

From passive to active actors in the power market - Increasing the value of wind

Skytte, Klaus

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From passive to active actors in the power market

Increasing the value of wind

WindAC Cape Town, South Africa, November 2017

Klaus Skytte

Klsk@dtu.dk

Energy Economics and Regulation DTU Management Engineering , Denmark







- Motivation
- Wind at the Nordic energy markets
- Optimal bidding strategies
- Analytical cases
- Takeaways

The Future Energy System





Value of Wind - business cases



• Similar to water, you can talk about a **wind value** when the generation becomes active at the market



Goal to create adequate regulatory framework conditions and market designs that facilitate and stimulate active wind participation

• Reach the highest wind value possible





Case: Energy strategy in Denmark

Wind 42% share (2015).

Political targets:

- 2020: 50% of traditional electricity consumption covered by wind power
- **2035:** All electricity and heat based on renewable energy (Obs. the previous governmental position)
- **2050:** The total* energy supply based on renewable energy *Total energy system incl. heat, gas, transport, industry, etc.



Wind production share in DK-West

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RE-think

Making markets RE ready versus RE market ready

Market-driven deployment of renewables:

- no priority/splitting of the market
- market based support until RES are competitive
- allow for new business cases

12:00 the day before		1 hour before delivery	
ELSPOT	ELBAS	REGULATING POWER	R
Day-ahead	Intra-day/Adjustment	Real-time/Balance	
- Hourly schedule for next day - Needed by slow plants	- Allow schedule changes - Important for VRE	 Ensures real-time supply/demand balance Important for compensatin demand calculation errors 	g



Regulatory framework challenges Incentive to act flexibly

Market integration and flexibility From passive to active dynamic generation / market actors

- Act to negative prices at the spot market (day-ahead)
 - Case: Change in market design from 2009: negative prices at NordPool
 - Close down of wind turbines in hours with neg prices = saved costs
- Active at the balancing markets Close down of wind = down regulation

© **Case Denmark**: New wind turbines gets a Feed In Premium in certain full load hours (depending on size). When curtailed, the not "used" full load hour with support can be used later.



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Some existing off-shore tenders have no incitements for WTs to curtail when negative prices.

© One (Anholt) doesn't receive FIT when negative prices.

Case Norway & Sweden: The green certificate system is market based, but the implemented design gives limited incentive to act flexible.

Managing Negative Spot Prices



Case: Sund & Bælt wind farm - 16. March 2014



Elspot prices @

Source: NEAS Energy

Managing **Negative** balancing **Prices**

Case: Down ward regulation – 9 August 2014

Regulating prices



Source: NEAS Energy

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Analytical cases



Reference: passive

- a) Active at the spot market only.
- b) Active at both the spot and balancing markets.

c) Active at both the spot and balancing markets + perfect foresight



Findings





- Less than 1% increase in total revenue when the WPP is making strategic offers in the dayahead market (from *Ref* to case *a*)
- WPP is witnessing around 8% revenue increase by actively participating in the balancing market. (from *Ref* to Case *b*)

Takeaways



- Trend to more market integration and need of more *flexibility*
- Need to find business cases increase the value of wind simultaneously with the phase out of support.
- Become active players at both the day-ahead and balancing markets
- Asymmetry in prices => optimal to make strategic bids at the different markets
- Important inputs for the design of future power markets

Thank you for your interest



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Klaus Skytte Head of Energy Economics and Regulation System Analysis Division DTU Management Engineering Technical University of Denmark

klsk@dtu.dk, http://www.sys.man.dtu.dk/



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- +Market value
- + Capacity value
- + Forecast error value
- +Ancillary services value