Challenges of Power Price Forecasting

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Major fundamental factors influencing power prices on the wholesale market

Fuel Markets
- CO₂ prices
- Gas prices
- Crude prices
- Coal prices

Supply
- Marginal costs of thermal plants
- Available capacity
- Unplanned outages
- Revision schedule
- Cross-border exchange balance

Demand
- Consumer behaviour
- School Holidays
- Bank Holidays
- Time of day

Weather Impacts
- Precipitation / Snow melt
- Reservoir / Run-of-River Hydro Plants
- Wind
- Wind generators
- Solar radiation
- Photovoltaic / Solar
- Cloud cover
- Temperature
- Lighting
- Air Conditioning / Electric Heating

These principles remain intact but interdependencies are becoming more complex and global ...
Challenges of Power Market Analysis

1. **Analysis must go global !!!**
   Interdependencies with macroeconomics and global energy markets increasingly influence our local power and gas markets.

2. **Understand the neighbouring markets !!!**
   Crossborder effects become stronger among the European power markets.

3. **Meteorology is essential !!!**
   Weather impact is increasing.

4. **Data mining remains key !!!**
   Data transparency is lagging behind.
1. Increasing Global Interdependencies

Global macro and global primary fuel developments increasingly influence our regional fuel and power markets.

- US Shale Gas Boom
- Energy Efficiency / Demand Destruction
- Renewables Expansion
- Asian Energy Appetite
- Acceptance of Nuclear Energy
- Global Freight (LNG, Dry bulk)
- Environmental Policy (CO₂, SOₓ/NOₓ)
- Arab Spring
- Abenomics
- US Budget Crisis
- Chinese 5-Year Plan
- Geopolitics
- Quantitative Easing
- EU Debt Crisis
Increasing Cross Border Dependency

Germany is exporting weather and availability effects abroad and vice versa.

**Export effects**
- German PV and wind sensitivity (but renewables shut-in effect due to limited crossborder capacities)
- German nuclear availability (esp. nuke moratorium in March 11)

**Import effects**
- French temperature sensitivity
- French nuclear availability
- Nordic, Alpine and Balkan hydro sensitivity
- Dutch gas sensitivity (and further links to UK and Nordic via BritNed and NorNed cable)
- Increasing swing character of Polish and Czech border as well as Hungarian and Slovenian border via Austria (Hungarian and Czech nuke availability, hydro in Balkans)

Market Coupling will accelerate crossborder effects further
2. Development of German Crossborder Exchange Balance*: Increasing Exports with higher Volatility

![Graph showing 30 day Moving Average Mean and Enveloping Standard Deviation (in MW)]

- German imports
- German exports

- Increasing German exports

- Fukushima and nuke moratorium

* Net German crossborder nominations (Denmark, Sweden, Poland, Czech, Austria, Switzerland, France, Netherlands)
German renewable capacities continue to grow impacting residual demand and spot price.

- German PV and wind installations account for 46% of installed capacity and 23% of generated power.
- Expected reform of the renewables law under the new German government causes major uncertainties regarding renewables capacity growth
- PV generation is driving down residual demand and spot price in sunshine hours: from “dromedary” to “camel” shape

* Residual demand: UCTE hourly load – wind and PV generation
Multiple disclosure requirements from various sources exist and are often discussed but not yet uniformly set

Legal Framework
Mainly EU Congestion Guideline, REMIT, “Markttransparenzstellengesetz” (Germany), EU Regulation 714/2009 and EU Directive 2003/6/EC

Legal Overlap
Overlapping in disclosure requirements for ex ante and post market data as part of the financial markets regulation and fraud control (e.g. EMIR, MIFID)

Associations & Authorities
ACER, ERGEG, Entso-E, EFET, Eurelectric, BNetzA, BKartA

Market
Power producers, TSOs and transparency platforms: e.g. RWE, Eon, EnBW, GdF Suez, RTE, Elia, EEX, Nordpool, EMFIP

RTE real-time electricity generation
EEX available generation capacity

1) Voluntary Commitment
4. "Quality before Quantity - How to improve publication requirements of power plant data?"

Current Status: Data Quality and IT Issues
- Data inconsistencies (definitions, granularity)
- Differing time horizons and completeness of published revision plans
- Missing of relevant plants or specific outage data
- Availability forecasts are too optimistic compared D-30 vs. D-1
- Non-timely publication of revision extensions and unplanned outages
- Handling data errors (double entries) and corrections
- Handling newbuild or mothballed capacities (test operations, etc.)
- Problems on tracking data updates and changes

Establish European-wide standards for power plant data
- A uniform transparency platform with consistent publications
- Publication of realistic capacity availabilities
- Identical data granularity and publishing frequency
- Ad-hoc announcements of unplanned power plant outages
- Publication of realistic and complete revision plans
- Solid and reliable data structure
- More focus regarding data corrections
- Clear labelling and consistent rules when correcting data
- Possibility of tracking events (outages, revisions, etc.)