

The background of the slide is a photograph showing the silhouettes of several wind turbines against a sky with soft, orange and blue hues, suggesting a sunset or sunrise. The turbines are of varying heights and are positioned across the frame, with the most prominent one in the center-left.

An independent balance responsible party's use of forecasting

SafeWind End Users Workshop, Energinet.dk, Fredericia, Denmark, March 2nd 2012

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CONTENT

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- What is a balance Responsible Party?
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NORDJYSK ELHANDEL A/S

Nordjysk Elhandel was established in 1998 by four Danish DSO's – In 2011 bought by private investors

Nordjysk Elhandel is handling and trading wind energy, electricity production and consumption and carbon emissions. Largest independent wind balancing company in Europe

140 employees, turnover 2011 (E) 530 mill. Euro (4,000 mill. DKK)

Our customer portfolio includes:

- More than **185 decentral electricity producers** – mostly CHP (coproduction of heat and power) plants
- . The majority of **wind power** operating on market terms in Denmark and several wind power plants in Sweden and Germany totaling pt. **2400 MW** – app. 6 TWh wind power production annually
- **300.000 electricity consumers** including a number of the largest companies in Denmark – annual consumption 3.1 TWh
- A large portfolio of **CDM projects** (FN Clean Development Mechanism) in both Africa, Asia and Latin America plus several ETS compliance companies across Europe

ACTORS IN THE DANISH ELECTRICITY SYSTEM

TSO – Transmission System Operator

In Denmark Energinet.dk. Also called system responsible

Nord Pool – Den Nordic Energy exchange



Balance Responsible Parties

Production, consumption and trade

Grid companies (DSOs)

Responsible for the distribution grids and the meters at the consumers and producers. Monopolies.

Trading companies (Electricity Suppliers)

Sell electricity nation wide

•Companies with a supply obligation

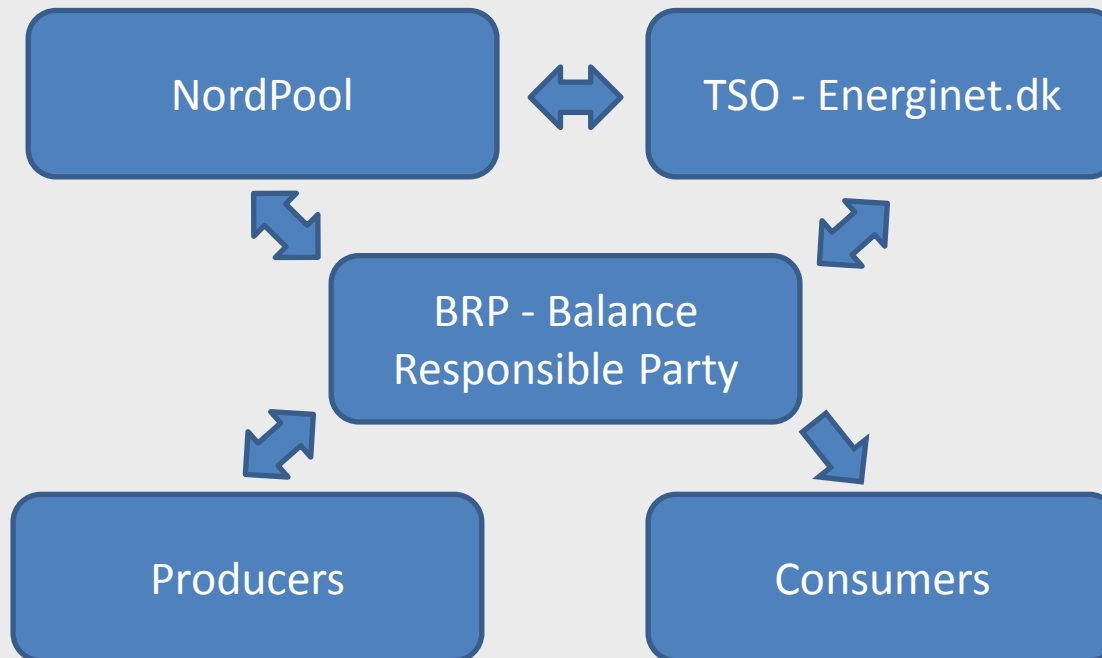
- Supplying end users who have not exercised their right to choose an electricity supplier

Producers / generators

Consumers

KOMMUNICATION IN THE ELECTRICITY BALANCE

Communication between system responsible TSO (Energinet.dk), the consumers, the producers and the electricity stock market NordPool



BALANCE RESPONSIBLE PARTIES

The Balance Responsible Parties has the **economic responsibility** for the balance between:

- Production **sold** and actually **produced**
- Consumption **bought** and actually **consumed**

It is **almost impossible** to achieve perfect **balance** between the prognoses from the day ahead and the actual consumption or production in the operating day!

The larger the imbalance in the market the larger the imbalance costs (not always)

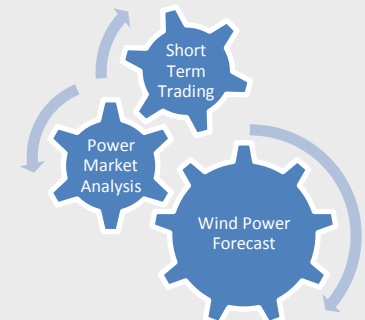
Errors in the wind prognosis are one of the largest parameters in the size of the imbalance costs (the price of up and down ward regulation)

WIND POWER FORECAST AT NEAS

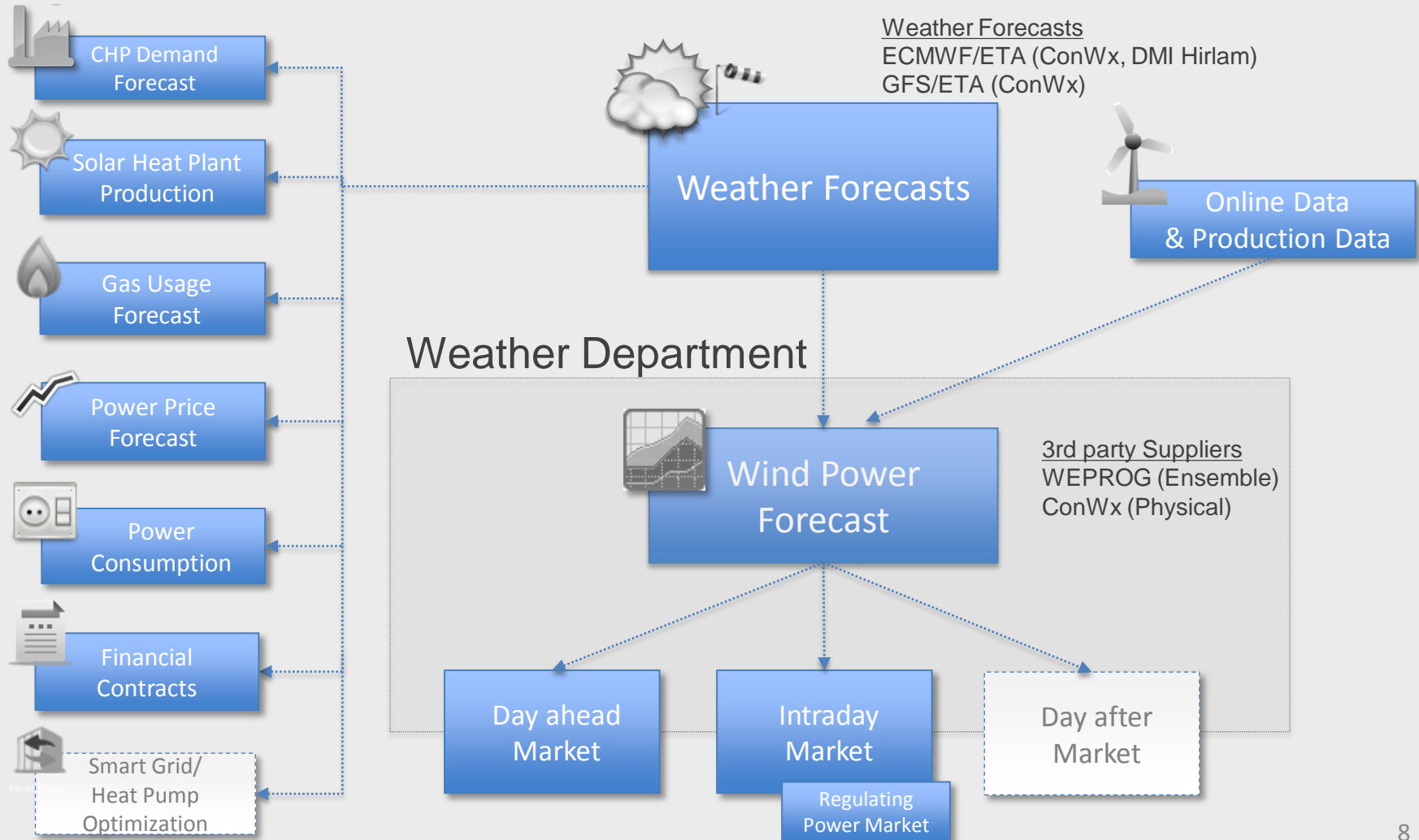
- Wind business area at NEAS is big and growing rapidly

Market	NEAS Wind	Share of NEAS Portfolio (MW)	Share of Total Wind (MW)
DK1/DK2	1565 MW	~70%	~39%
Germany	616 MW	~95%	~2%
Sweden	180 MW	100%	??

- Wind Power Forecasting is “mission critical” for the wind business area:
 - Key information and decision base for acting as BRP and trading in the various power markets
 - Wind Power Forecasts used in combination with other key functions at NEAS, determines how NEAS acts in the different power markets
- NEAS has its own “Weather Department” to ensure the best possible power forecasting quality
- In combination with other functions, the weather desk determines how NEAS trades at the different markets

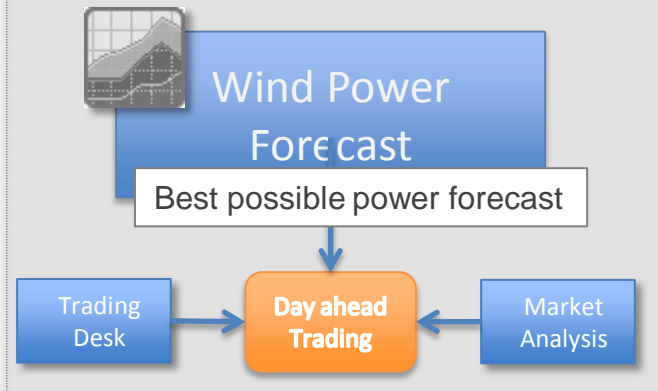


WEATHER FORECAST AT NEAS



USAGE OF WIND POWER FORECASTS

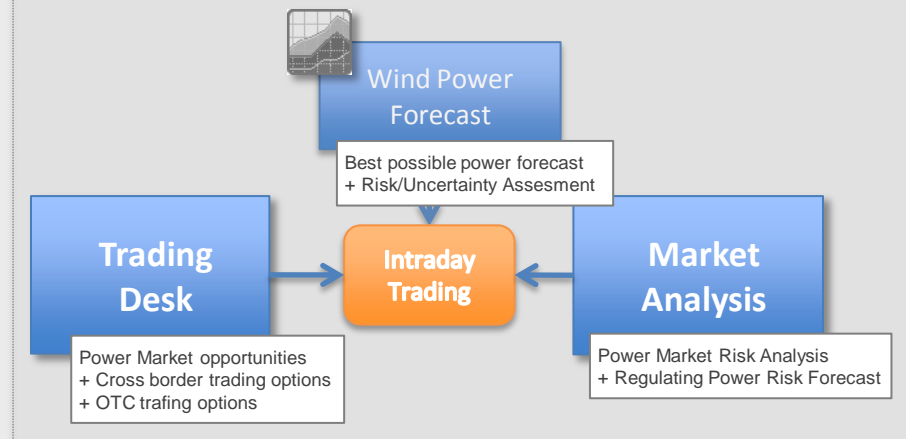
Day ahead Trading



- Wind Power Forecast dominant
- Focus on volumes

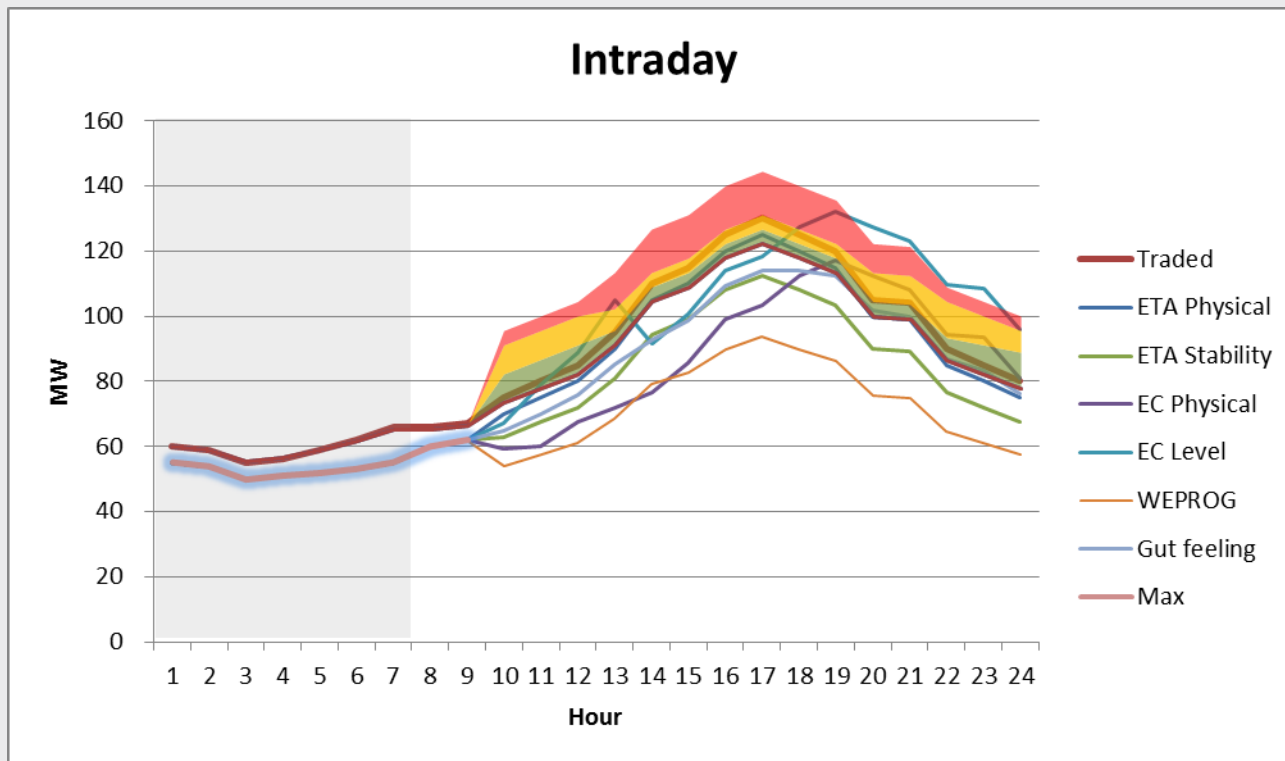
- Combination of
Wind Power Forecast,
Market Analysis
Trading Desk
→ Determines intraday trades
- Focus on minimizing financial risk
- Wind Power Forecast focus:
 - Uncertainty and risks
 - Weather scenarios with lowest risk

Intraday Trading



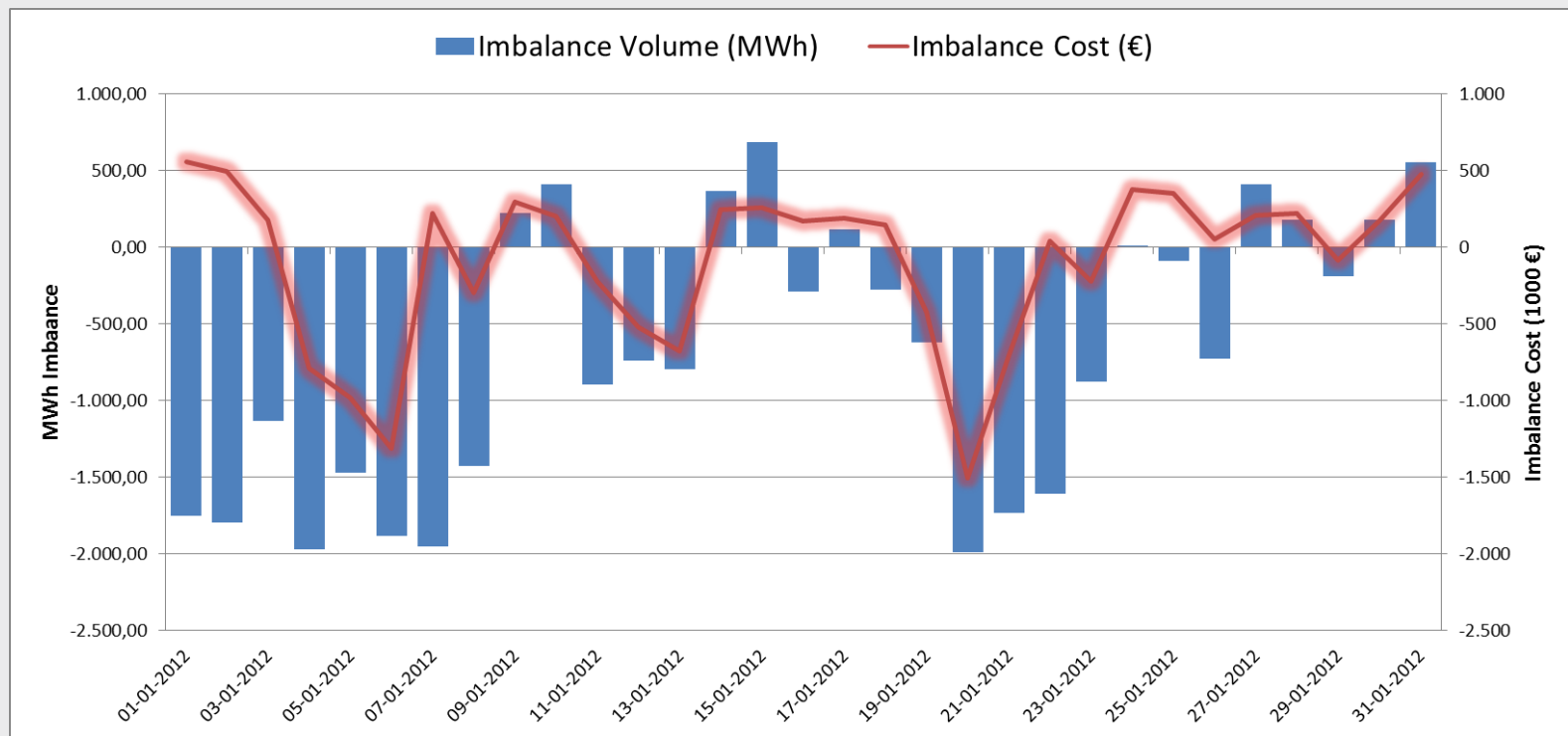
SCENARIO AND RISK

- Risk for high down regulation prices



IMPORTANCE OF RISK ASSESMENT INTRADAY (1)

- Imbalance can be an expensive cost and a valuable asset!
(Fictive numbers)



IMPORTANCE OF RISK ASSESMENT INTRADAY (2)

- German Imbalance Market volatile

Production Data vs. Trade - Balance Report									
Navigate: Germany 2012 January Wednesday 11									
Trade Day Ahead Trade Intraday Settled Actual Production Provisional Production Approximation MW Short MW Long									
600 MWh									
11-01-2012 Hour	Traded			Actual Production			Imbalance		
	Dayahead (MWh)	Intraday (MWh)	Dayahead Turnover (€)	Settled Production (MWh)	% Data	Approximated Total (MWh)	Short (MWh)	Long (MWh)	Cost (€)
08 - 09	-228,6	-20,0	10.061	136,1	84,8%	181,3	-67,3	0,0	-5.764
09 - 10	-241,0	-25,0	10.145	148,2	84,8%	195,4	-70,6	0,0	-708
10 - 11	-246,0	-25,0	9.932	173,0	84,8%	222,3	-48,7	0,0	-4.380
11 - 12	-246,6	-25,0	10.128	195,5	84,8%	245,0	-26,6	0,0	-1.210
12 - 13	-248,6	0,0	9.454	184,2	84,8%	232,5	-16,1	0,0	-1.235
13 - 14	-247,5	0,0	9.566	170,1	84,8%	218,4	-29,1	0,0	-2.967
14 - 15	-244,8	0,0	9.442	164,4	84,8%	211,2	-33,6	0,0	-3.822
15 - 16	-235,9	0,0	9.486	161,7	84,8%	207,4	-28,5	0,0	-2.857
16 - 17	-227,5	0,0	9.810	164,7	84,8%	208,3	-19,2	0,0	-1.378
17 - 18	-219,6	0,0	9.961	146,2	84,8%	186,2	-33,4	0,0	-4.046
18 - 19	-220,0	0,0	8.668	135,7	84,8%	172,2	-47,8	0,0	2.549
19 - 20	-229,1	0,0	8.216	116,2	84,8%	151,0	-78,1	0,0	583
20 - 21	-248,1	0,0	8.651	107,9	84,8%	144,6	-103,5	0,0	-9.989
21 - 22	-274,1	0,0	9.358	102,8	84,8%	145,0	-129,1	0,0	-9.398
22 - 23	-301,0	-35,0	11.011	109,0	84,8%	159,2	-176,8	0,0	-11.491

DATA HANDLING & DATA QUALITY

- **Forecast quality vs. configuration and master data**
 - Forecast quality is closely linked to the quality and management of configuration data and portfolio management.
 - The portfolio changes every month. New tendering contracts signed, other cancelled. Turbines in break down etc.
- **Forecast Benchmarking**
 - We need to improve our forecast benchmarking.
Related to the problem with portfolio management.
- **Huge amount of data**
 - The forecast system produces a lot of data, and it is a challenge to secure that the analysis people and the meteorologists are working with the correct data. If something in the data transport fails, it can potentially generate huge imbalances

Limited access to online data

- Online data is used in combination with latest forecast values to estimate position in the market.
- The share of online data is too low -> dependent on forecasting

