

THE ADVISORY HOUSE



Alternative routes to market for
offshore wind under EMR
12 June 2013



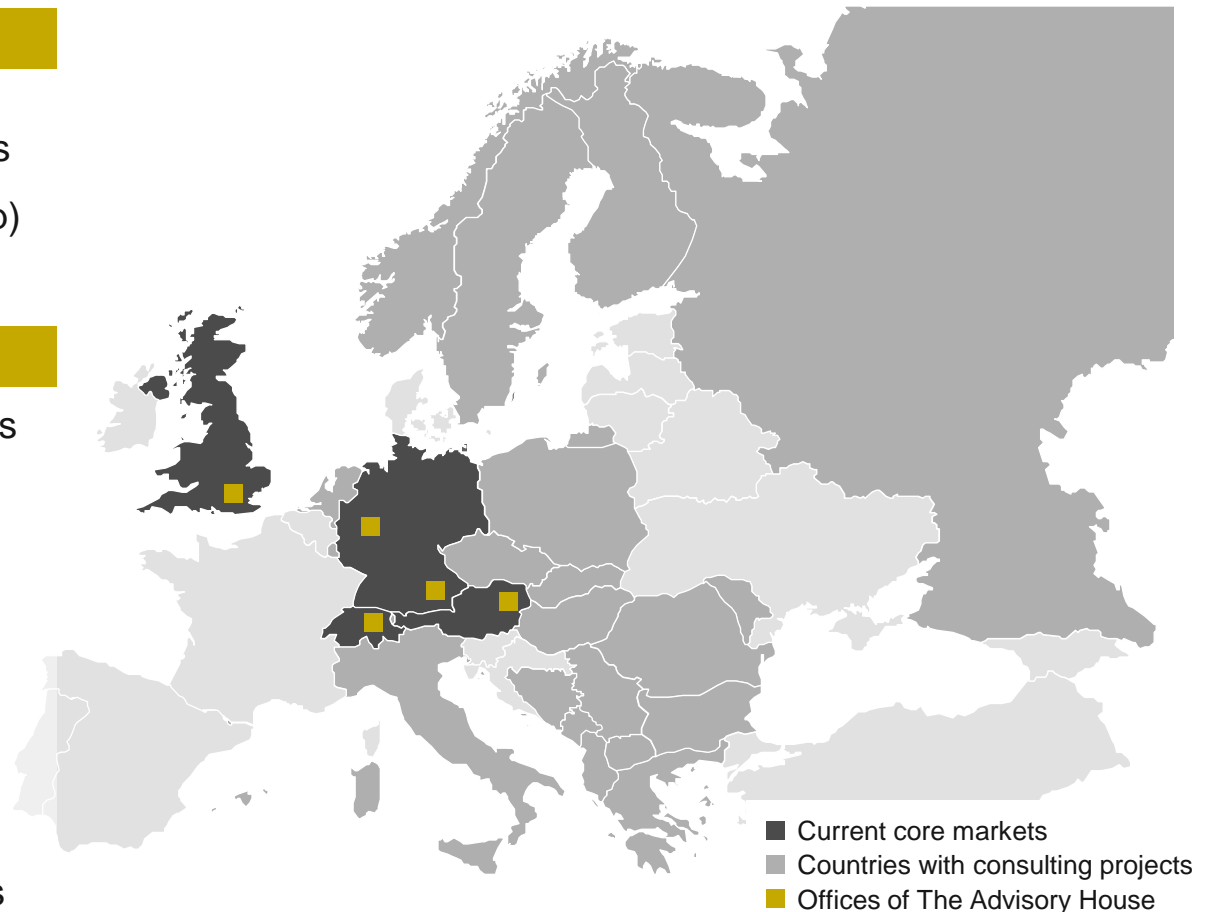
The Advisory House is a leading management consultancy to the energy industry with five locations across Europe

Clients

- Leading energy companies as well as multiple regional utilities
- Contacts (business relationship) at senior management level

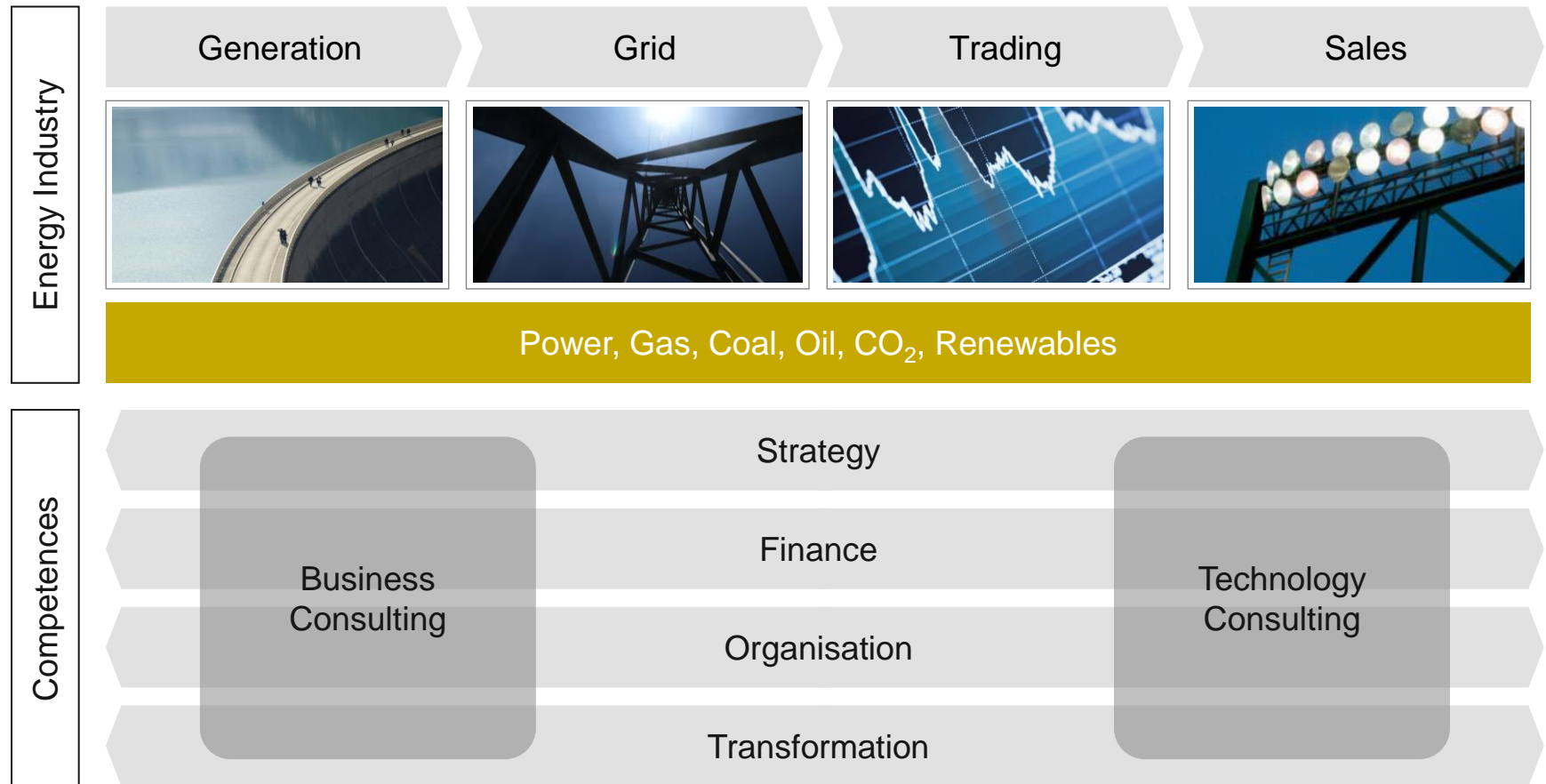
Markets

- Five offices in four core markets Switzerland, Germany, Austria and the UK:
 - Zurich (2003)
 - Munich (2005)
 - Vienna (2007)
 - Dusseldorf (2009)
 - London (2011)
- Numerous consulting projects outside of today's core markets



About The Advisory House

The Advisory House serves regional and cross-border energy companies in Europe with about 80 consultants



We have been ranked first place in the category "energy industry"

Rank	Consultancy	Points
1	The Advisory House	424
2	McKinsey & Company	393
3	Accenture	385
4	A.T. Kearney	378
5	Boston Consulting Group	362

→ Competence as evaluated by clients¹:

500 points = very high
300 points = medium
100 points = very low



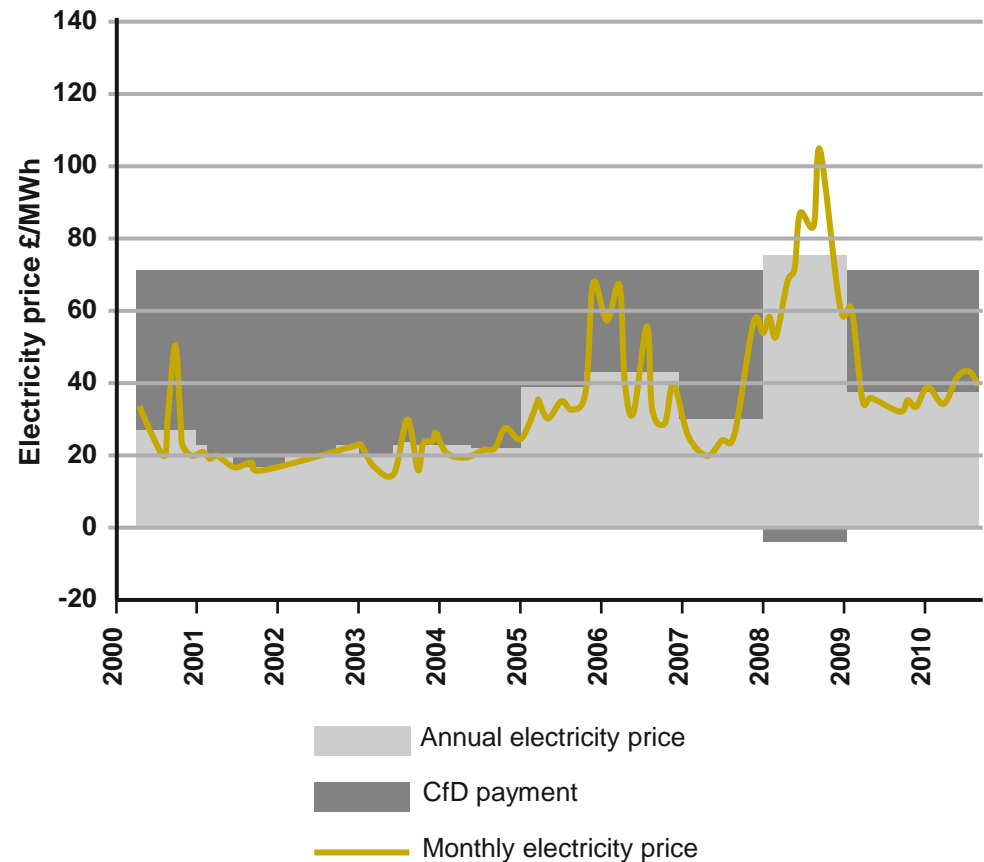
The study "Consultancy Hidden Champions" is conducted by the "Wissenschaftliche Gesellschaft für Management und Beratung GmbH (WGMB)" led by Prof. Dietmar Fink, in collaboration with the publications Capital and Financial Times Deutschland.

¹ Industry competence, based on broad and deep knowledge of the structures, business models, products, processes, markets, players, as well as the culture and informal rules of the energy industry

Decarbonisation measures in EMR

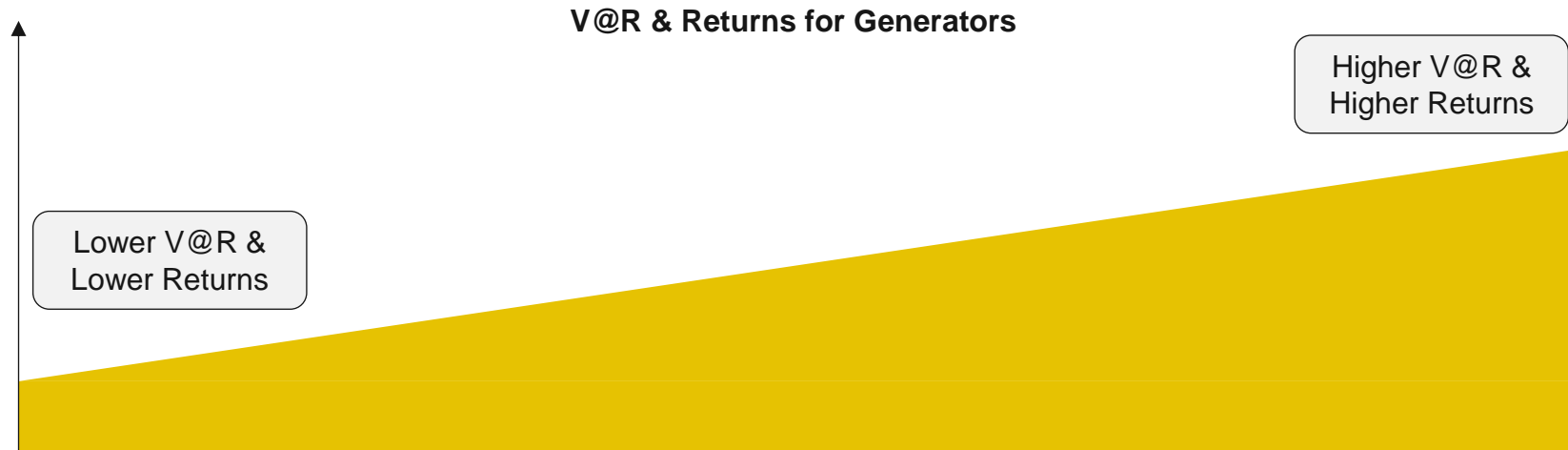
Four key measures in EMR

1. Contracts for difference (CfDs) – depicted at right
2. Carbon price floor
3. Emission Performance Standard (EPS)
4. Capacity Mechanism



Routes to market

PPA	Bilateral contracts	Outsourced trading	In-house trading
<ul style="list-style-type: none">• Heavily discounted• Reduced availability• Short tenors	<ul style="list-style-type: none">• Price competition• High churn• Sleeving agreements	<ul style="list-style-type: none">• Many existing traders• Multiple risk models• Collateral requirements	<ul style="list-style-type: none">• High upfront infra. costs• Very scaleable• Retains risks & returns



Changes under EMR to low carbon generator risk profiles

Low carbon generators with CFDs will be exposed to the following risks:

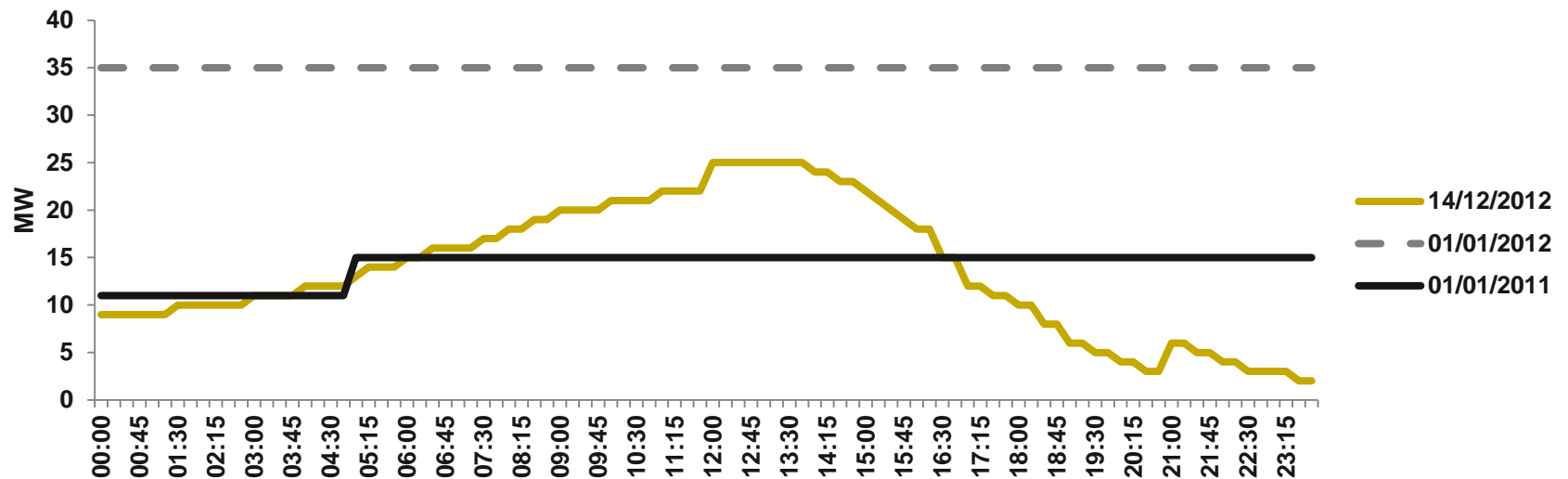
1. **Basis risk** – The ability or otherwise of a generator to acquire the Market Reference Price (MRP). Generators they may keep up to 10% outperformance but net the remainder off the CFD payment.
2. **Forecast risk** - The ability or otherwise of a generator to accurately forecast output a year, month, week, day and hour ahead in order to allow the generator/trader to contract sell forward.
3. **Imbalance risk** – The ability or otherwise of a generator to adopt a trading strategy which reduces imbalance charges and potentially earn additional balancing service revenues.

- PPAs traditionally rolled all these risks into a single discount factor
- Alternative routes to market such as Trading Service Agreement allow some or all of these risks to be transferred from the generator

EMR is changing behaviour of low carbon generators

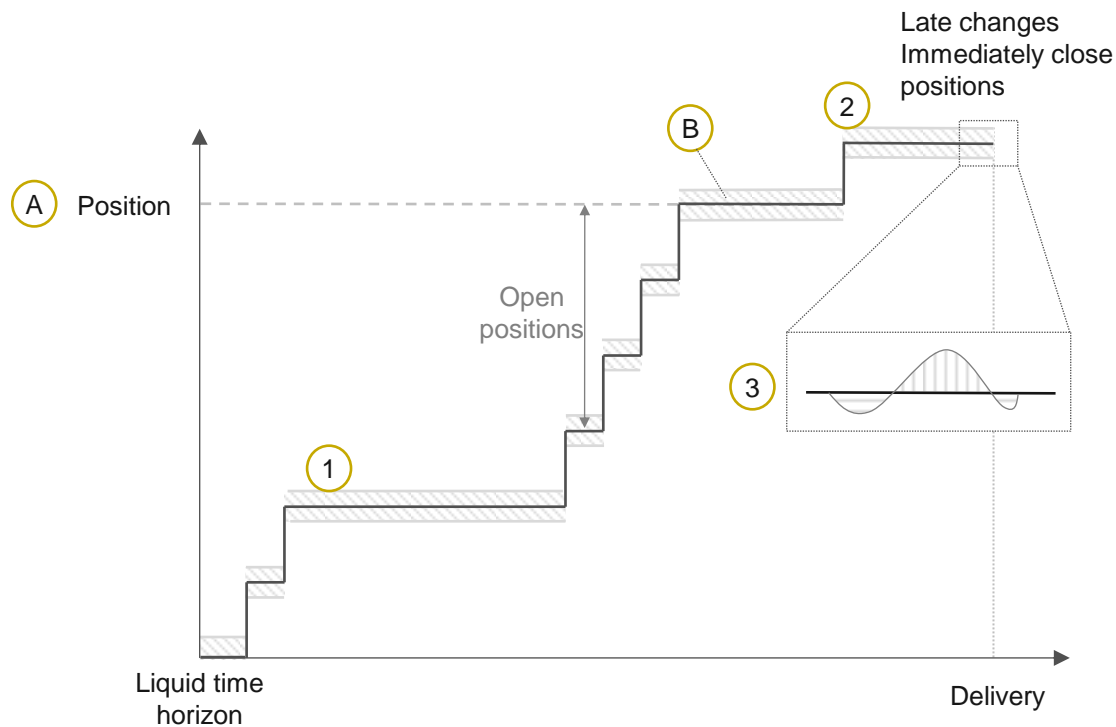
- Example of **nominated daily output** from 35MW wind farm before and after investment in **improved trading and forecasting capability**:

- 01/01/11 profile nominates **average output** for 24hr period (11-15MW)
- 01/01/12 profile nominates **maximum output** for 24hr period (35MW)
- 14/12/12 profile nominates real-time output **every 15 minutes** (2-25MW)



Portfolio power trading strategy to mitigate Value at Risk exposure

Basic power portfolio strategy to mitigate Value at Risk exposure



Description

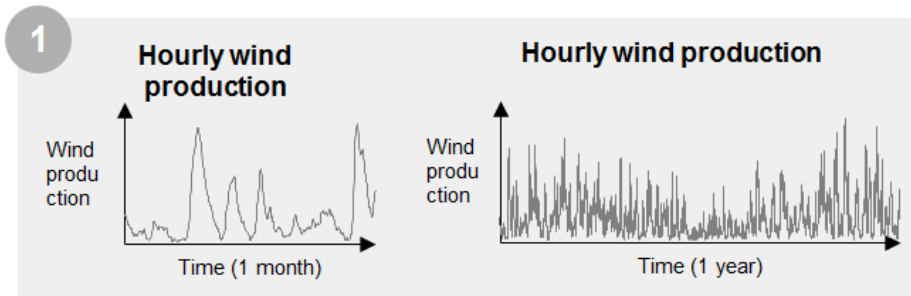
Basic strategy

- 1 Strategy defines reduction quantities and time horizons of open positions
→ reduction path
- 2 Quantitative risk: define size and variability hedging position through structure and projectability of production and distribution portfolio
- 3 Structural risk: minimise through activities as soon as product is liquid

Sub-strategy

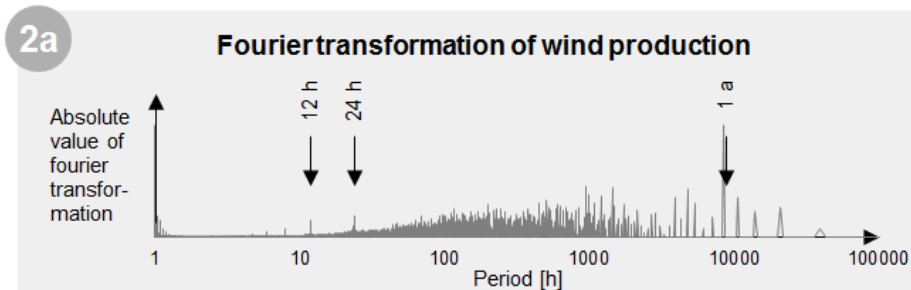
- A Definition of position: adjust to expectation value vs. safe position (at any point in time)
- B Definition of risk limits for speculation according to readiness to assume risk

Value of offshore wind assets in combination with thermal assets lies in forecast periodicity of wind production



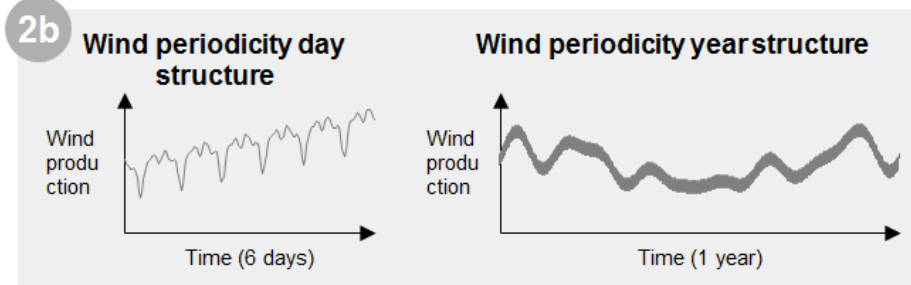
Historic Data

- Normalisation of wind data by installed capacity and full load hours of wind production
- For further analysis: transformation of data in order to ensure Gaussian residuals (required by volatility model)



Periodicity Analysis and Results

- Periodicity analysis: Fourier transformation of transformed wind production data
- Extraction of plausible periodicities: maxima of Fourier transformation show daily structure (periods 24h, 24/2h, etc.) and yearly structure (periods 8760h, 8760/2h, etc.)
- Results for periodicity of wind production: Inverse Fourier transformation respecting extracted periodicities only



Conclusions

1. EMR may increase the risk exposure of low carbon generators to:
 - Basis risk
 - Forecast risk
 - Imbalance risk
2. Offshore wind generators may have opportunity to earn additional revenues from:
 - Investing in forecasting and trading capabilities
 - Better management of O&M and balancing services
 - Offering commodity hedging products through wholesale price wind correlation

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