Challenges of RES Integration

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Bonn, 13 Mai 2016
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50Hertz - part of the Interconnected European Electricity System

1. 50Hertz
2. TenneT TSO
3. Amprion
4. TransnetBW
RES Integration has been extremely successful in the 50Hertz grid area

Installed capacity of RES in the 50Hertz grid area [MW]

Feed-in of RES in 50Hertz grid area [TWh]

In 2015 RES electricity production covered approx. 49% of electricity consumption in the 50Hertz grid area.

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German Transmission Grids are heavily congested and have to be extended

50Hertz congestion costs [Mio. Euro]

- Federal Requirement Plan Act passed by German Parliament in 2013, adjusted in 2015: 3 HVDC lines, 40 AC lines
- Power Grid Expansion Act, passed in 2009 adjusted in 2015: 22 projects

In 2015 German congestion costs at transmission level exceeded 1 billion Euro.

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Flexibility is key for ensuring secure RES integration

Power ramps Germany 2013

- As at 31/12/2013
- Load
- Load – Wind
- Load – Wind – PV

Solar eclipse 2015

- ~ 13.7 GW
- ~ 6 GW

New and improved market products, a level playing field for flexibility technologies and interconnected RES areas allow the integration of large quantities of variable RES.

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High Flexibility potentials are available waiting for technical and commercial realization

50Hertz cooperation with DSOs on ancillary services

- Cooperation with DSOs on development of new concepts for the integration of renewable energies into ancillary services
- Mutual data exchange as essential prerequisite
- WindNODE project as real-life lab for the intelligent energy system of the future
- 50Hertz with more than 70 partners

Innovative flexibility solutions

- Wind power in control reserve market
  Start of pilot phase: wind power plants can be prequalified for negative tertiary control power.
  In February 2016 a pool of two windfarms (60 MW) was prequalified in the control area of 50Hertz.
- New batteries
- Electric boilers
- Industrial facilities

Communication and coordination based on intelligent IT systems is a key success factor.

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European market integration will facilitate further increase of intermittent RES

Offshore interconnections with our Nordic partners

- **Combined Grid Solution**
  - Germany – Denmark
  - Interconnection between offshore wind farms
  - Capacity of ~ 400 MW

- **Hansa Power Bridge**
  - Germany – Sweden
  - Subsea interconnection
  - Synergy between wind & hydro
  - Capacity of ~ 700 – 1400 MW

European Market Coupling

- **Single European Price Coupling (EPC)**
  - successful on the day-ahead-market in the „MRC - Multi Regional Coupling“ region (green)

- Next steps: Expansion to other regions, EPC in the intraday spot market, flow-based Market Coupling in Central Eastern Europe (CEE, blue).

Markets will become more short term to accommodate for increasing fluctuation.

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Summary: Elements for a successful Energy Transition

- Flexibility increasingly important
- Innovation as a key factor
- A market design that considers conventional and Renewables production
- Develop a working legal framework and processes between market players
- Develop a major role for RES in ancillary services (e.g. balancing power)
- Involve the public and foster public acceptance

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