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The RES-E perspective on market integration

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Presentation outline

- Targets
- A continental approach
- Operating power systems with high shares of wind power
- Market design and the integration of wind power
- Why are we talking about capacity markets?
- Conclusion

EU RES targets

RES directive (2009/28/EC)

Wind energy according to NREAPs:

- 495 TWh
- 14% of electricity consumption

Wind energy according to EWEA:

- 580 TWh to 680 TWh
- 15% to 18% of electricity consumption

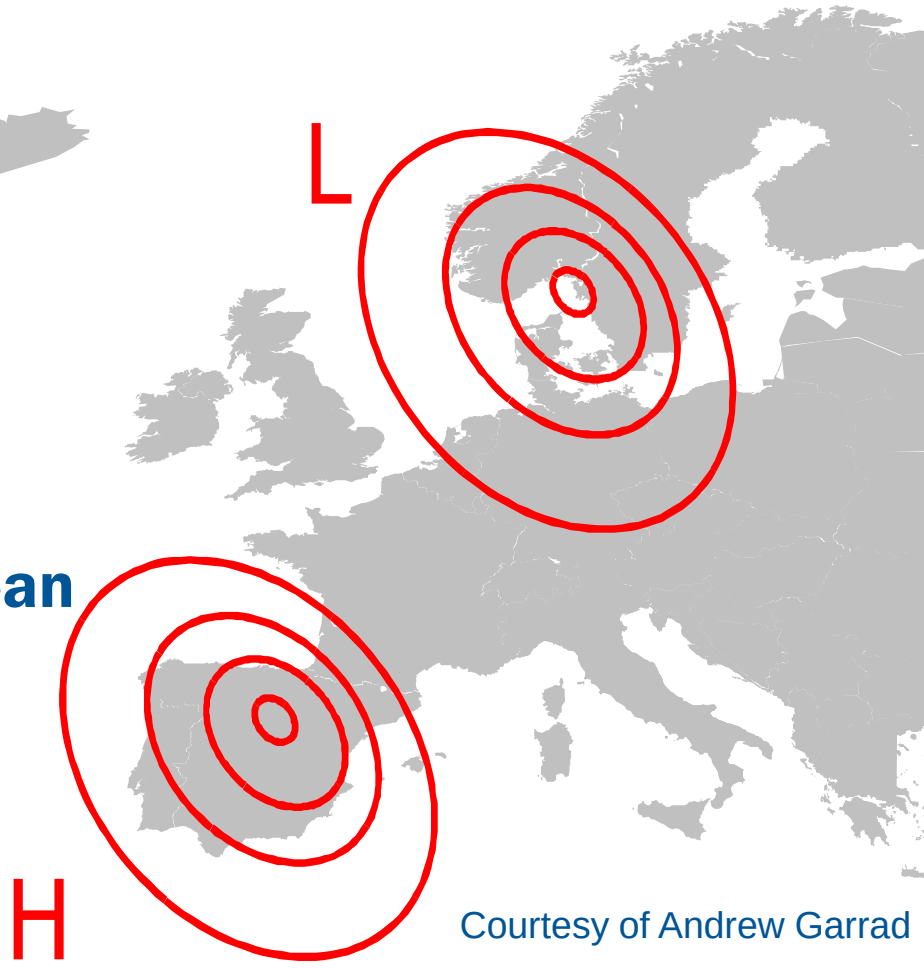
EWEA Target for 2030:

- 400 GW, of which 150 GW offshore
- 1150TWh
- 26.2% to 34.3% of EU electricity demand

A continental approach

- Weather systems
  - dimensions of 1000 kilometres
- Regional decorrelation
- Utilisation of transcontinental decorrelation requires
  - infrastructures
  - markets

Integrating a continental resource requires a European approach



Courtesy of Andrew Garrad

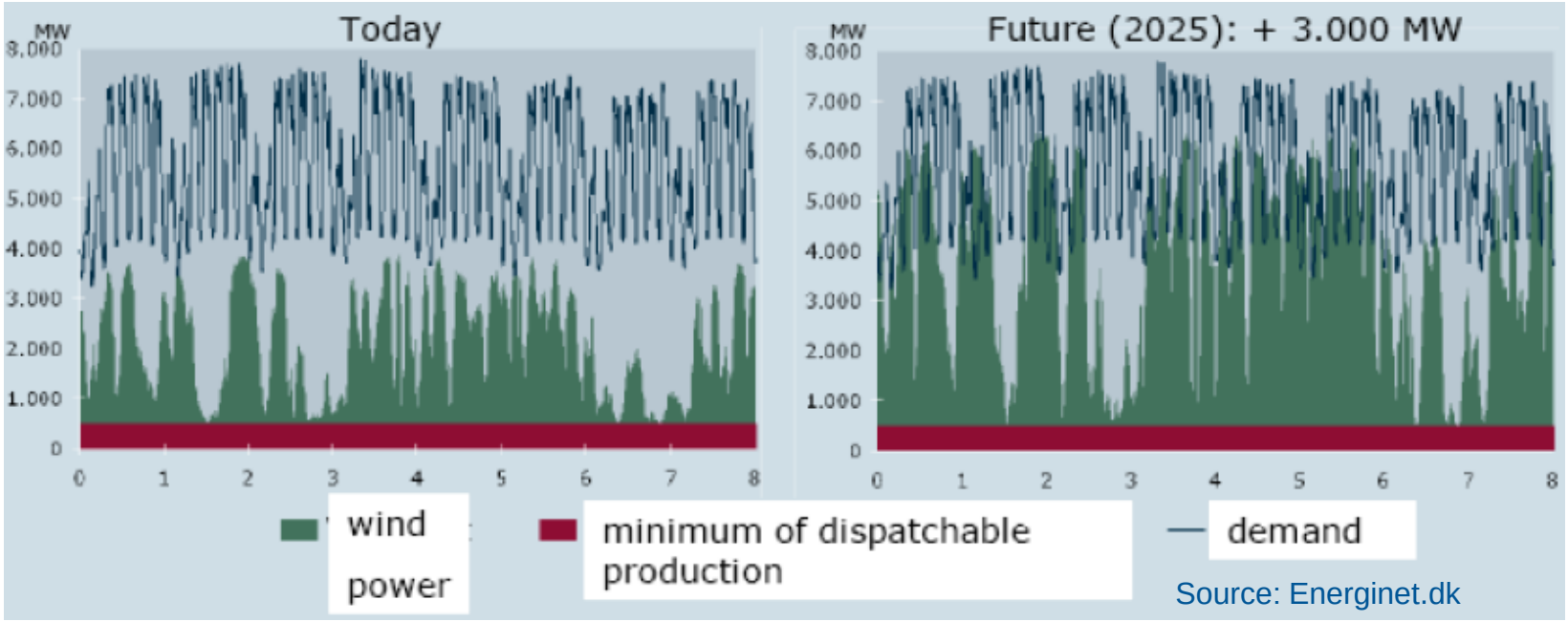
Operating power systems with high shares of wind power

- Wind power fits well in power systems but requires additional ‘integration efforts’, depending on:
  - Wind power penetration level
  - Flexibility of the power system in question
    - Generation (up and down regulation capability)
    - Demand management and storage
    - Grids (available cross-border capacity)
    - Power market characteristics (e.g. for balancing services): time, geographical area
- Flexibility of power systems varies widely in EU
- Integration efforts (e.g. moving to more flexibility) can be implemented by suitable market design
- Limit to wind power penetration level is not technical!

Operating power systems with high shares of wind power

TSO concerns:

Consequences of an additional 3,000 MW on the Danish power system - Government objective: 50% wind by 2025!



Source: Energinet.dk

A cost-effective deployment of wind power, and the integration of European electricity markets are fundamentally linked.

Market design and the integration of wind power

- Gate-closure time closer to real-time have a dramatic impact on forecast accuracy and the cost of balancing the system as proven by various power system studies.

- The EU target model aims for EU market coupling and the creation of cross-border electricity markets at all timescales by 2014.

➡ EU-wide deployment of intra-day market trading with implicit auctioning and gate closure times as close to real time as possible is crucial.

Market-related issues to be adressed

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Energy-only markets:

- How can energy-only markets be made suitable for supporting the long term RES policy goals?
- Increased price variability and lower average spot market prices might dampen investors appetite

➡ Market transparency and cross-border integration must be ensured

➡ Provide for more market liquidity and a bigger market place in general

➡ New market forms (e.g. ancillary services) might provide additional revenue stream for generators without creating additional market distortions

Why are we talking about capacity markets ?

- Motivation: Ensure investment/development of sufficient capacity
- Variable RES tend to have low contribution to planning reserves
- Variable RES tend to induce lower capacity factors from conventional units.
- Business case for slow-ramping, inflexible power generation assets (typically mid-merit) seems to slip

➡ High share of variable RES tend to increase the need for flexible capacity

Why are we talking about capacity markets ?

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Issues:

- In theory, CM implementation is easy, in practise it is very complex
- At your peril: further market distortion – examples of markets gone bad abound
- Disincentivise investments in infrastructure and demand –side management

Issues to be clarified:

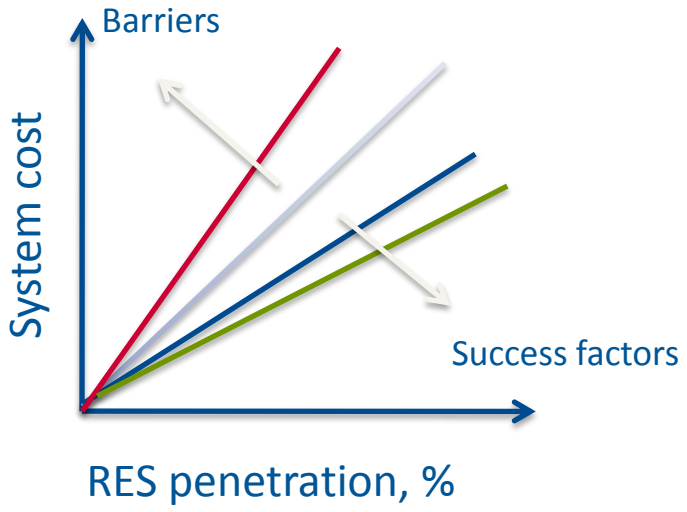
- Is there a capacity problem in the EU at all?
- How much firm capacity do you get from variable RES in a Pan-european perspective?
- How do you eliminate free riders and other externalities?

Conclusion

Barriers:
- Lack of grid
- Lack of TSO cooperation
- Inflexibility due to market rules and contracts
- Unobservable RES – behind the fence
- Inflexible operation strategies during light load and high risk periods

System cost:
- curtailments
- Higher fuel costs
- Higher emission costs

Success factors:
- Good forecasting tools
- Thermal fleet:
  - More quick starts
  - Fewer running hours
  - Faster ramps
- More geographical spread
- Distributed generation + DSM
- Grid-friendly RES



What's the « limit » is never quite the right question!

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Thank you

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