Balancing and Intraday market Design –
Options for Wind Integration

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The Role of Power Market Design for the
Achievement of the 20% Renewables Target

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Wind and system uncertainty

- Demand uncertainty
- Load volatility
- Supply deficit
- Excess supply
- Overall demand for balancing power
- Pos. reserve capacities
- Exp. pos. balancing power
- Exp. neg. balancing power
- Neg. reserve capacities
- Supply deficit (e.g. 0.1%)
- Supply surplus (e.g. 0.1%)
- Power plant failure
- Supply deficit

2
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Wind uncertainty depends on size of region and lead time

Source: Own, DENA II forthcoming 2010, Roon und Wagner 2009
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Potential to integrate wind depends on ...

- Technical constraints
- Interaction with energy markets
- Interaction with transmission constraints
- Market power

Potential supply of balancing services

Demand uncertainty

- Reducing lead time of forecasts
- Improving accuracy of wind forecasts
- Averaging wind output over larger areas

Demand uncertainty
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Lead time – benefit and drawback

Source: Own, DENA II forthcoming 2010, Roon und Wagner 2009
Criteria for an efficient market design

Efficient dispatch of the market:

- Does the market make full use of information as it is improving during the day?
- Will incentives exist for the least-cost source of balancing to provide them?
- How transparent and liquid is the market?

Market access:

- Will all actors that technically could respond be included into market?
Criteria for an efficient market design

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Does the market make full use of information as it is improving during the day?

1. Ability to optimize between balancing and energy markets

2. Joint provision of power across multiple hours

3. Ability to re-optimize dispatch of power systems within day
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4. Efficient dispatch of the market

- Does the market make full use of information as it is improving during the day?

  • Intraday-markets become more important
  • System of block-bids has worked well in the past but difficult for the future
  • Bids must consider intertemporal aspects
  • and interactions between Spot- and balancing markets

- Will incentives exist for the least-cost source of balancing to provide them?

  • Transparent information on bids and system state
  • Institutional capacity to perform market power analysis -> Transparency

- How transparent and liquid is the market?

  • Can current bilateral market mechanism allow for efficient dispatch AND ensure liquidity of the market?
  -> Need for a complex market design
Market access

Spot market – level of market integration

Will all actors that technically could respond be included into the market?
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Market coupling - still some way to go

Intra-day market
- Continuous
- Only for specific time windows
- No trading possible

Balancing markets
- Continuous
- Weak market coupling
- Internal market coupling
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**Market access must be improved**

Will all actors that technically could respond be included into market?

- Internal European market for intra-day and balancing – still some way to go!
- Internal market coupling mechanism for intra-day and balancing technical feasible (Flow based market coupling)
- However in EU no consensus yet
- Balancing market in many countries low priority

- Market barriers for DSM and renewables
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Different approaches to provide reliable market design for integration of renewables

- Increase liquidity of intra-day markets
- Spanish System
- Nord-Pool type zonal pricing
- PJM approach
  - > Stream line

How to chose a Solutions?
Thank you for your attention