Local flexibility markets: beyond the status quo

El webbseminariet: En effektiv utformning av flexibilitetsmarknader på lokal, regional och nationell nivå
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A truly European Power Exchange

- 20+ nationalities in staff
- 285 members in 21 EU countries
- 7 European shareholders
- 51% private, 49% TSOs
- 8 European markets operated
- 8 new planned
- 21 borders
- market-coupled
- 7 local offices across Europe
- 14 EEX Group

Markets covered under the roof of the Clearing House

Current EPEX markets
Coming soon
Serviced Power Exchanges

Local EPEX / EEX Group offices

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593 TWh traded in 2019 on all spot markets — +5% Y2Y

1st operator of a European market-based local flexibility demonstrator in 2019

Proven technical performance adapted to new market behavior

Largest Intraday market in Europe with 92 TWh traded in 2019 — +11% Y2Y

Success of 15-min products — 25% of German intraday volumes traded on 15-min contracts in 2019

Average number of orders per day (in thousands)
One gateway to value the whole chain of power trading

**FUTURES MARKET**
Year/month/week before delivery

**CAPACITY MARKET**
Year(s) before/after delivery

**DAY-AHEAD AUCTION**
One day before delivery

**INTRADAY CONTINUOUS**
Until 5 min before delivery

**HEDGE**
Fluctuations

**Value**
CAPACITY & DEMAND RESPONSE

**Value**
PRODUCTION CONSUMPTION

**Value**
FLEXIBILITY

Integrated & Secure Clearing Solution
The changing power system increases the need for flexibility

THE OLD
- centralized, dispatchable, unidirectional, large-scale, fixed

THE NEW
- distributed, intermittent, bi-directional, small-scale, on-demand

transmission

Development of RES
Decentralization
Multiplication of actors
Variability

effects: grid instability, grid congestion, volatile markets

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Local flexibility markets as transparent and market-based solution

Flexibility providers:
- Power plants
- Aggregators
- VPPs
- Storage
- Renewables

Trading systems
Standards
Transparency
Coordination
Neutrality

EPEX Local Flex

TSOs
Mid-voltage DSOs
Low-voltage DSOs
### Main principles for local flexibility markets

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
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<tr>
<td><strong>Market-based</strong></td>
<td>Voluntary and cost-efficient market fostering competition among flexibility providers</td>
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<tr>
<td><strong>Local</strong></td>
<td>Identifying constrained areas and local needs for flexibility to see locational price signals emerging</td>
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<td><strong>Neutrally organized</strong></td>
<td>Clear roles with a third party as market operator to ensure transparency, confidentiality and confidence in the market</td>
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<tr>
<td><strong>Open</strong></td>
<td>All type of technologies (thermal or RES assets, storage, flexible load,…) and flexibilities (upward or downward)</td>
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<td><strong>Grid impact</strong></td>
<td>Triggering modifications of supply or demand having a concrete effect on the physical grid with the aim to relieve congestions</td>
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<td><strong>Secure</strong></td>
<td>Complement to existing congestion management mechanisms and longer term grid expansions to ensure grid stability</td>
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Focus on northern Germany: A significant wind production

Increasing share of renewables…

…comes with new challenges

- High cost for grid management, paid by end-consumers
- High share of renewable curtailment
- High coordination need between system operators
Presentation of the enera project

The enera project pillars

| Grid       | • Demonstrate technical innovation in the grid  
|           | • Increase grid resiliency and safety |
|           | • Market-platform for congestion-management  
|           | • Live demonstration of TSO-DSO coordination |
| Data      | • Extensive work for integration of smaller localized flexibilities  
|           | • Data science & Software as a service |

The pilot

Pilot project involving EPEX SPOT as flexibility market operator

➔ Real case application of Local Flexibility Market concept

Main questions

- What price for flexibility?
- When and how long can/should it be used?
- How to integrate decentralized and localized flexibilities?
Summary of enera facts and achievements in the design and demonstration phases (so far)

- **New systems, competencies & processes:**
  - New Market design, roles, digital market platform
  - Efficient TSO-DSO coordination process
  - Digital verification platform and flex registry
  - Forecasting, aggregation, steering and communication systems for flexibility

- **Experimentation figures (so far):**
  - 9 market participants
  - 23 local market areas
  - 360 MW of certified flexibility
  - More than 3000 orders
  - More than 100 transactions

- **For the TSO and DSOs:**
  - Paving the way for new competencies (active system management)
  - Concrete testing of local flexibility delivery and grid impacts for congestion-management
  - Pro-active, coordinated and cost-efficient flexibility usage, ahead of real-time

- **For the market and flexibility providers:**
  - Concrete exploration & assessment of a new market design for congestion-management
  - Development of new competencies to steer and optimize flexible assets (via VPPs)
  - Integration of small-scale flexibilities (< 10 MW) into congestion-management processes
A renewed and flexibility-proof market design is needed

Recent years
Growing intra-zonal congestions
Increasing costs associated

Now
Market design experimentation and demonstration

2030-2050
Transition towards a renewed and future-proof market organisation

New regulatory framework
« Clean Energy Package »
- Supported role for Demand-Response and aggregation
- New requirements for TSO-DSO coordination
- Market-based redispatch
- Flexible assets to be owned by market participants

Research and Experimentation
Academic and empirical research on market design, integration of new flex, T&D coordination...

Implement best market design
Use research and pilot projects to create the right regulatory framework on national levels
- Incentive system operators to procure flexibility in most efficient way across all grid levels
- Solutions adapted to need of market: rural/urban, load- or supply-intensive
- Interaction with existing markets & flexibility mechanisms
- Robust market rules and market monitoring
Recommendations to establish a consistent market-based flexibility framework

1. Create reliable price signals
   - The cost of load is defined by the value of the electricity to the consumer, making it impossible to define costs for these load-side flexibilities, they can only unfold their potential through a market with free bids
   - To create a reliable price signal, clear distinction between different needs of TSOs is key. In the target design, market-based congestion management should not be mixed with balancing markets but rather dealt with on dedicated trading venues

2. Set up large scale pilot projects
   - Research on optimal market design can only be successful if market mechanisms are explored under real conditions
   - The interaction between different markets and the needed adjustments can only be assessed in reality
   - Large scale pilot projects are therefore needed to advance and establish a consistent flexibility framework

3. Set the right incentives for system operators
   - System operators need to be incentivized to procure flexibility in most efficient way
   - This must hold for all grid levels, also for the low voltage grid. Solutions exists to integrate end consumers’ flexibilities
   - Regulated mechanisms and CAPEX-focused incentive regulation lock the potential of flexibility and give no incentives to system operators to use non-wire alternatives
Thank you for your attention!

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