Experiences with wind forecasts in DK

SafeWind End Users Workshop,

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Lars Henrik Hansen

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Outline

- Portfolio management
- Wind power production on HR2
  - Forecast with low deviation – case #1 and #2
  - Forecast with high deviation– case #3
  - Short summary
- Discussion

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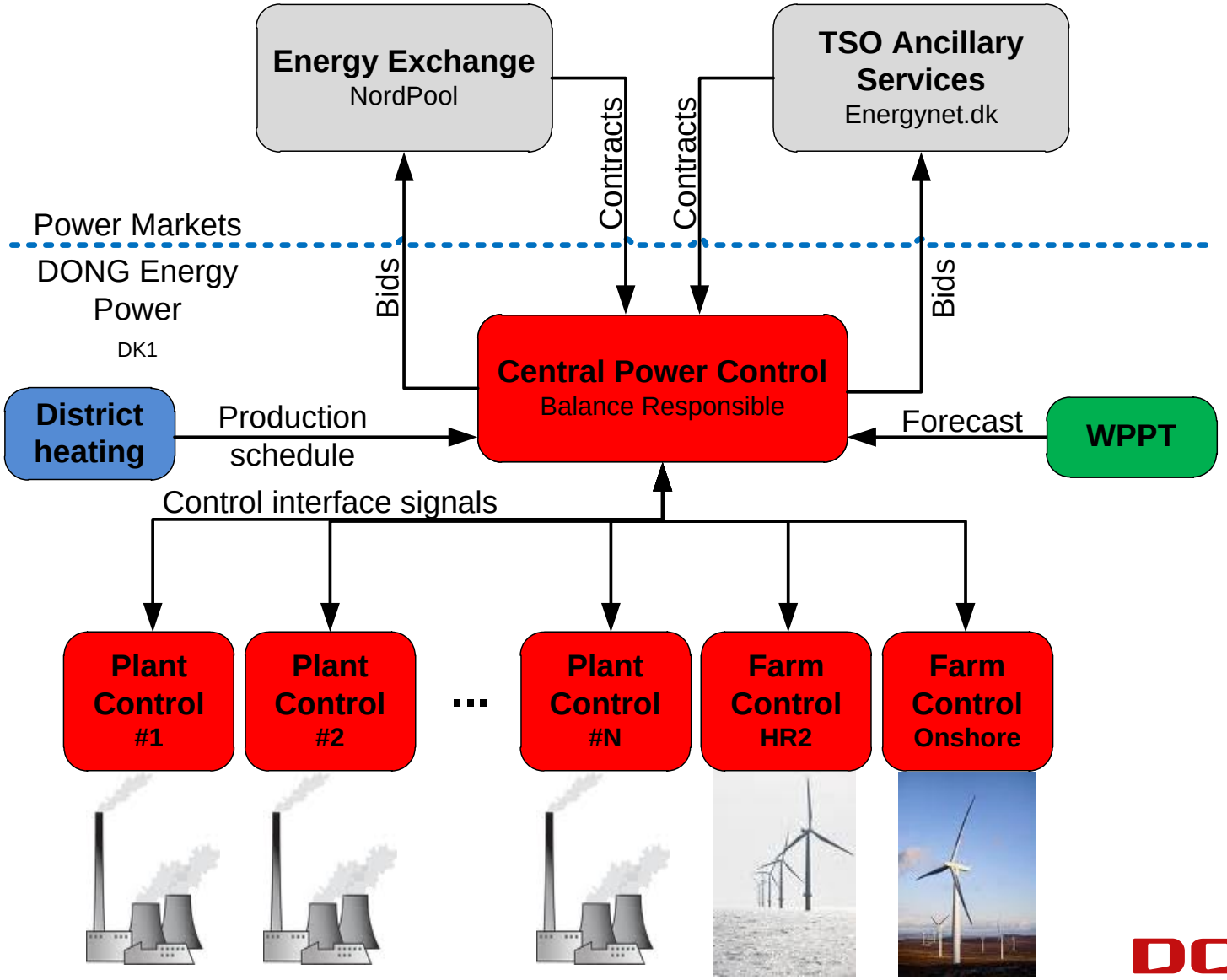
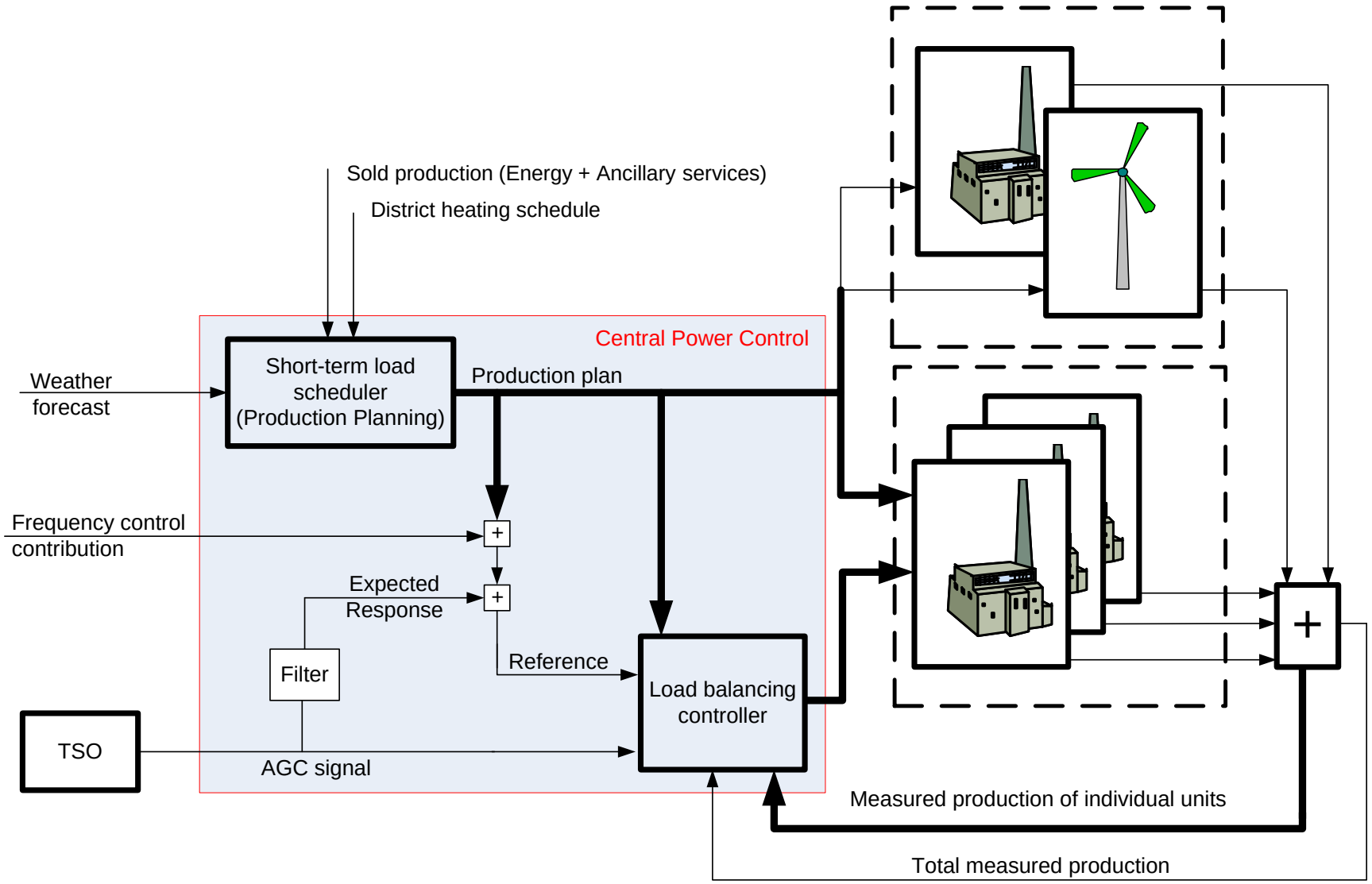
DONG Energy portfolio management



DONG Energy Central Power Control



Wind power production on HR2

- Forecast with low deviation – case #1 and #2
- Forecast with high deviation– case #3
- Short summary

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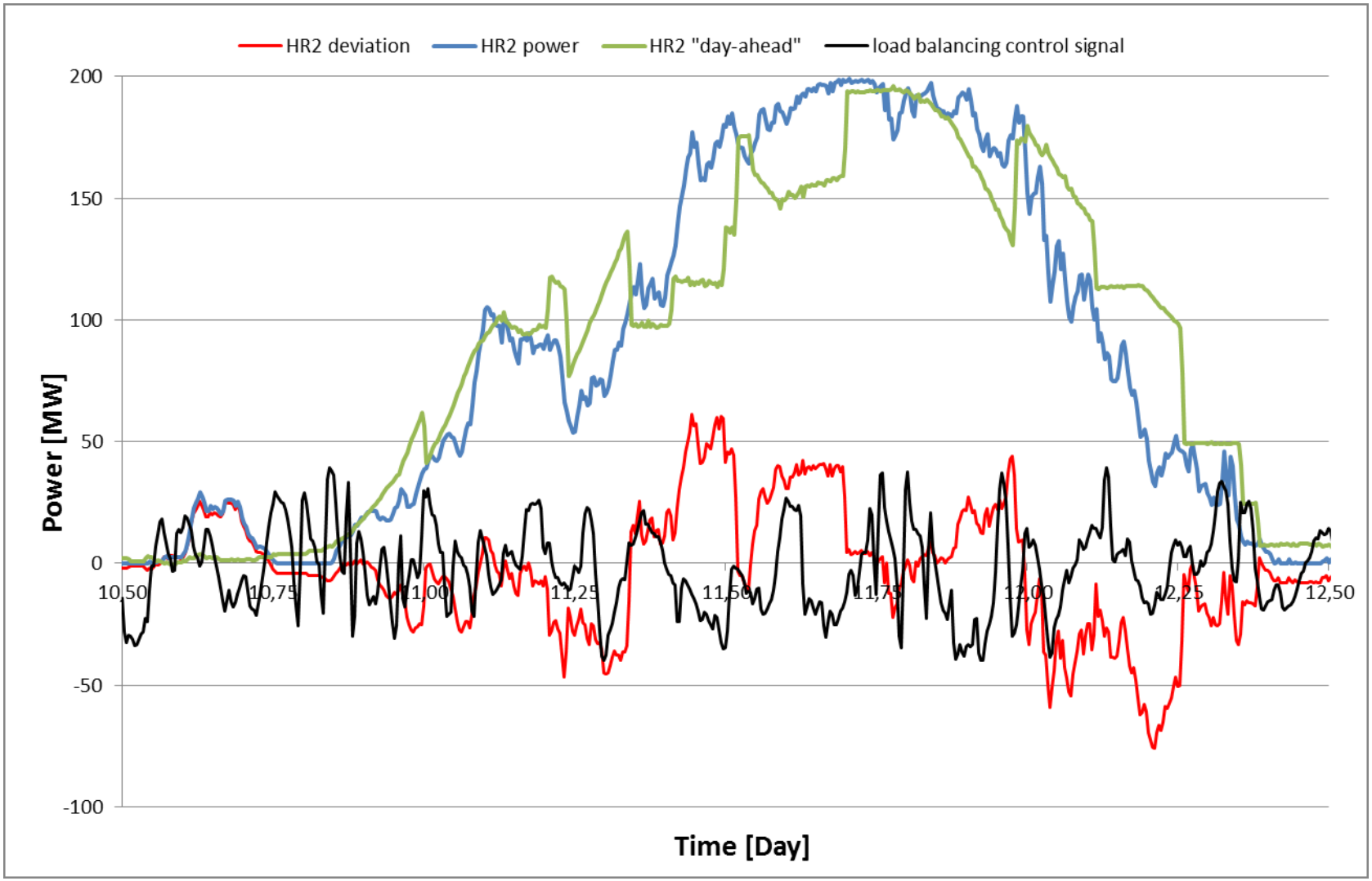
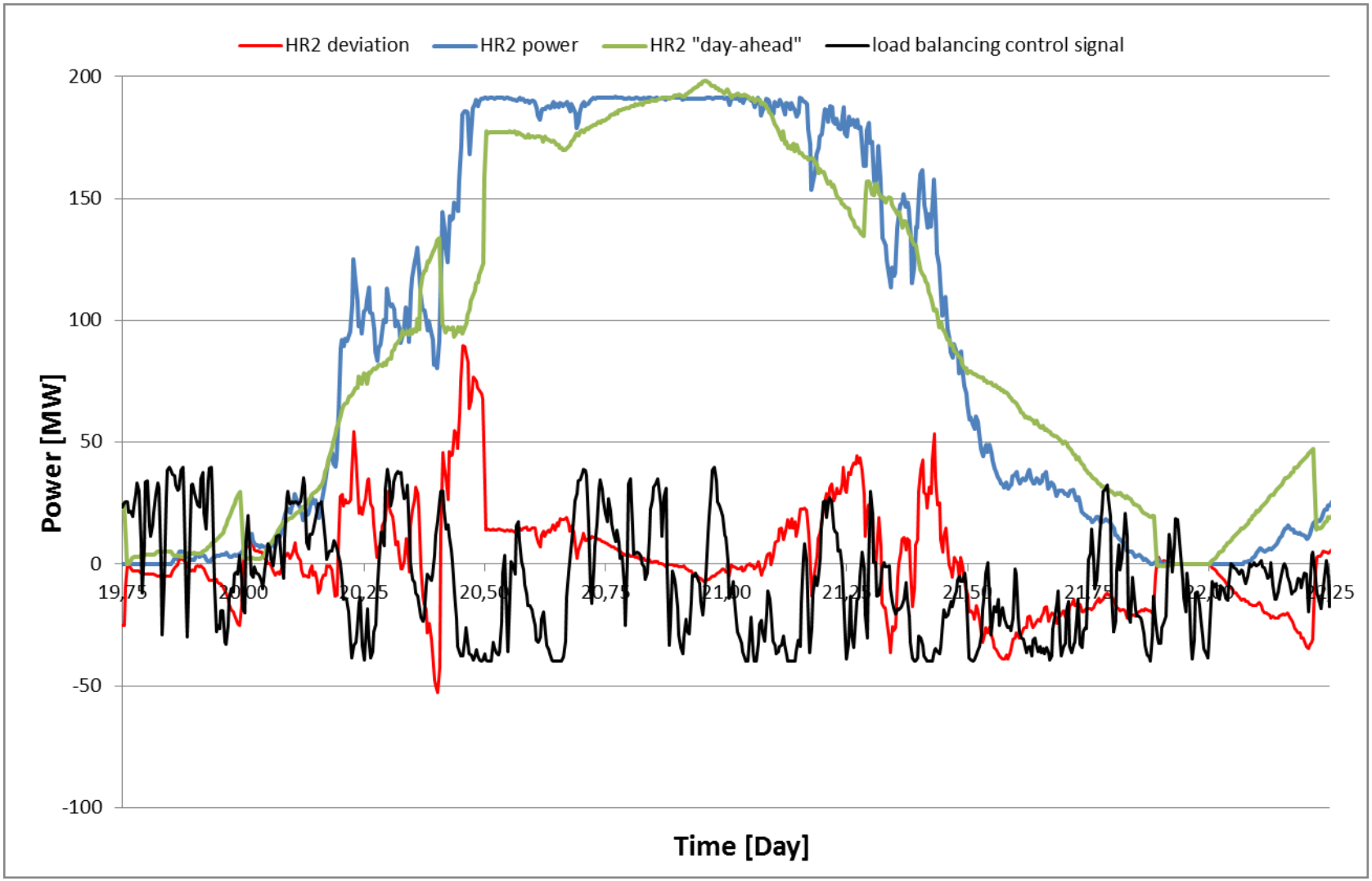
Forecast with low deviation – case #1

Horns Rev 2 September 10th – 12th 2010

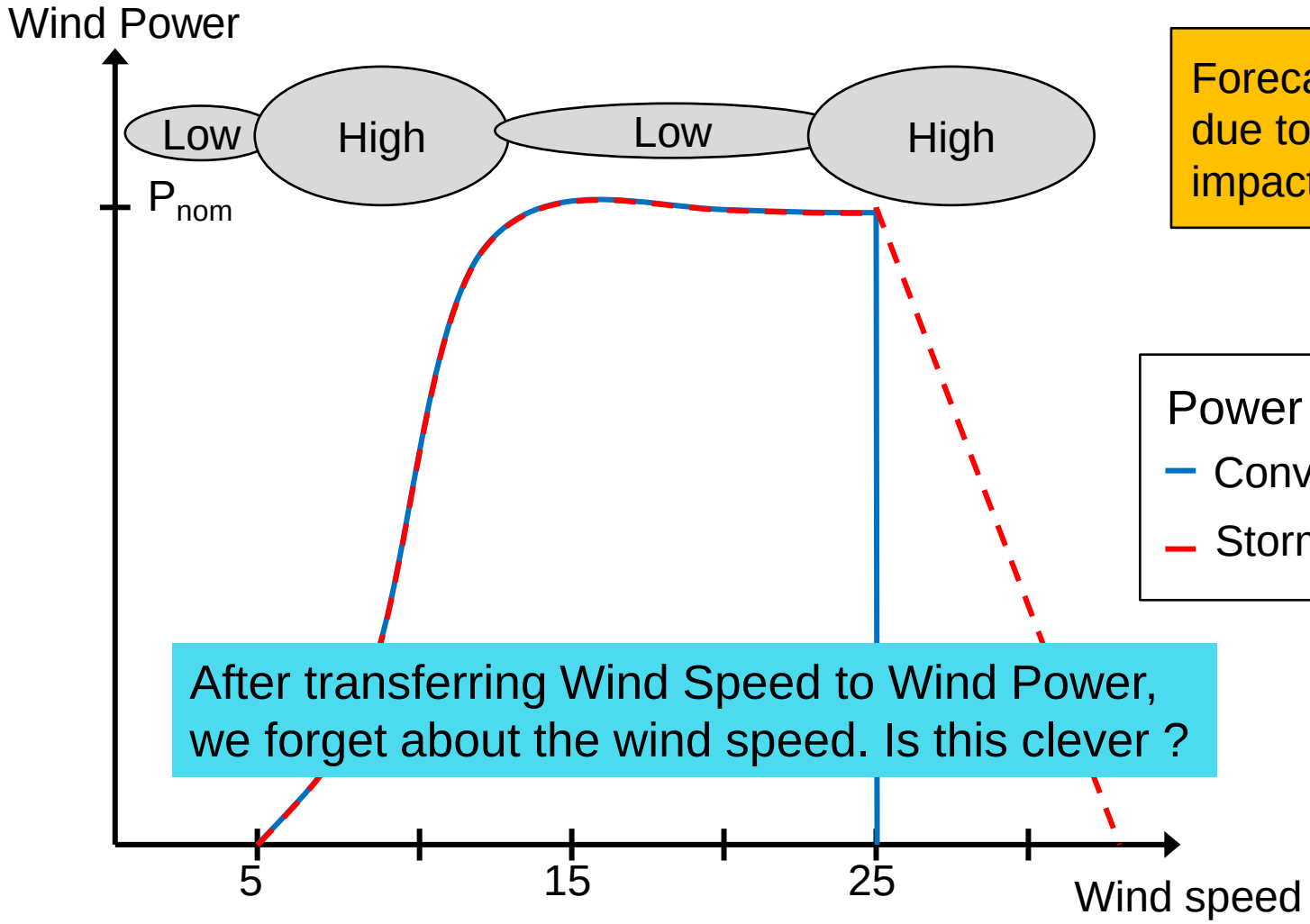


Forecast with low deviation – case #2

Horns Rev 2 September 20th – 22nd 2010



Wind power is based on power curves – a source for forecast errors



Forecast errors due to dynamic impact

Power curves:
- Conventional
- Storm control

After transferring Wind Speed to Wind Power, we forget about the wind speed. Is this clever ?

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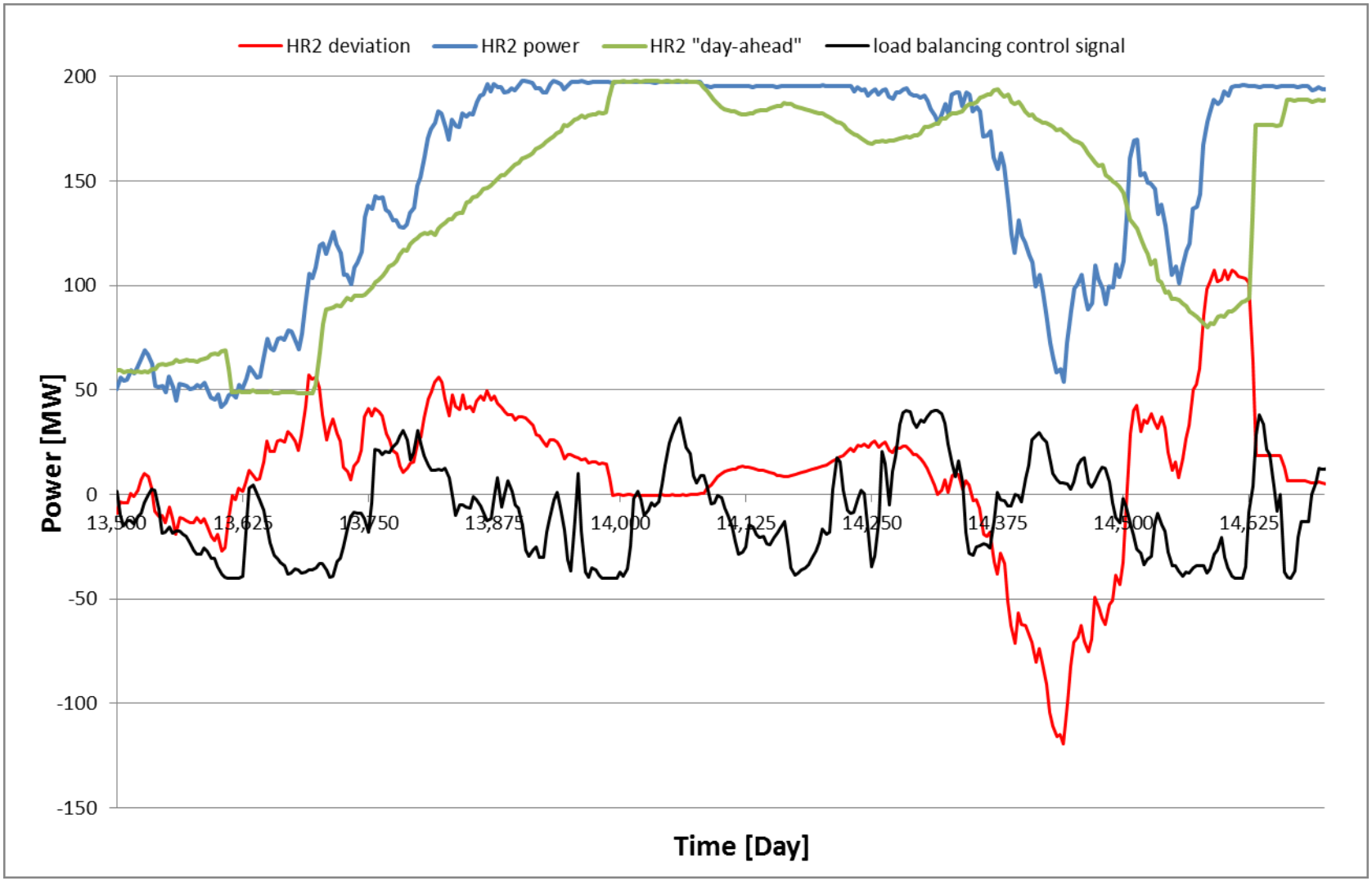
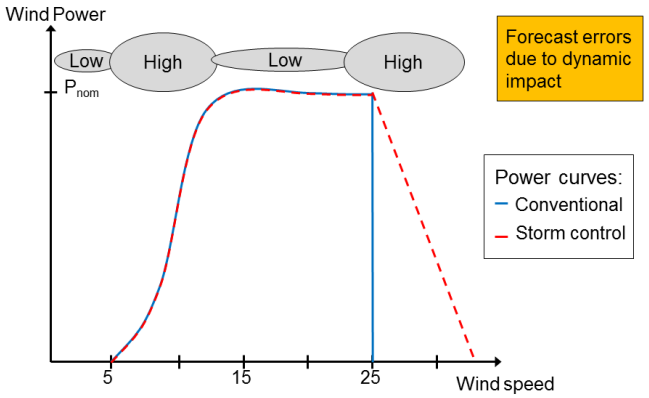
Forecast with high deviation – case #3

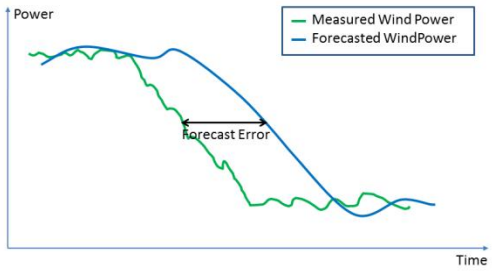
Horns Rev 2 September 14th 2010



Summary

- Wind power forecast challenges:
  - Wind oscillations:
    - on the active/steep part of the wind turbine power curve is a source for big errors between forecast and actual production
    - in the power limiting regime of the wind turbine power curve is a source for minor errors between forecast and actual production
  - Phase errors:
    - timing issues produce large errors between forecast and actual production

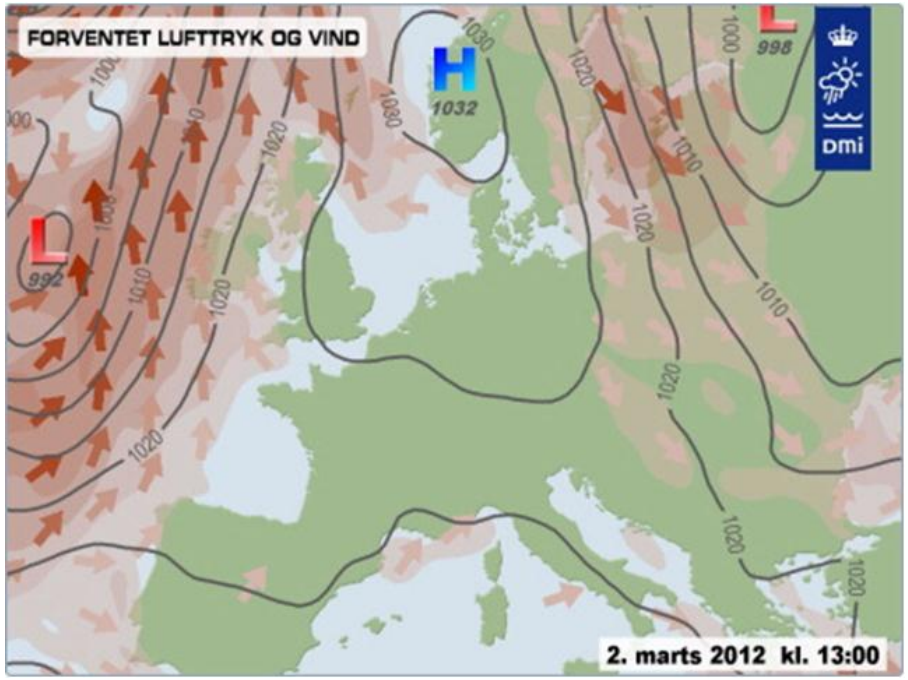




Discussion

Discussion

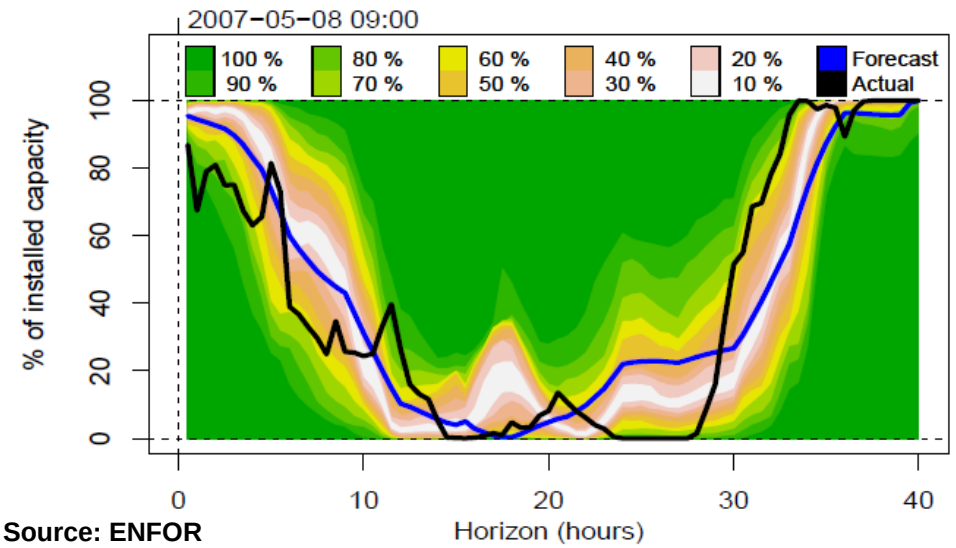
- Due to significant forecast errors – are we ready to provide ancillary services and Spinning Reserves from wind farms?
- Can we reduce forecast errors, when we combine several wind farms distributed over a large area – are we ready?



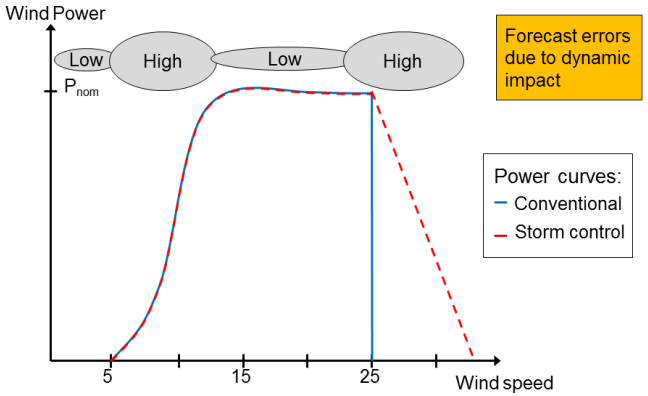
Discussion

- How do we incorporate dynamics of the wind speed in the forecast?
- Risk of stormy weather or sudden wind calm:
  - is it realistic to associate forecasts with confidence interval, which shows high uncertainty in these cases?
- How do we allocate sufficient spinning reserves?
- How can we reduce impact of forecast errors ?

Example of WPPT point and quantile forecasts



Source: ENFOR



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Thank you for your attention …