The German experience with regulating power and wind energy: present state and future challenges

Current Status Germany

– Technically possible?
  → Yes, see status Denmark

– Economically feasible?
  → Market rules prevent provision of regulating power by wind energy
Market interaction – Frequency Control: DE, NL, CH, AT

- Market Participants
  - Forward contract
  - Day-Ahead Trading
  - Intraday Trading (30min)
- Market Participants
  - OTC Contracts (15min)

Gate Closure
Time of delivery

Market: Resource optimal allocation
Market interaction – Frequency Control: DE, NL, CH, AT

Market Participants

Forward contract → Day-Ahead-Trading → Intraday-Trading (30min)

OTC Contracts (15min)

TSO

Gate Closure

Time of delivery

Redispach → Compensation

Market: Resource optimal allocation

Grid constraints

Delivery → Settlement

Resource allocation

Gate closure

Time of delivery
Market interaction – Frequency Control: DE, NL, CH, AT

<table>
<thead>
<tr>
<th>Market Participants</th>
<th>Forward contract</th>
<th>Day-Ahead-Trading</th>
<th>Intraday-Trading (30min)</th>
<th>Gate Closure</th>
<th>Time of delivery</th>
</tr>
</thead>
</table>

Market Participants

OTC Contracts (15min)

TSO

Contraction of Control Reserve (CR) | Activation of CR | two-part tariff - P (&W) |

TSO

Redispach

Compensation

Trading | Delivery | Settlement

TSO

Market: Resource optimal allocation

Grid constraints

Unpredictable incidents

REGELLEISTUNG.NET
Internetplattform zur Vergabe von Regelleistung

50hertz, amprion, TenneT, TRANSNET BW
Regulating Power Products by Activation Speed

Qualitative Classification Regulating Power

- **Inertia**
- **Primary Reserve**
- **Secondary Reserve**
- **Tertiary Reserve**

- **Market**
Verification & Control strategy

- Continuous de-rating → losses in normal operation
Continuous de-rating vs available active power

- No losses in normal operation
Pilot Project R2 Down, Belgium

**Project**
- Control Reserve: „R2 Down“, product length: 15 minutes
- Verification Procedure & Control: Available active power

**Wind farm**
- Belgium, Estinnes, Operator Windvision
- 11x ENERCON E-126 – 7,5MW & 6MW (1x)

**Process**
- Prequalification (1 month) – Criterias: accuracy AAP & controllability
- Participation on control reserve market: 29/1/2015 until 25/3/2015
Barriers for regulating power by wind

– Continuous de-rating -> losses in normal operation

→ solution: Available Active Power Mechanism

– Symmetrical product
  (Primary Reserve)

– Time between: auction <-> time of delivery

– Product lengths
  (Primary Reserve: one week ➔ one bid)
Pilot Project ReWP

Balancing energy from wind and photovoltaic farms

Project state: Started

Project duration: 08/2014 – 07/2016

Contact:

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Project coordinator
Fraunhofer-Institut für Windenergie und Energiesystemtechnik (IWES)

Image: vencav - Fotolia.com
Advantages

– Conventional „must-run“ units may be decreased
– Higher volumes / lower prices in market expected
– Wind energy takes part in system responsibility
→ Overall cleaner electricity generation

Challenges

– With better forecast accuracy -> higher supply of regulating power
– AAP: Acceptance of System Operators necessary
Outlook

- AAP improving due to research

- Market design under development (Strommarkt 2.0)
  \(\rightarrow\) Many topics already addressed (not all!)

- Interconnection of European balancing markets and products
Thank you for your attention!

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