

Impact of balancing market design on business case for storage

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VALUE OF STORAGE



Business case of storage depends on the ENTIRE value stack



VALUE OF STORAGE





STORAGE IN THE BALANCING MARKET -GOOD CANDIDATE?



Rapidly falling costs

Fast reaction time

 \rightarrow a perfect candidate for FCR

What is in there for storage?

- High prices for FCR balancing capacity (the most concentrated market) ٠
- Current price levels in aFRR/mFRR markets: very high for balancing energy, although differ considerably among countries; rather low balancing capacity prices as compared to the FCR market.



TO PUT THINGS IN PERSPECTIVE...

FCR RESERVE REQUIREMENT IN GERMANY





TO PUT THINGS IN PERSPECTIVE...

FCR RESERVE REQUIREMENT IN GERMANY



* Data as of beginning of 2018. This is meant to illustrate potential use of sotrage units currently in operation and does not imply that all the units currently participate in the FCR market.



62%*

TO PUT THINGS IN PERSPECTIVE...

FCR RESERVE REQUIREMENT IN GERMANY

Battery storage has a potential to cover ~90% of the demand for Frequency Containment Reserve in the German balancing market

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BUSINESS CASE FOR STORAGE IN EU COUNTRIES? – COUNTRY EXAMPLES

In Germany, around 4 suppliers use storage systems for FCR balancing service provision: currently, only participates in the FCR market.

- In the UK, first provider with 150MW of battery storage as part of a VPP was granted access to the balancing market in August 2018.
 - Pilot project in the Netherlands, commissioned by TenneT this fall, uses an EV fleet for the provision of aFRR as part of a VPP, including DR, vRES and micro-CHP plants.

In Belgium, 2-MW battery used for FCR in combination with other resources as part of a virtual power plant (VPP).



BUSINESS CASE FOR STORAGE IN EU COUNTRIES? SOME STUMBLING BLOCKS...

Access to the balancing market (BM)

- Market access varies among countries and decentralized storage is not always allowed to participate
- Pooling/aggregation not necessarily allowed (e.g. the Netherlands)
- Some countries, e.g. Germany, provide special conditions* for storage, either as a battery pool or as part of a VPP, due to a long duration of activation.

The EU principle of a level playing field: Are special conditions justified or shall access requirements be adjusted to allow participation of all kinds of providers?

Balancing auction configuration complicates participation:

- Min. bid sizes,
- Long contracting periods (a week or longer)
- Low product resolution, etc.

* cf. "Anforderungen an die Speicherkapazität bei Batterien für die Primärregelleistung"



ENERGY POLICY

EFFECT ON THE BUSINESS CASE FOR STORAGE AND HOW TO IMPROVE IT?



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Energy Policy

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Distributed energy resources and the organized balancing market: A symbiosis yet? Case of three European balancing markets



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ABSTRACT

Thanks to new technological advancements and poised to become a viable alternative to conventivices to transmission system operators. In this pap and participation in the organized balancing marke a number of formal, administrative and technical balancing markets in Austria, Germany and the N design effectively facilitates DER participation. To that provides a comprehensive tool for the assessi tion. Our results show that flexible pooling condit the authorization of non-precontracted bids, amon Different design variables, however, can enhance of be taken into account in order to achieve an impi Design complexity and gaps in the EU regulation

→ improvement of market performance and DER participation can be ensured only if market adjustments follow a similar procedure and enhancing or neutralizing effects of design variables are taken into account.



HOW TO IMPLEMENT THE IMPROVEMENTS?

Formal access to the balancing market





KEY TAKEAWAYS

Participation in the balancing	Balancing market heterogeneity
market (BM) is crucial for the	effects the case especially for
business case of storage	international players
Flexible pooling options and split balancing energy and balancing capacity markets are the first step to improve BM efficiency	For provision of aFRR and mFRR, storage needs to be pooled with other DER due to its technical constraints \rightarrow smart portfolios
Participation should not be	The cost of battery storage must be
complicated by non-market measures	offset by multiple value streams
(e.g. network tariffs ruining the case	(e.g. arbitrage in the spot markets,
for storage even if participation in the	BM, vRES integration and other
BM is possible)	grid-supporting services)



THANK YOU

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APPENDIX



AUSTRIAN INSTITUTE OF TECHNOLOGY

Global cumulative storage deployments



Source: BloombergNEF



MARKET SEQUENCES – AUSTRIA & GERMANY





MARKET SEQUENCES – GERMANY & THE NETHERLANDS







GERMANY: BALANCING ENERGY PRICES



Source: Manuel Lösch / Strommarkttreffen 2017



AUSTRIA: BALANCING ENERGY PRICES

Marktentwicklung SRR - Abrufpreise





THE NETHERLANDS: BALANCING ENERGY PRICES



Dutch positive FRR bids

Source: Fabian Ocker 2017

ASSESSMENT FRAMEWORK







ASSESSMENT FRAMEWORK

Based on the procedure for the participation of balancing service providers (BSPs) organized in six main steps:





COMBINATIONS OF VARIABLES

