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STORAGE**
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Ownership & operation of storage by TSOs

Session:

Energy Storage in Transmission and Distribution
Grids

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International experience



Nowadays, in most jurisdictions TSOs/DSOs can't own or operate batteries



Fast intervention to avoid supply interruptions



Increase in renewables



Enhanced frequency response



Main exceptions are California, Italy and islands



High solar penetration & ambitious RES targets



Lost load due to unexpected gas unavailability

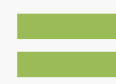
DSO allowed to participate if its share is <50%



Lost RES output & reliability concerns



Research & Development



Terna has around 15 batteries to avoid loss of RES output, provide reserves & test reactive energy



In isolated systems with high share of RES regulated batteries are often allowed to manage the system



Regulatory analysis



EU regulation: fully integrated network component &/OR previous tendering



Nov 2016



- 1- Unsuccessful tendering
- 2- Necessary for secure & reliable operation
- 3- Regulator's approval



Dec 2017

TSO ownership if:

Integral part of the transmission system



1- Necessary for secure and reliable operation

2- Not for balancing or congestion management

[EP only:except for the reactive instantaneous restoration of network security in case of network contingencies]



Feb 2018

OR unsuccessful tendering



Using batteries for balancing or managing congestions would distort the market...



Balancing

Need to increase or reduce generation

Batteries would compete against generation



Congestion management

Need to replace generation by generation which doesn't create congestions

Using TSO batteries to replace generation would distort the market

...but batteries can be used to avoid congestions...





Congestion as market failures

- Congestion in the electric system means that the optimal market outcome (least cost dispatch) is not possible and that a more expensive alternative is needed
- In addition, if only a few (or even only one) providers are able to solve the congestion, there is a market power issue



Transmission lines reduce congestions without competing with generation

- Transmission lines may eliminate/reduce congestions and allow for the least cost dispatch
- They do so without competing with generation plants, they just allow for increased competition between plants making least cost dispatch possible



Can batteries do the same?

- There are places where building a line is difficult for physical, social or environmental reasons
- In addition, batteries are scalable and can also be moved to a different location



Batteries can eliminate network congestions without replacing generation



Overload

Batteries provide energy in congested area and avoid need to re-dispatch

Back-up

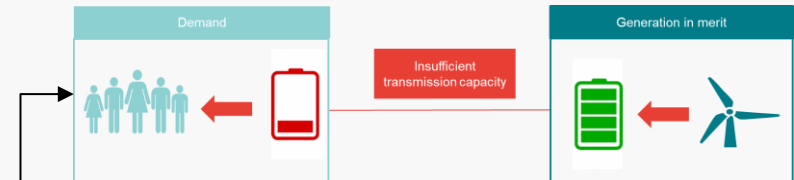
Batteries provide back-up capacity and avoid need to re-dispatch



Batteries provide reactive power and avoid need to redispatch

Avoidance of power surges

Using one battery would replace generation ->
Need for two batteries working simultaneously



These uses of batteries don't distort any market, they facilitate minimum cost dispatch of others' electricity by reducing congestion-related issues (as a transmission line would do)

CONCLUSIONS

- **Batteries can be used to reduce congestions without distorting the market similarly to a transmission line**
- **Using batteries in this way would make efficient generation dispatch possible**
- **The Council and the Parliament's proposals are in line with this efficient and non-distortionary use of batteries**



Thank you!

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