The Nordic regulating power market

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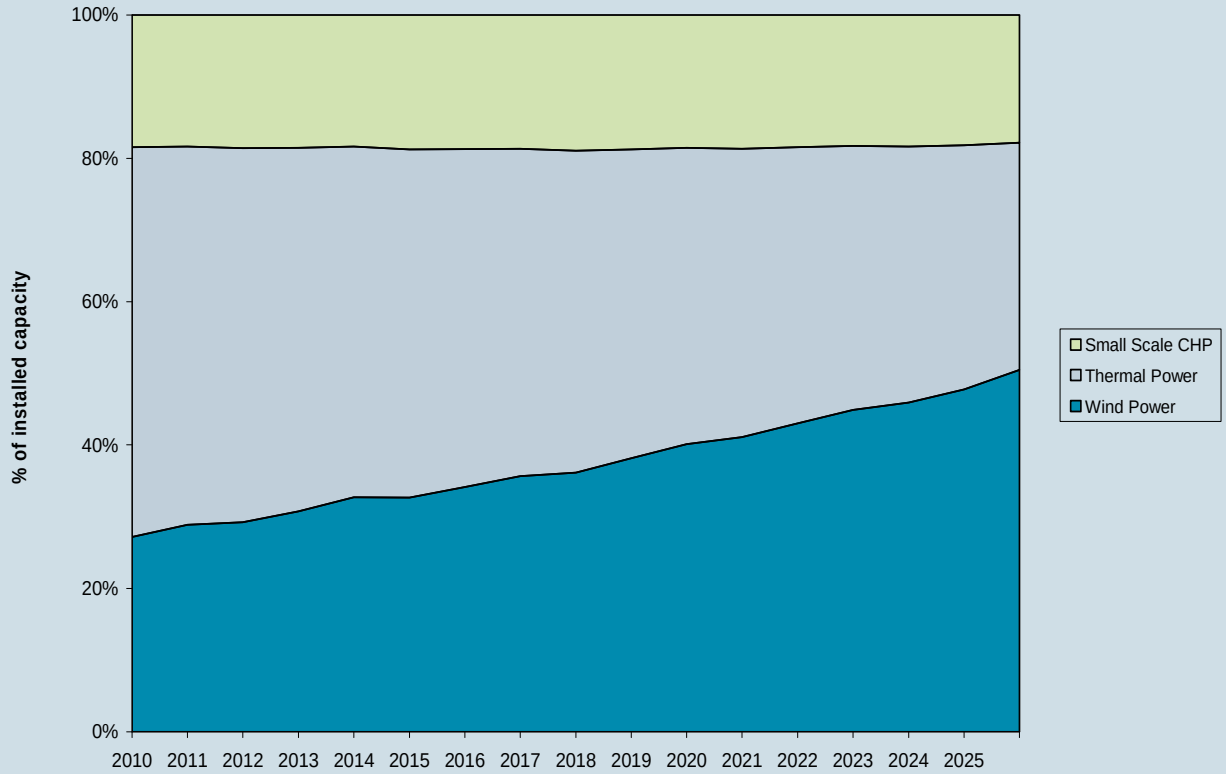
Agenda

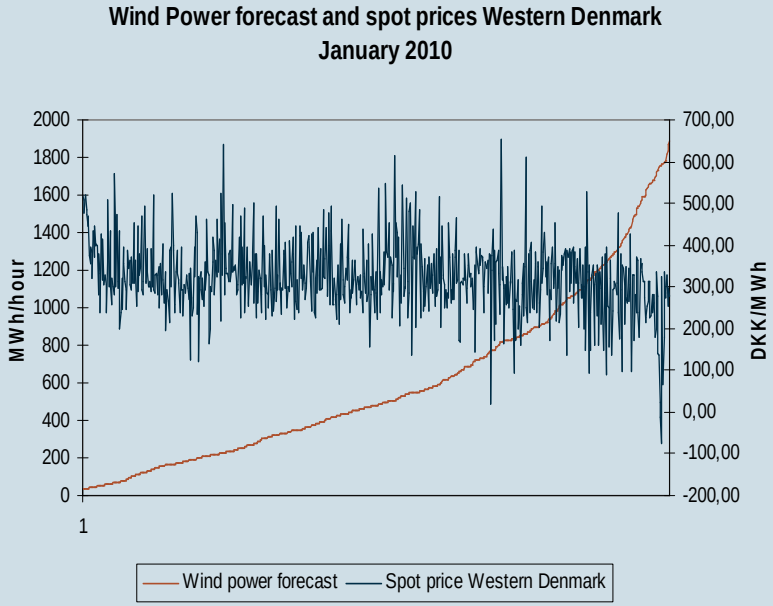
- **Expanding the Danish wind power towards 2020**
- **The Nordic regulating power market**

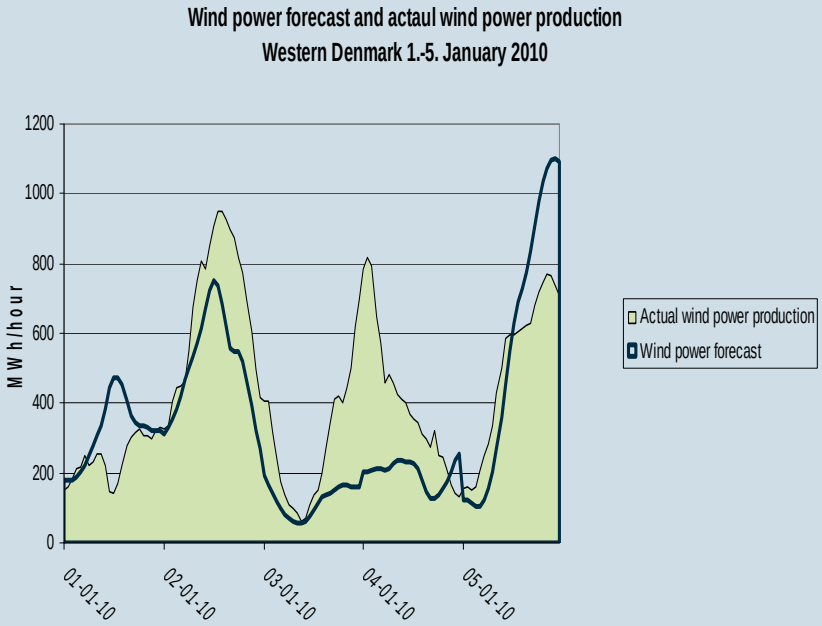
A scenario for the expansion of the wind power capacity in Denmark



Source: Energinet.dk

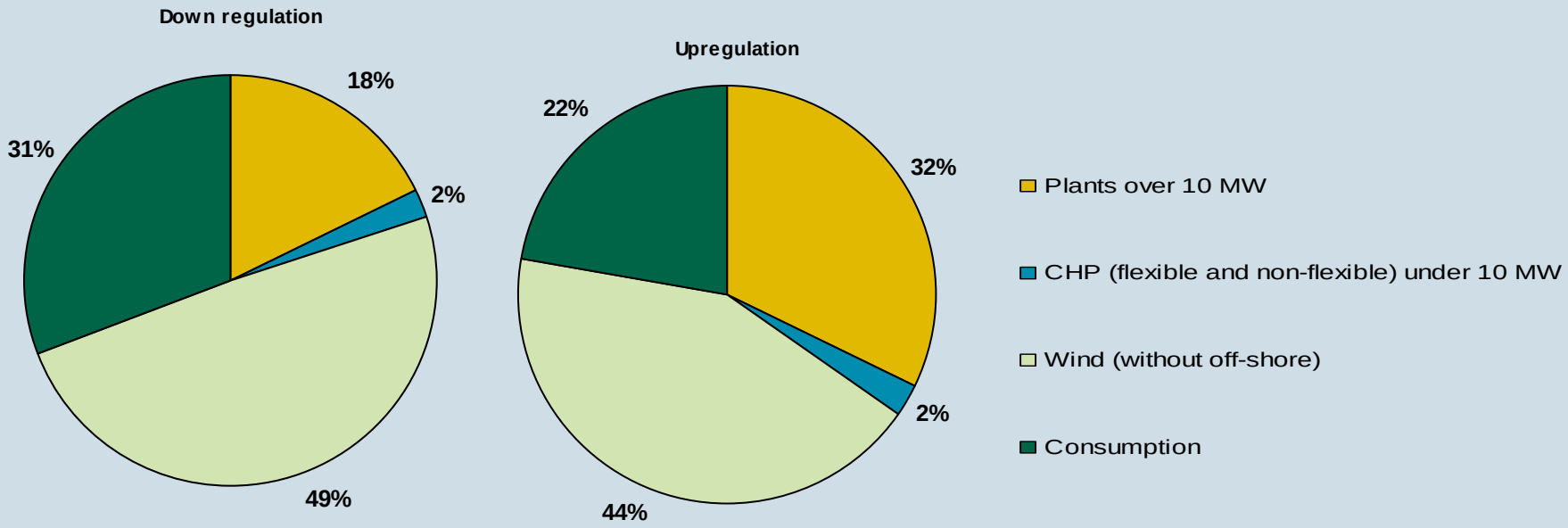
Wind power drives spot-prices down





- Price-peaks are non-existing in hours with high wind power forecasts, but at lower forecast levels price peaks is more frequent
- Wind power will be one of the main future price drivers
- But wind power comes with an extra costs: Forecast errors
- Roughly 25 % of the actual wind production in Western Denmark in the last half of 2009 was handled by the balancing market

System imbalances Western Denmark (2009)



- Wind Power is the largest cause for imbalances in the Danish power system
- Balancing Wind Power requires cross-border balancing and therefore balancing market integration

Agenda

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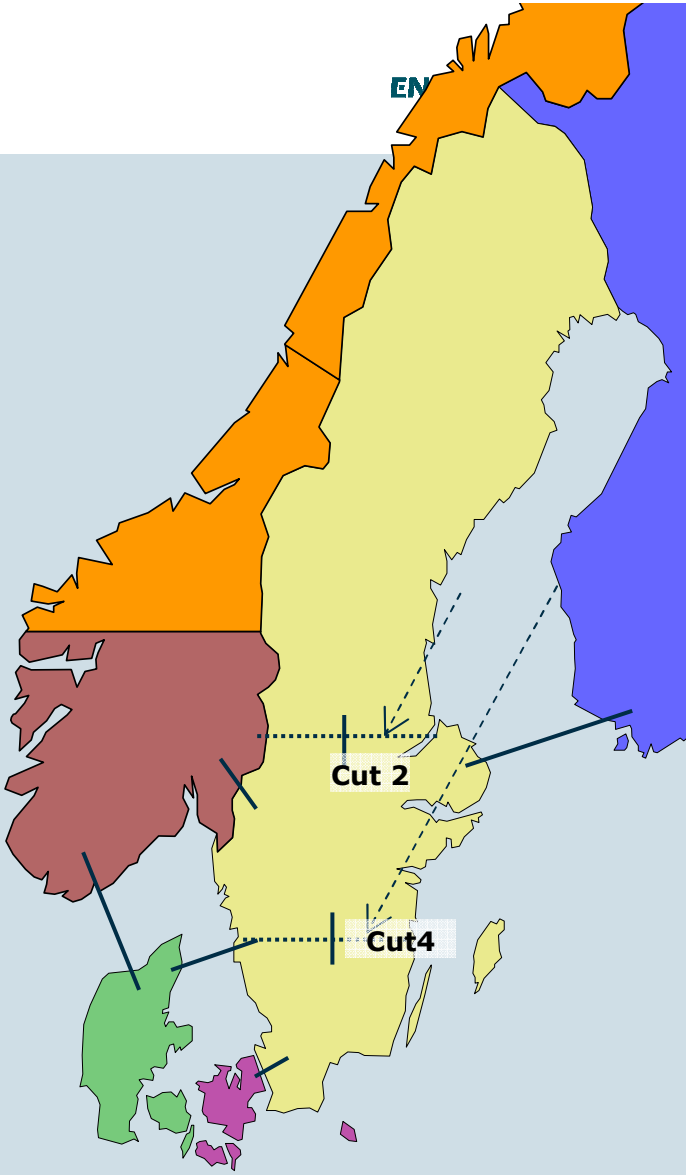
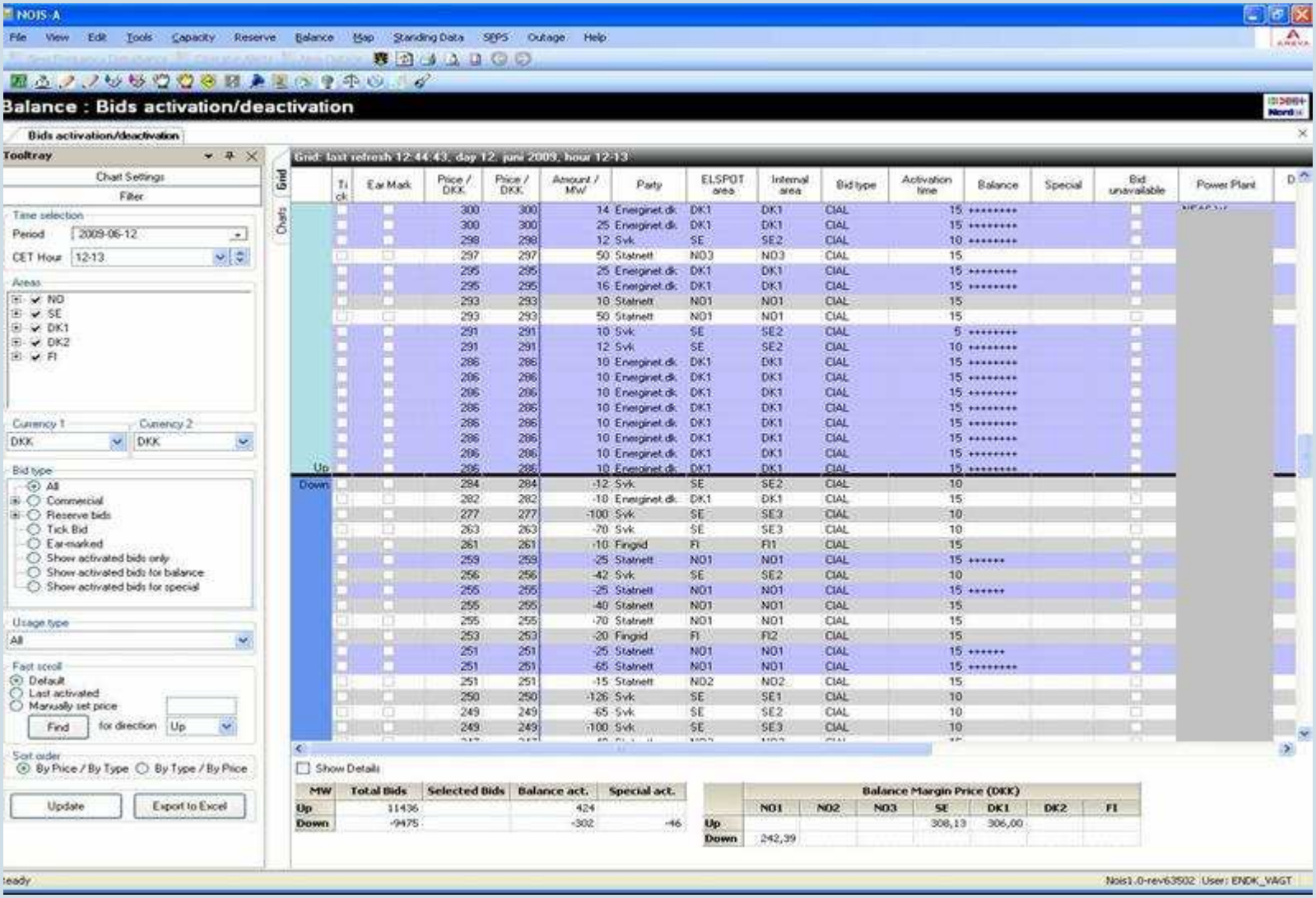
- **The Nordic regulation power market**

The Nordic regulating power market

- **All of the Nordic power system must represent one common Nordic market for regulating power:**
- Necessary regulations must be made in the subsystem having the lowest regulation costs
- The regulating power and the balance prices offered to the market players is the same in all areas for much of the year
- The individual TSOs must no longer regulate according to their own subsystem
- Svenska Kraftnät and Statnett is overall responsible for the balance in the Nordic synchronous area
- Eastern Denmark has been a part of the market since 2002
- Western Denmark was fully integrated into the market in 2008

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The Nordic regulating power market

- **The market is divided when congestion occurs:**

▪ When congestion occurs between the subsystems, the common market is divided

▪ The division is made in advance when congestion occurs in the day-ahead market or in the hour of operation

▪ If congestion in the day-ahead market does not result in congestion in the hour of operation, the regulating power price in the two subsystems will remain equal

▪ When congestion occurs between two subsystems, each of the systems get an individual regulating power price

▪ **Further developments of the Nordic regulation power market**

▪ Integration of consumption resources

▪ Ancillary services from wind turbines

▪ Further cooperation with neighbouring countries (Germany)