Digitalisation and system integration

International perspectives on renewables, trading, VPPs and decentralisation.

Power System Flexibility Campaign & 3DEN Joint Expert Webinar
Strategies for Digitalisation of Electricity Systems (25 February 2021)
Aleksandra Radwanska, Next Kraftwerke
Our Virtual Power Plant

“In 2009, we started with our vision of a Virtual Power Plant. Today, we operate one of the largest Virtual Power Plants in the world.”

Jochen Schwill & Hendrik Sämisch
(Founders & CEOs)

Aggregated Power: 9 700 MW
Aggregated Assets: 10 000
Providing services to: 8 system operators
Our clients
Independent power producers in 8 European countries
Virtual Power Plant vs. Microgrid
Different goals and legacy systems ask for different setups
VPPs unlock flexibility of VRE and DER

How can we monetise this flexibility?
When is flexibility really valued?
Market designs encouraging flexibility
Snapshot of market designs for January 2021

<table>
<thead>
<tr>
<th>Condition</th>
<th>Germany</th>
<th>Austria</th>
<th>Poland</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity market is liberalised</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Many buyers and sellers shape the price in a free, transparent market</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
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<tr>
<td>High or relatively high penetration of renewables*</td>
<td>~40%</td>
<td>~57%</td>
<td>~15%</td>
<td>~40%</td>
</tr>
<tr>
<td>Wholesale electricity price changes every hour or 15 minutes</td>
<td>✔️ DA - 1 hour ID - 15 minutes</td>
<td>✔️ DA - 1 hour ID - 15 minutes</td>
<td>✔️ DA - 1 hour ID - 1 hour</td>
<td>✔️ DA - 1 hour ID - 15 minutes</td>
</tr>
<tr>
<td>Renewables are a subject to variable remuneration</td>
<td>✔️ Feed-in-Premium or out of subsidy</td>
<td>✔️ Feed-in-Premium or out of subsidy</td>
<td>✔️ Feed-in-Premium, rarely Feed-in-Tariff</td>
<td>✔️ Feed-in-Premium, rarely Feed-in-Tariff</td>
</tr>
<tr>
<td>Renewables are responsible for their own imbalance</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Liquid Intra-Day Market</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Energy-Only-Market</td>
<td>✔️</td>
<td>✔️</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Existence of negative prices</td>
<td>✔️ ,6-hour-rule’</td>
<td>✔️</td>
<td>✗</td>
<td>✔️ Rare occurrence</td>
</tr>
<tr>
<td>Decentralised generation or DR allowed to deliver ancillary services</td>
<td>✔️ 3 product categories</td>
<td>✔️ 3 product categories</td>
<td>Limited participation, from 1 MW behind certain node</td>
<td>Pilot projects</td>
</tr>
</tbody>
</table>

*Source: Our World in Data based on BP Statistical Review of World Energy & Ember (2021)
How does a VPP deliver flexibility and provide quantified value?
Technology can **only support** business cases

**Renewables live monitoring & forecasting**
Improve your trading through forecasting based on live data

**Asset Dispatch & Control**
Control decentral assets through schedules based on wholesale market prices

**Demand Response**
Triggering demand-side flexibility for grid support & additional revenue

**Balancing Services**
Provide ancillary services to grid operators
Thank you for your attention!
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