignment of DSOs and TSOs is not possible, DSOs may hinder valuable aggregation of energy and system services of distributed energy sources. TSOs and DSOs might have diverging interests, and the enforcement of such a regulation/standardization likely will be difficult. Changes in operation of DSOs moreover are likely to occur slowly, as DSOs act within a difficult regulatory environment, being regulated by national regulators as well as partly by municipal authorities.

Ultimately, the difficulties on vertical coordination between TSOs and DSOs further aggravate the complexity of cooperation among TSOs: how can TSOs coordinate when each TSO faces a variety of differently governed DSOs? However, in future power market a better exploitation of real-time information on sources at distribution level will be required, be it through market- or some other mechanism.

The Target Model – ways forward and outlook

Given the uncertainties discussed for both TSO-TSO as well as TSO-DSO cooperation, Network Codes have to be drafted with care to avoid a lock-in into a harmful regulatory regime. Furthermore, the point was raised, that, if capacity markets will be implemented throughout the majority of EU Member States, this development will change the workings of the Network Codes, which were drafted with energy-only markets in mind mostly. Given the uncertainty in politics, what happens if technicians in the end will agree on a Network Code, while disregarding the politics? Today, the Target Model indeed seems to be drafted with care, with much focus on information sharing, leaving TSO core approaches and market interfaces to the respective TSOs.

One possible way forward could be starting regionally with implementing the Target Model, such that it may remain a careful change so as to avoid the regulatory lock-in. Regionally, TSOs cooperate already (Coreso, TSC, Nordic, Mebel). These regional initiatives could be a driving force for the implementation of the Target Model, while at the same time also aligning their core tasks and approaches in one step, thus going a step further. However, this process still requires regional regulatory initiatives parallel to the TSO initiatives. On the other hand, regional TSO initiatives in the first place were formed grouping already similar TSOs together. Thus, relying on these groups might also lead to even more diverging approaches – across the TSO groups that align on entirely different regimes. A joint EU approach and guidance will have to prevail.

To conclude, the workshop discussion showed that TSO operational approaches strongly differ across EU power system and offer a variety of different interfaces to the market, such as for balancing or reserve procurement. Furthermore, TSO-DSO cooperation is far from being well established, even though becoming ever more important with the emergence of distributed energy sources. While the Target Model is a careful and valuable step forward in aligning system operation, the core of TSO operation likely will remain a field for further debates to simplify market interfaces for EU-wide acting utilities and to facilitate network operation in a market with highly volatile (cross-border) demand and supply patterns.