



# Intraday Markets for Power: Discretizing the Continuous Trading?

EPRG Working Paper 1609

Cambridge Working Paper in Economics 1616

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## Non-Technical Summary

Increasing shares of wind and solar electricity generation result in increasing volumes of intraday trading pursued by market participants to adjust production schedules to updates to wind- and solar forecasts. Responding to this increasing trading volume, EPEX has implemented a first set of intraday auctions in Germany for 15 minute long products to complement the existing continuous intraday trading. This provides an opportunity to evaluate the market performance outcomes if auctions are added to continuous trading.

Our findings are of interest for the European discussion regarding which approach to choose towards integration of intraday markets. The Capacity Allocation and Congestion Management (CACM) formulated by the European Commission allows for both, the use of continuous and auction based intraday trading. However, in recent years the Cross-Border Intraday project (XBID) only aims to link continuous trading systems, not auction based trading. Orders entered by market participants in one country are matched by orders submitted by market participants in any other country, provided there is cross-border capacity available. However, the

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The authors would like to thank David Newbery and Sebastian Schwenen as well as various industry experts including from the Future Power Market Platform [www.diw.de/fpm](http://www.diw.de/fpm) for review comments and the German Federal Ministry for Economy Affairs and Energy for funding as part of the Project EUREEM.



implementation has been delayed because of complexities of the legal and the technical challenges of continuous matching.

For the market design of the European power markets, the 15 minute intraday auction introduced in Germany in December 2014 gives an interesting comparison point between auctions and continuous trading. The most obvious benefits are for small market players not equipped for continuous 24/7 trading and in terms of price revelation (from the start of the intraday market). We have investigated the behavior of the 15minute intraday market through some key indicators of market efficiency such as liquidity/market depth and price volatility. We observe that the additional auction increases liquidity, leads to a higher market depth (the revelation of market participant's capacity/flexibility) and to a reduced price volatility.

In a qualitative way, this paper highlights some additional features associated with auctions, such as their contribution to security of operation through a higher operational reliability, the deterrence of the high frequency continuous arms race, the setup of a reference point in terms of liquidity for the settlement of hedging products (that will be pivotal in a market with a very large share of renewables where volatility as hedging needs are expected to increase), the facilitation of a more efficient allocation of transmission capacity intraday (notably by enabling flow-based allocation), and guarantee that scarcity value of transmission capacity is signaled and can contribute to reduced transmission costs for consumers.

Future research should focus on the design features of such auctions. In particular it will be important to evaluate bid formats that allow market participants to provide full flexibility to the market, while facilitating rapid market clearing. Promising options such as multi-part bids can accommodate different physical/technical needs. Also the frequency at which intraday auctions are executed warrants further analysis of potential trade-offs between market/position re-balancing opportunities and liquidity – as well as opportunities of bid formats that are compatible with standing orders and can thus combine market depth with higher frequency auctions. Finally, the use of the available cross-zonal capacity by the auction should be assessed. This important question is linked to the accuracy of information provided to the TSO and the way the TSOs will re-calculate flow patterns based on updated information so as to allow for effective and secure network use.

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Financial Support

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March 2016

German Federal Ministry for Economy Affairs and Energy funding as part of the Project EUREEM

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