

## Panel participation

# Experience in practice: Blockchains adding flexibility to grids

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*Workshop on Open marketplaces to spur innovative energy  
services – DG ENER, DG CONNECT and Alliance AIOTI*

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# The role of the exchange in the energy value chain

> **eex**

> **epexspot**

**FUTURES  
MARKET**



**CAPACITY  
MARKET**



**DAY-AHEAD  
AUCTION**



**INTRADAY  
CONTINUOUS**

Year/Month/Week  
before delivery

Year(s) before/  
after delivery

One day  
before delivery

Until 5 min before  
delivery

**HEDGE**  
fluctuations

Value  
**CAPACITY /  
DEMAND-  
RESPONSE**

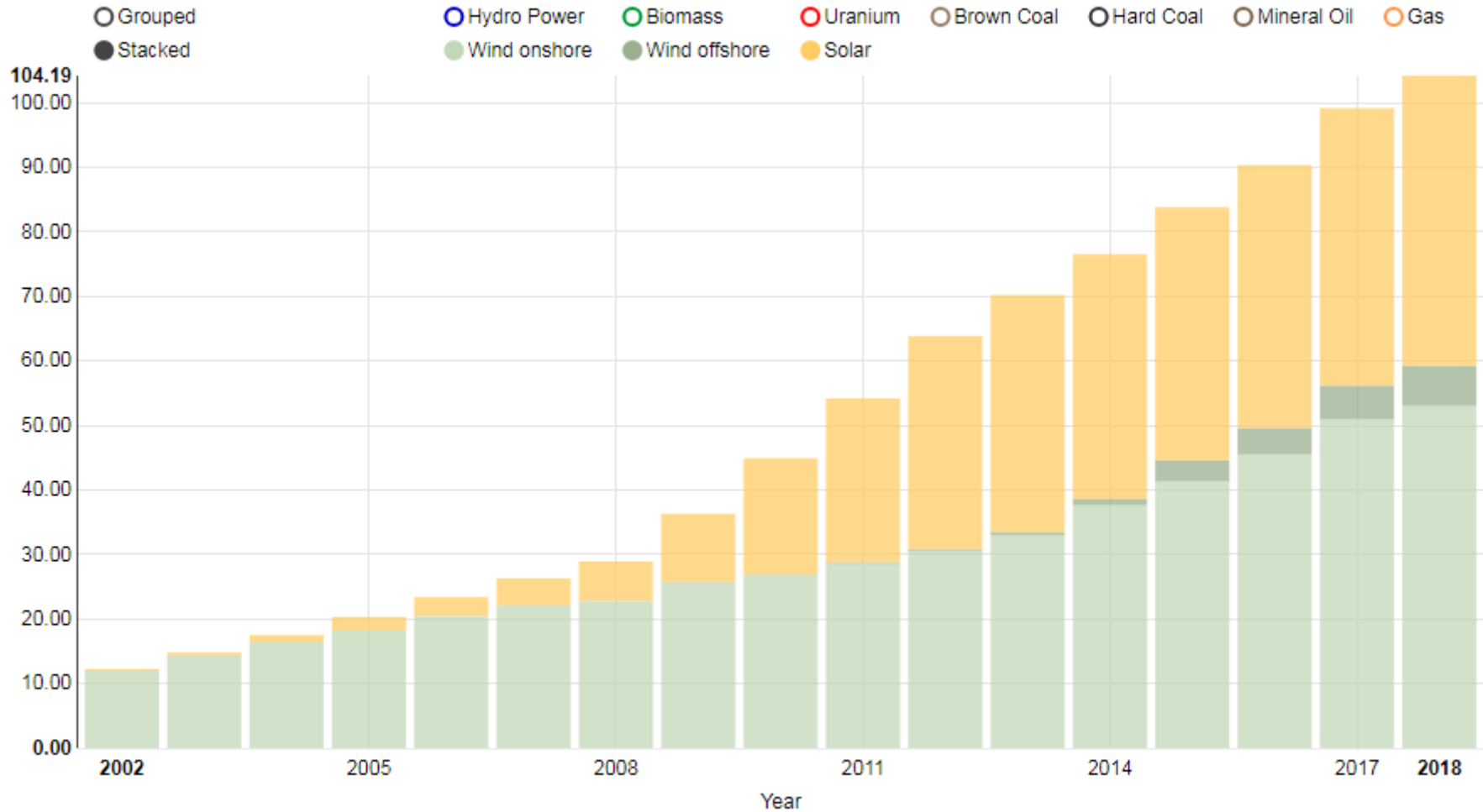
Value  
**PRODUCTION  
CONSUMPTION**

Value  
**FLEXIBILITY**

> **ecc**

**Integrated & Secure Clearing Solution**

# Decentralization of the electric system with skyrocketing RES installed capacity



Datasource: AGEE, BMWi, Bundesnetzagentur  
 Last update: 01 Oct 2018 17:46

Wind and solar net installed generation capacity in Germany

# From global to local: several kinds of flexibility at all levels of the grid

**Wholesale**



**global flexibility**  
to balance the grid

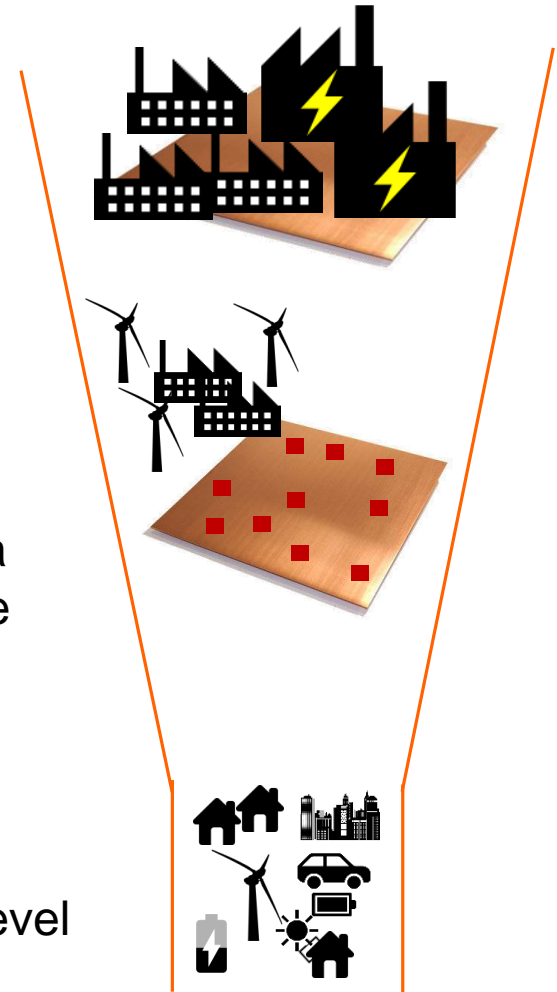
**Local**



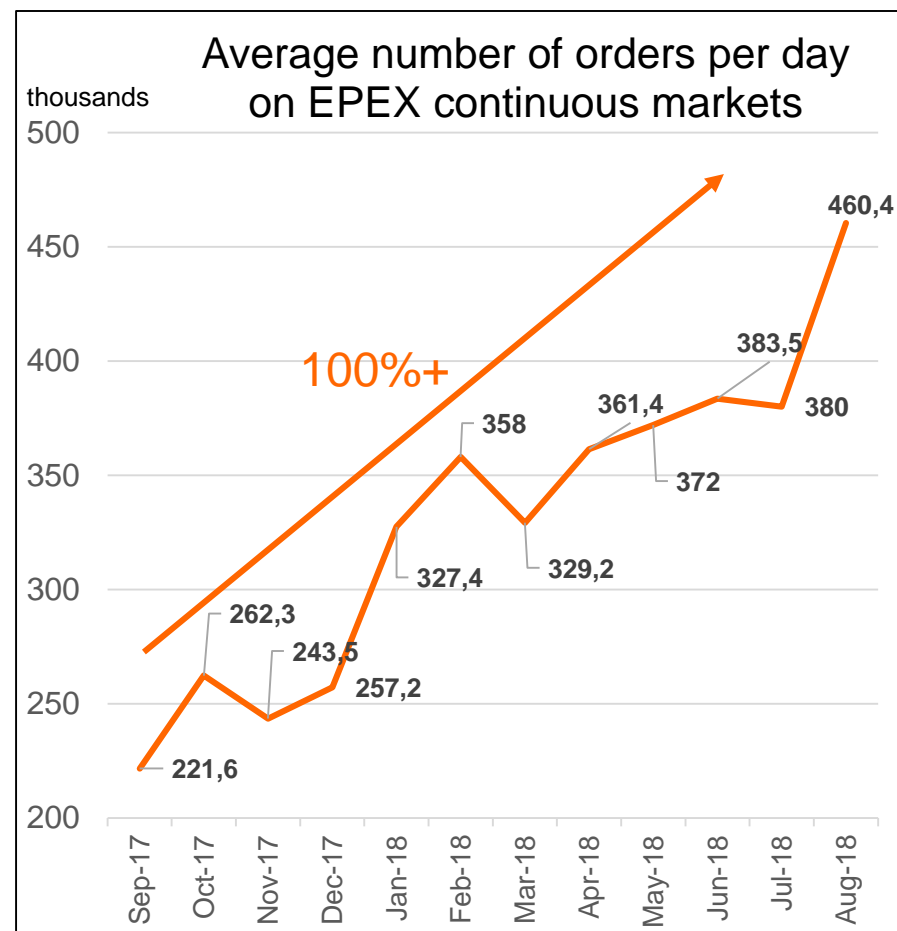
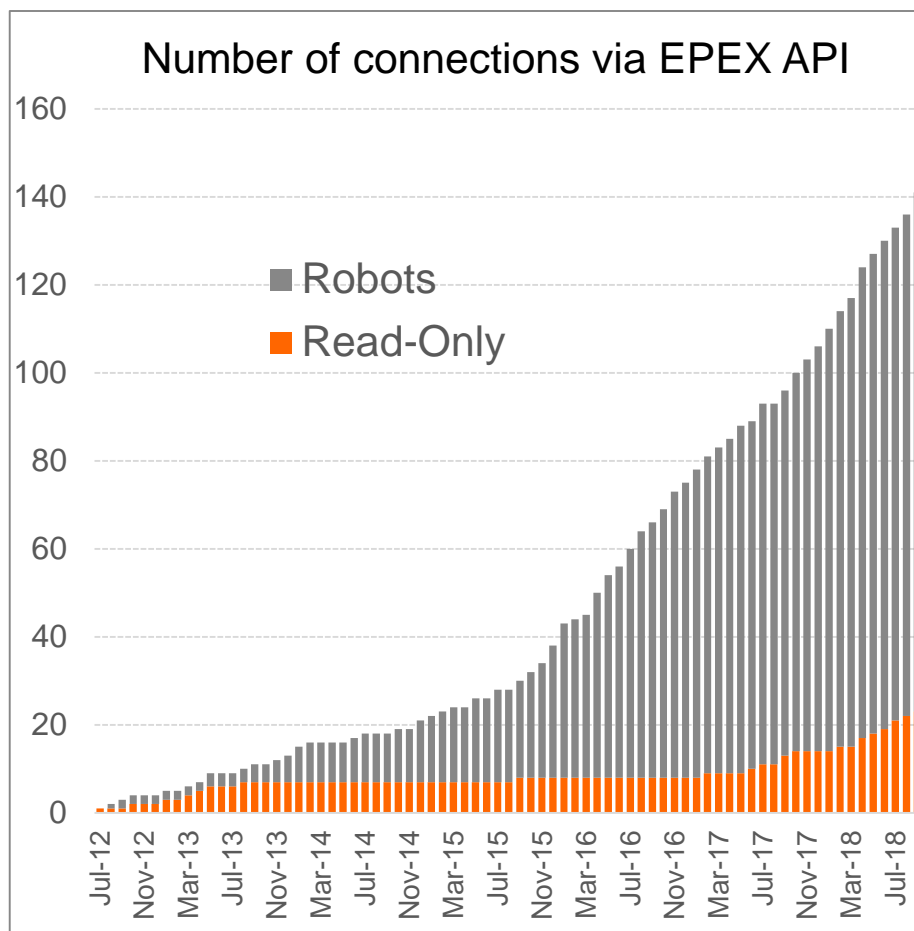
**local flexibility**  
to alleviate local congestion at a grid node level, when and where relevant

**Microlocal**

**microlocal flexibility**  
at the household / building / block level



# Global flexibility on the Intraday market



# Local flexibility markets to complement the coupled wholesale market

## FLEXIBILITY SUPPLY

### Flexibility providers:

- Power plants
- Aggregators
- VPPs
- Storage
- Renewables



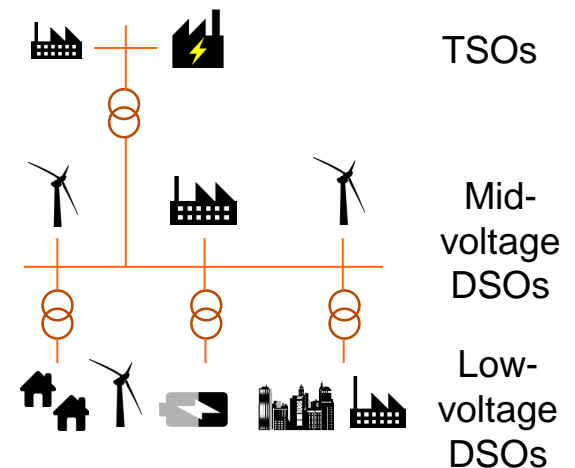
## FLEXIBILITY MARKET PLATFORM



### Market-based congestion management

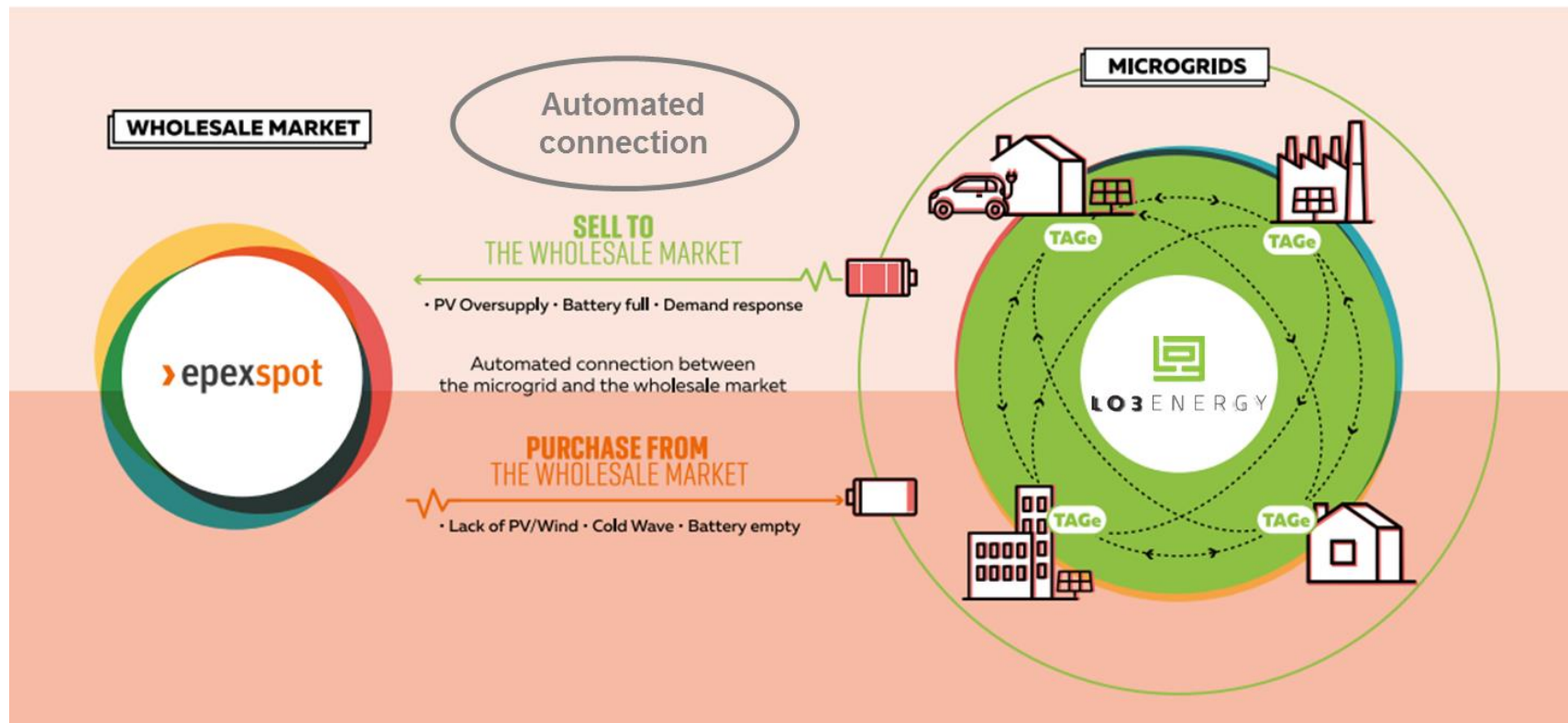
Trading systems  
Standards  
Transparency  
Coordination  
Neutrality

## FLEXIBILITY DEMAND FROM SYSTEM OPERATORS



# Individual flexibility at the microlocal level

Example of LO3 Energy as a microgrid enabler

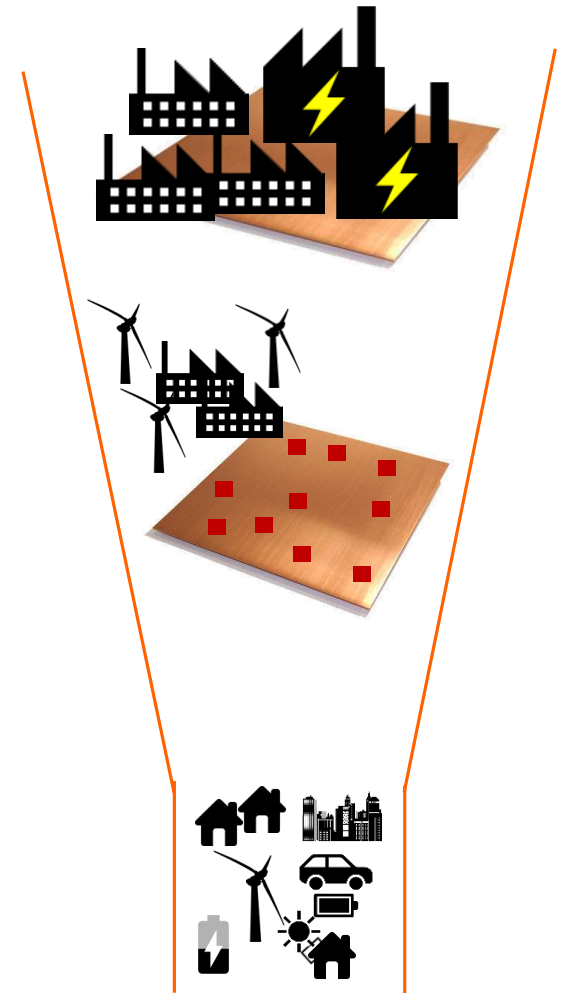


- ✓ Wholesale market
- ✓ Local flexibility markets, when and where relevant

- ✓ New technologies: smart meters, IoT, blockchain
- ✓ New market players: microgrids, smart devices, batteries, electric vehicles, etc.

# Blockchain as a support to market-based mechanisms for a flexible grid

- New coordination needs between global and local / microlocal levels
- Market-based mechanisms on top of physical solutions are adapted to solve each issue at different grid voltage levels
- Decentralized and automated electric system involving end-consumers individual preferences
- New technologies such as IoT, smart meters and blockchain contribute to flexible grids





# Thank you for your attention!



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