



4DH

*First Annual Conference*

*03. October 2012*

**Key knowledge about:  
Proactive participation of CHP,  
Waste to Energy plants and  
wind turbines themselves in the  
electricity markets**

*Anders N. Andersen, EMD International A/S*

**EMD**



# Example of simulated operation in energyPRO of a week WITHOUT bypass at Sønderborg CHP-plant



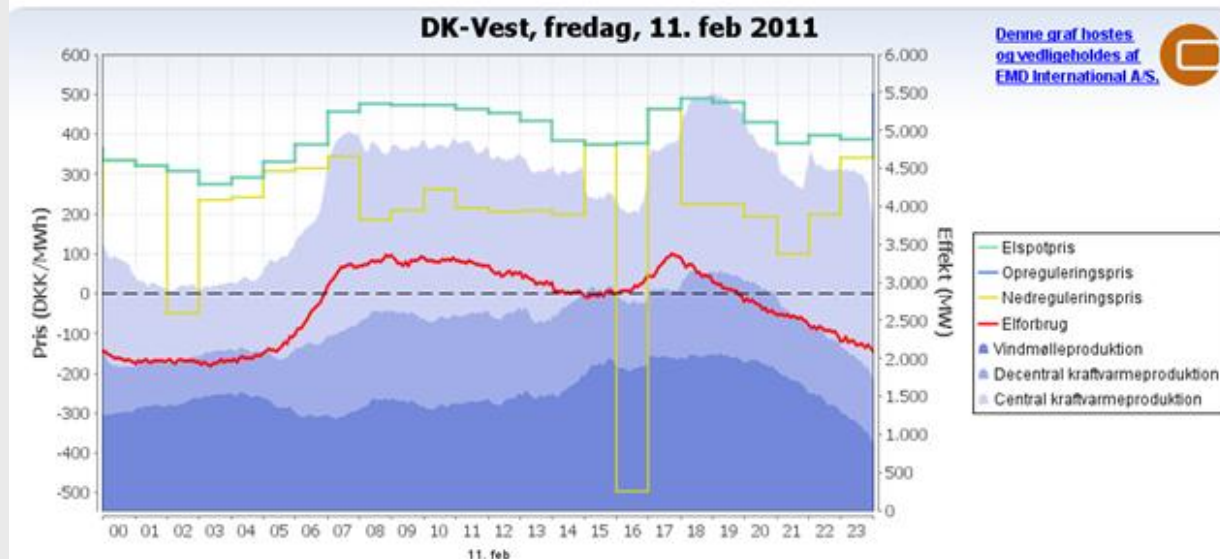
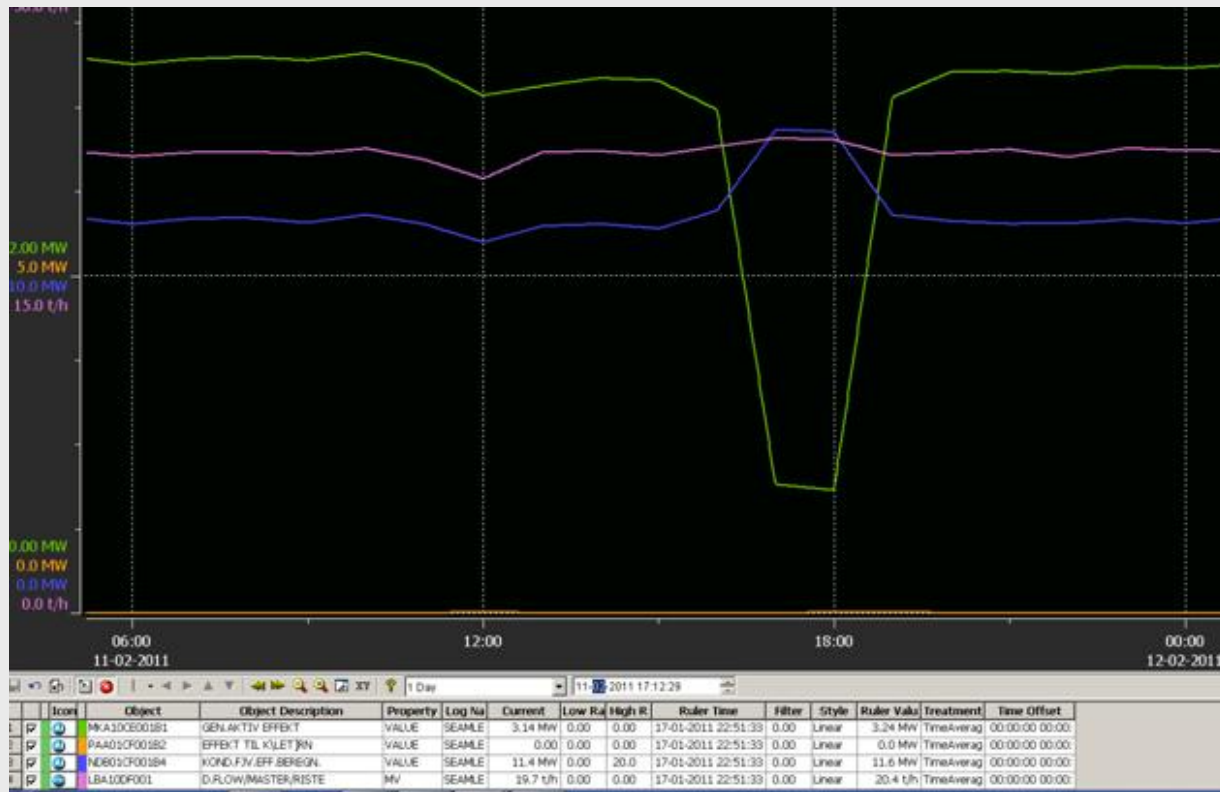


# Example of simulated operation in energyPRO of the same week WITH bypass at Sønderborg CHP-plant



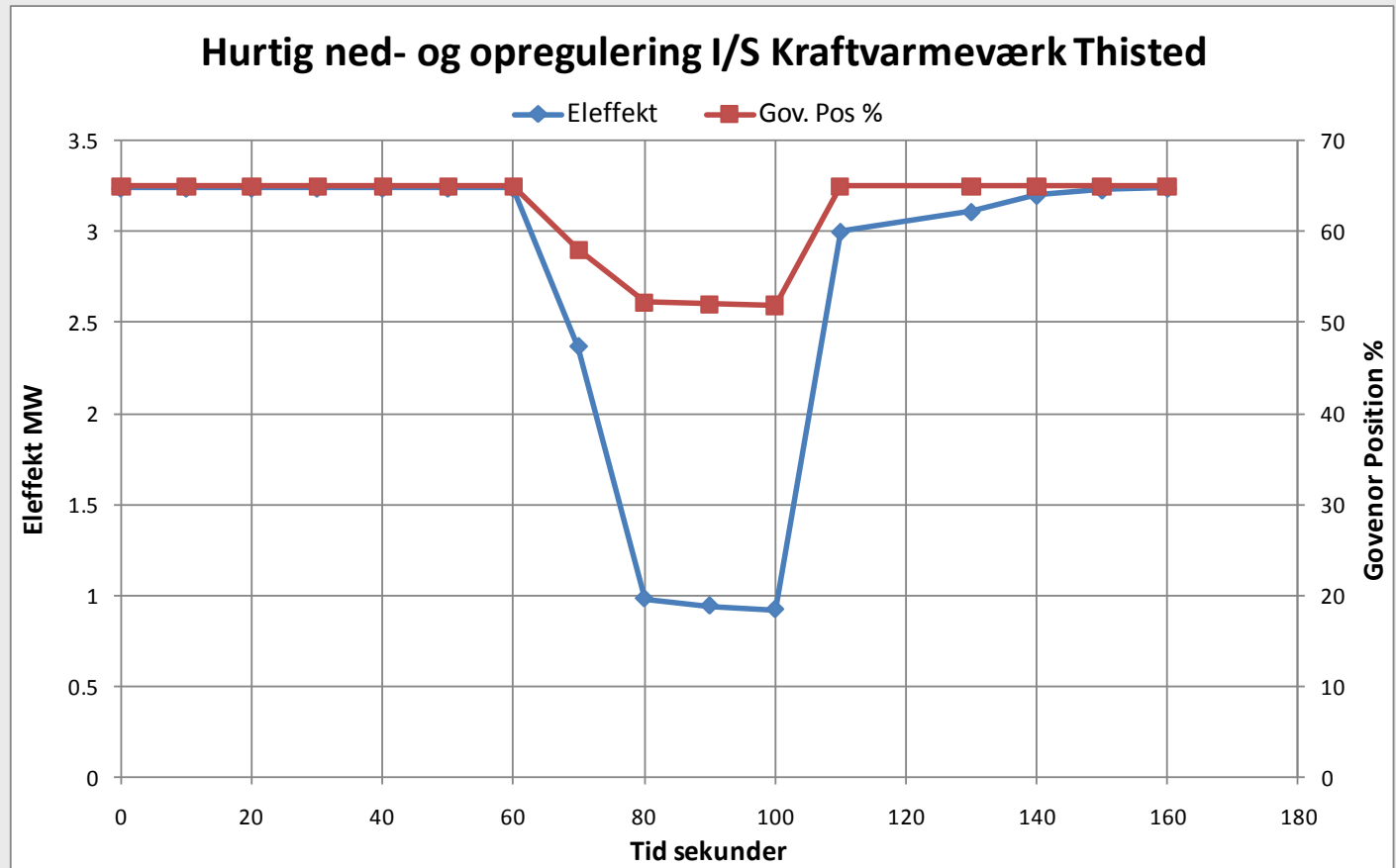


# Thisted incineration CHP 11-02-2011





# Bypass is also able to be offered as 30 sec. Primary Reserve

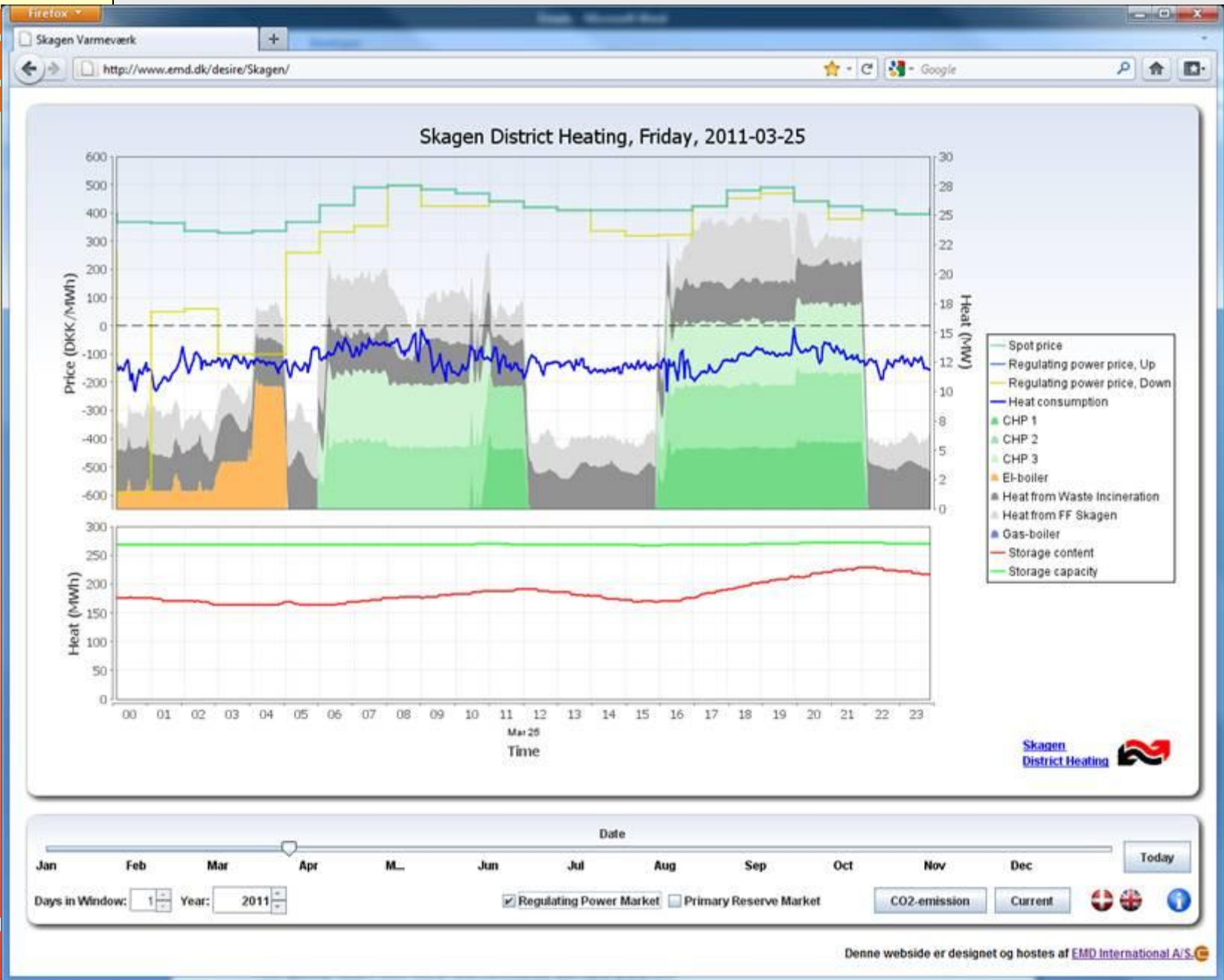




<http://www.emd.dk/desire/Skagen/>



**EMD**





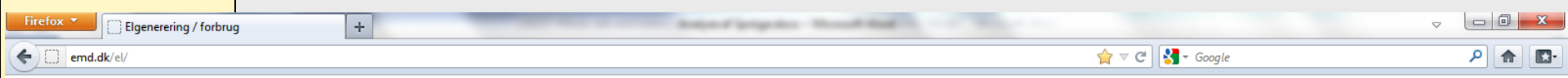
**We have in a research project made live test of the economic benefit for a 21 MW wind farm of offering downward regulation to the TSO**





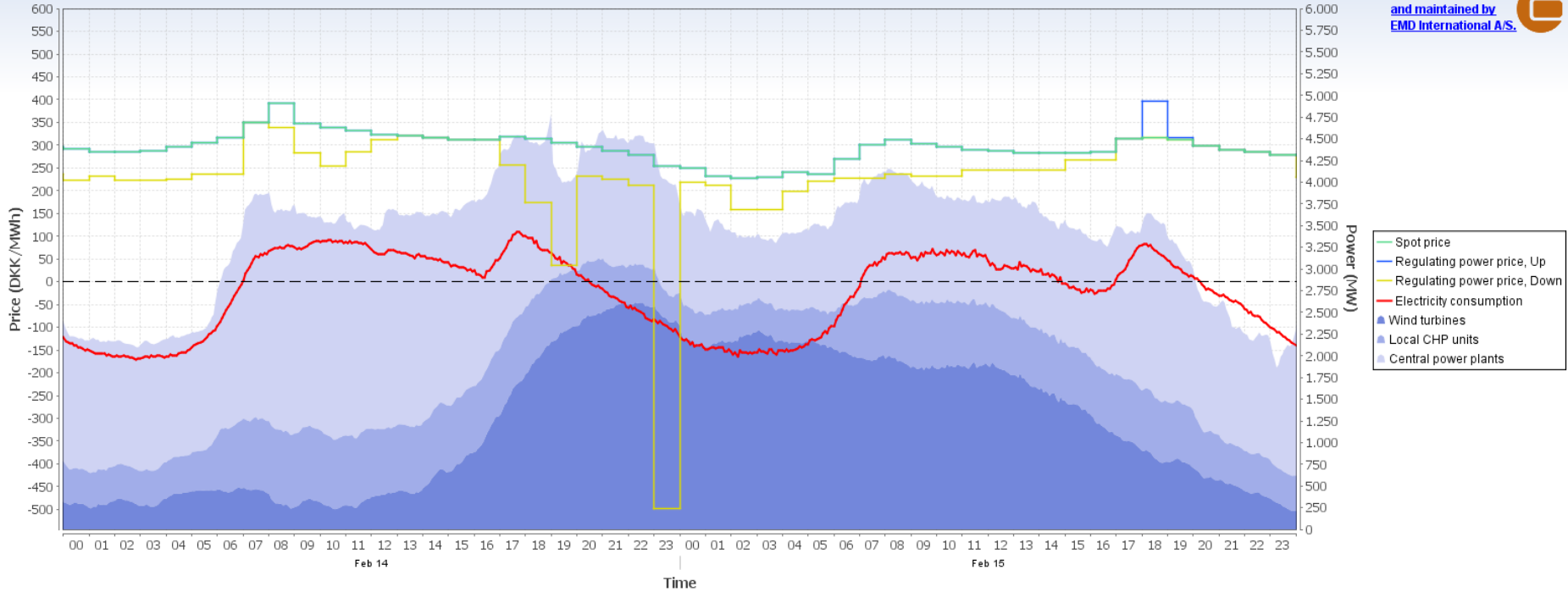


<http://emd.dk/el/>



### West Denmark, Tuesday, 2012-02-14 to Wednesday, 2012-02-15


This graph is hosted and maintained by EMD International A.S. 



Date: Jan Feb Mar Apr M... Jun Jul Aug Sep Oct Nov Dec Today

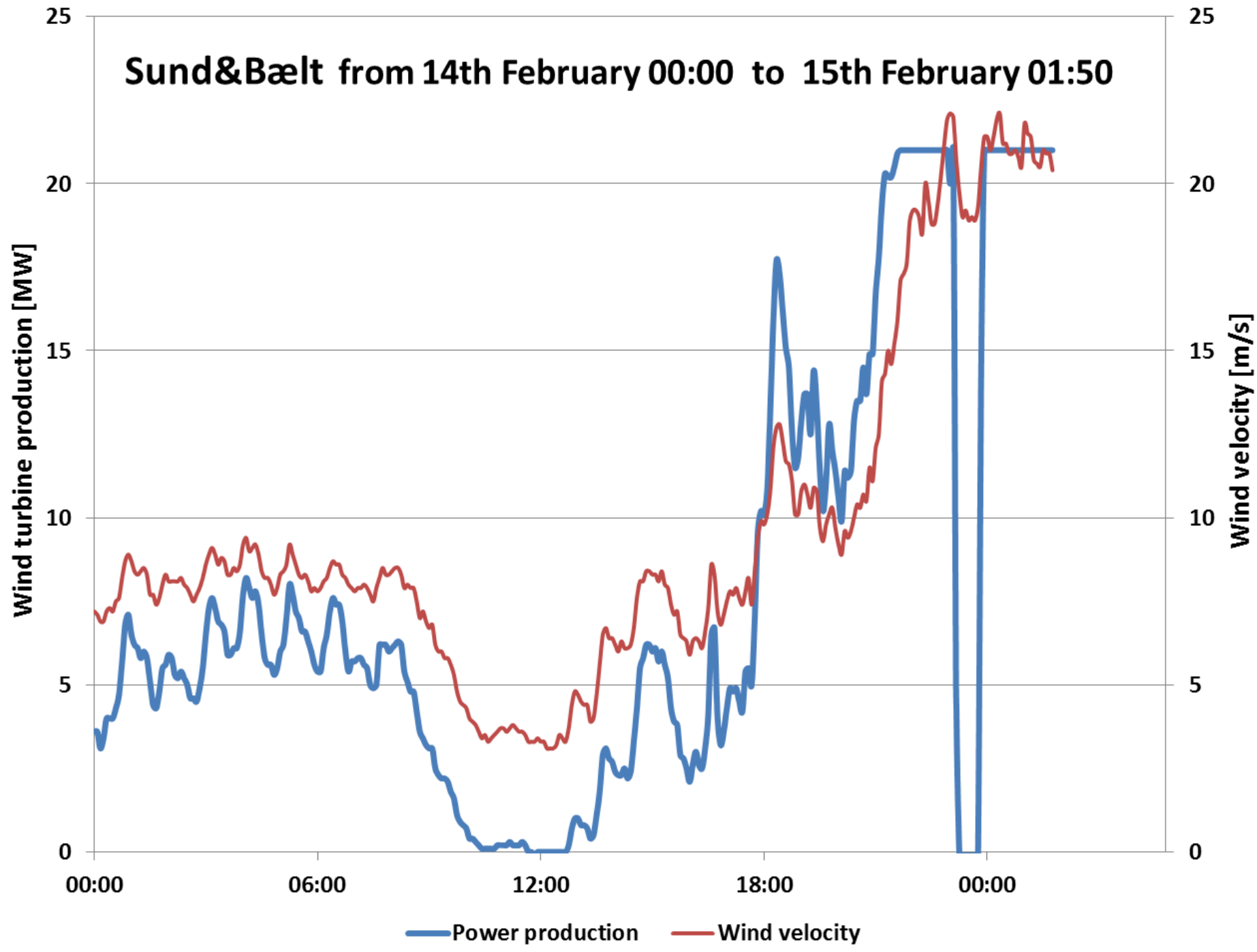
Days in Window: 2 Year: 2012

Regulating Power Market  Primary Reserve Market



**EMD**

# Sund&Bælt from 14th February 00:00 to 15th February 01:50



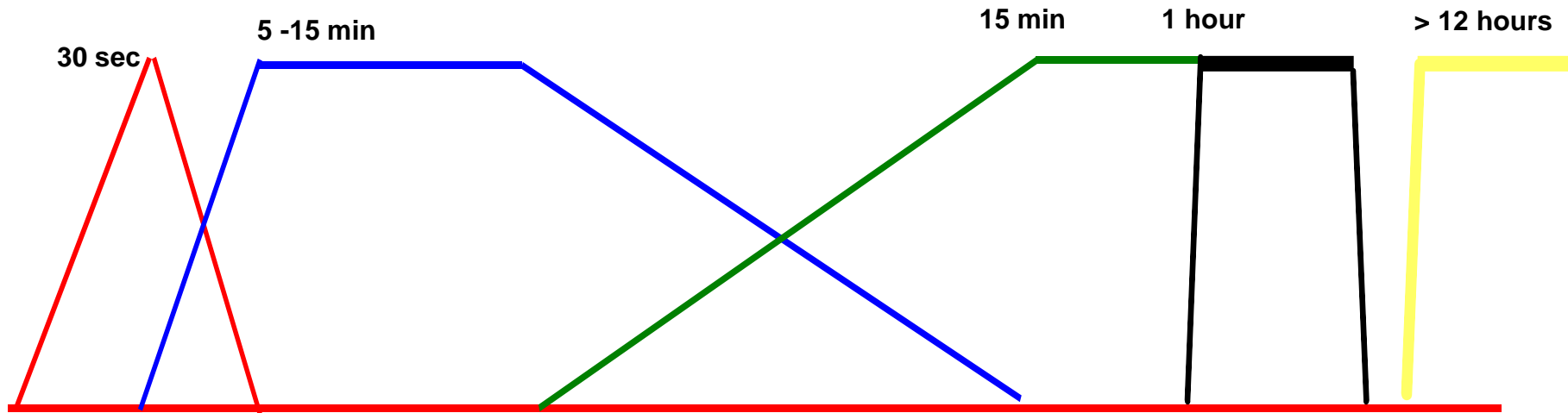


**Thank you for your attention.**

**EMD**

# The electricity markets for balancing the electricity system and wind productions

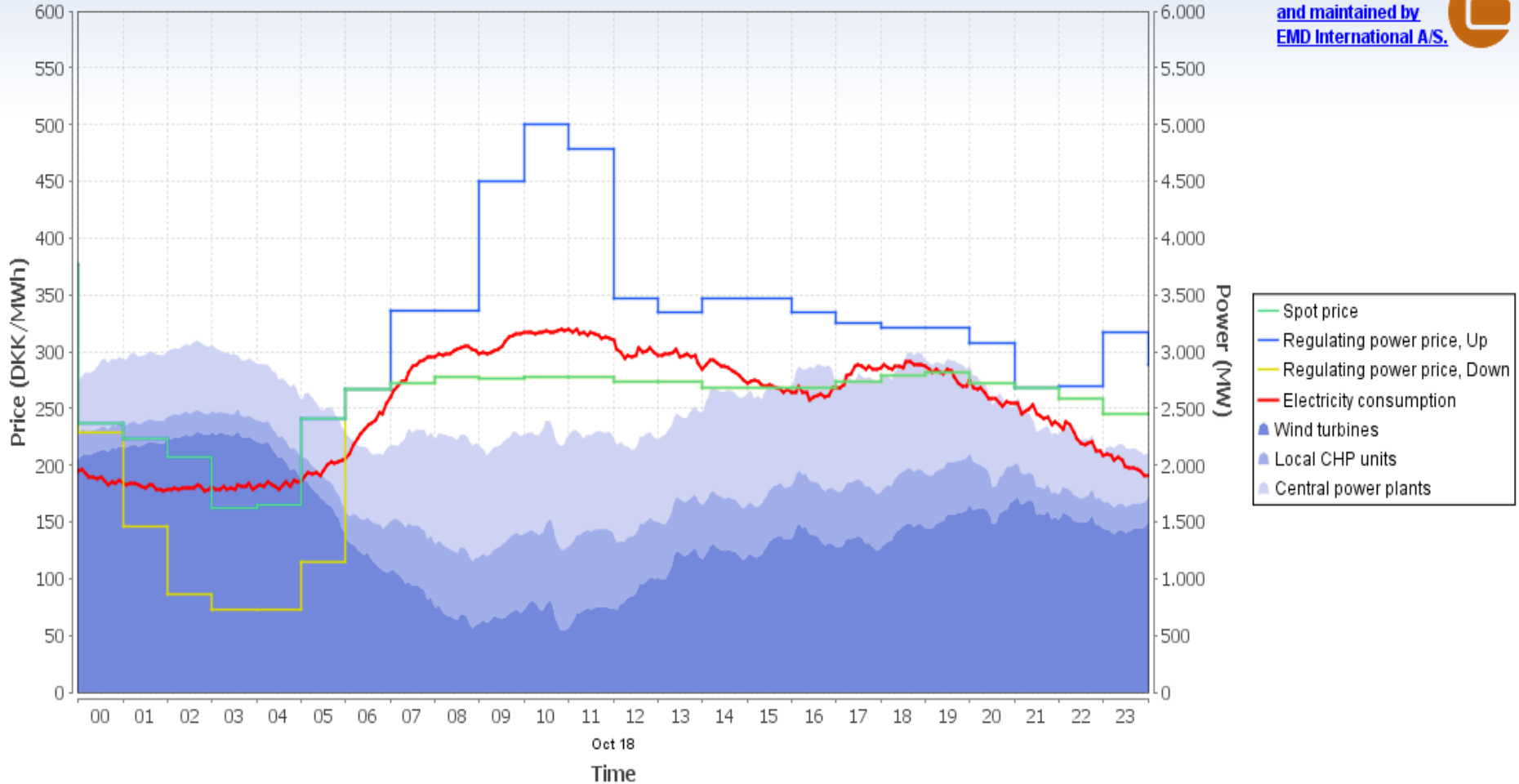
- Frequency containment reserves, Primary reserve
- Frequency restoration reserves, Secondary reserve
- Replacement Reserves, Tertiary reserve
- Intra day wholesale market
- Day ahead wholesale market



# A typical challenge of balancing wind

## West Denmark, Tuesday, 2011-10-18

This graph is hosted and maintained by EMD International A/S.



Date

Jan Feb Mar Apr M... Jun Jul Aug Sep Oct Nov Dec

Today

Days in Window: 1 Year: 2011

Regulating Power Market  Primary Reserve Market

