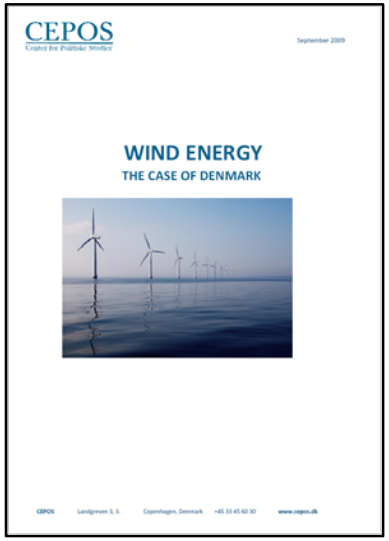
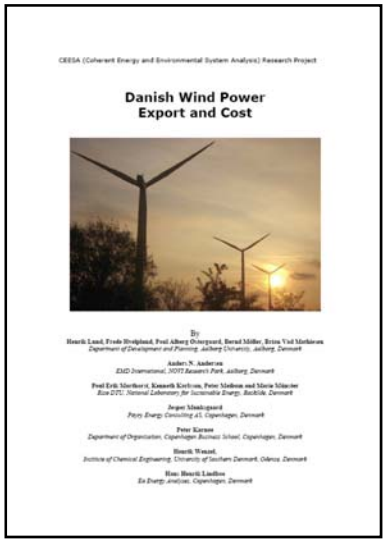
Dansk Selskab for Vindenergi Konference 2010

Vindstedcentret 25-26 august 2010



Bag om CEPOS rapporten



Henrik Lund

Aalborg Universitet

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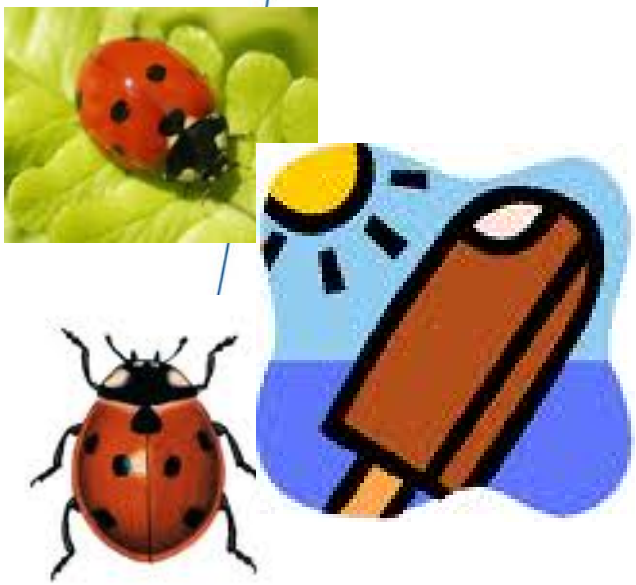
Korrelation og kausalitet



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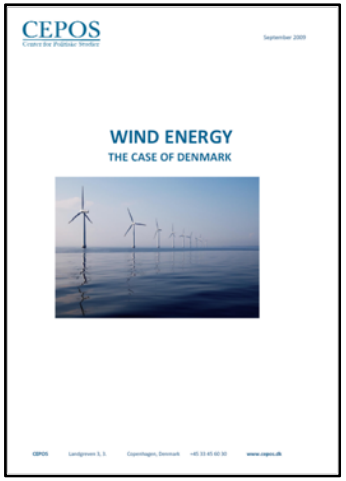
Baggrund: CEPOS (Sep. 2009)



- The CEPOS study claims on page 2 that wind power *"has recently (2006) met as little as 5% of Denmark's annual electricity consumption with an average over the last five years of 9.7%"*.

- The CEPOS study claims on page 19 that *"a significant fraction of the charges and taxes paid for by Danish domestic consumers is recycled to support ….. the feed-in tariffs that make it attractive … to invest in wind power"*. (see full citation in section 2.1).

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Something Rotten? Obama Says Danes Receive 20% of Their Power Via Wind; New Study Tells the Real Story

September 14, 2009· 18 Comments

FOR IMMEDIATE RELEASE
September 14, 2009
Contact:
Chris Tucker, 202.346.8825
Patrick Creighton, 202.621.2947

Something Rotten? Obama Says Danes Receive 20% of Their Power Via Wind; New Study Tells the Real Story

Danish experts visit Washington this week to explain to American audiences what's really happening in Denmark

WASHINGTON – President Obama has frequently cited Denmark as an example to be followed in the field of wind power generation, stating on several occasions that the Danes satisfy "20 percent of their electricity through wind power." The findings of a new study released this week cast serious doubt on the accuracy of

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Denmark's Wind Power: Should the U.S. Adopt Their System?

”… but really, there isn’t any thing you can replicate..”

”….Denmark isn’t really a good model…”

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Denmark's Wind Power Experience: Costs and Consequences

”… Danish consumers pay a fifty percent premium over the market price.. . To produce the electricity by wind..”

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Vores rapport:

By
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Pöyry, Copenhagen, Denmark

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Institute of Chemical Engineering, University of Southern Denmark, Odense, Denmark

Hans Henrik Lindboe
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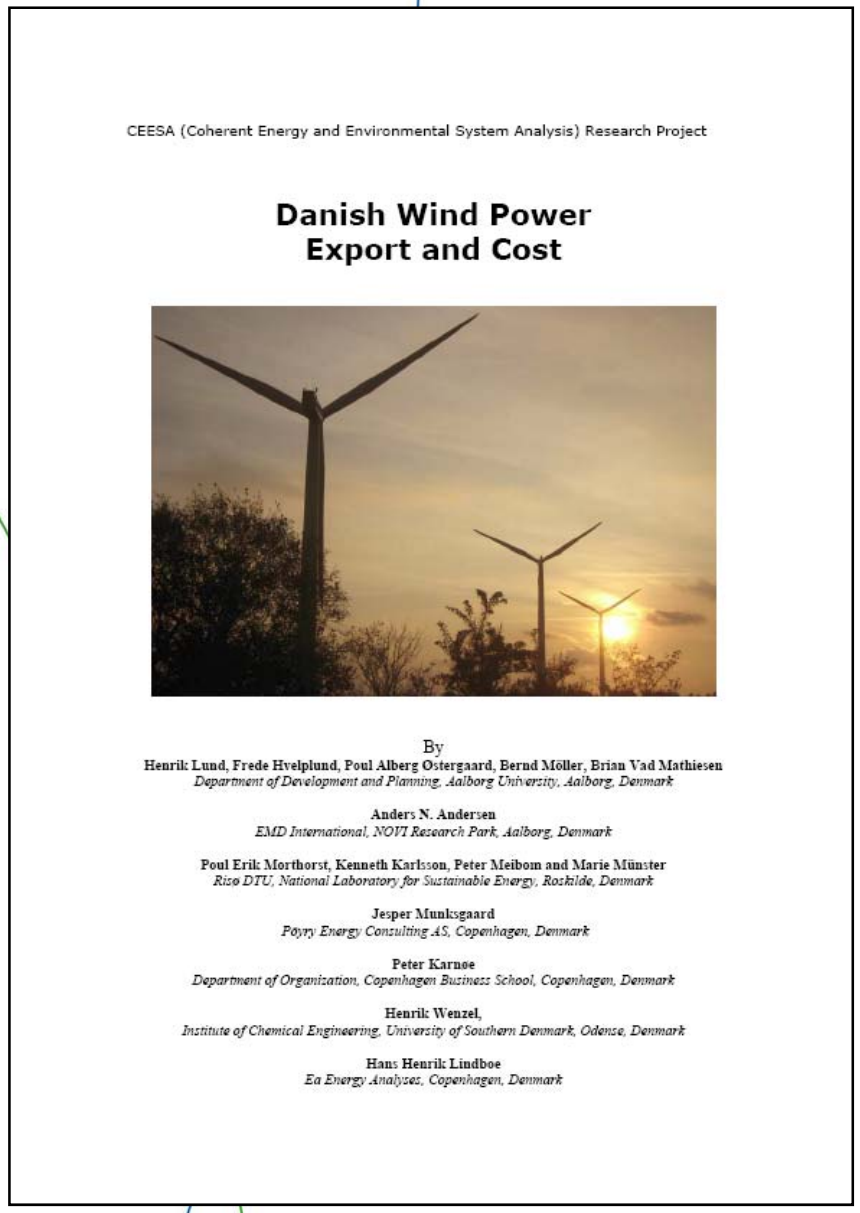

CEESA (Coherent Energy and Environmental System Analysis) Research Project

Danish Wind Power
Export and Cost

By
Henrik Lund, Frede Hvelplund, Poul Alberg Østergaard, Bernd Möller, Brian Vad Mathiesen
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Henrik Wenzel,
Institute of Chemical Engineering, University of Southern Denmark, Odense, Denmark

Hans Henrik Lindboe
Ea Energy Analyses, Copenhagen, Denmark

Fakta år 2008

- Vindmøller i Danmark producerede 6.978 GWh svarende til 19.3 procent af el-forbruget (36.105 GWh).
- Vindmølleproduktionen var større end forbruget i 43 timer med en overskudsproduktion på 5 GWh svarende til mindre end **0.1 procent** af vindmølleproduktionen.
- ”Ingen eksport” eller ”Vindproduktion større end eksporten” var 4,398 eller ca. **63 procent** af vindmølleproduktionen.
- Hvad med de resterende **36.9 Procent** af vindmølleproduktionen: CEPOS hævder at det hele blev eksporteret….!!!!!!

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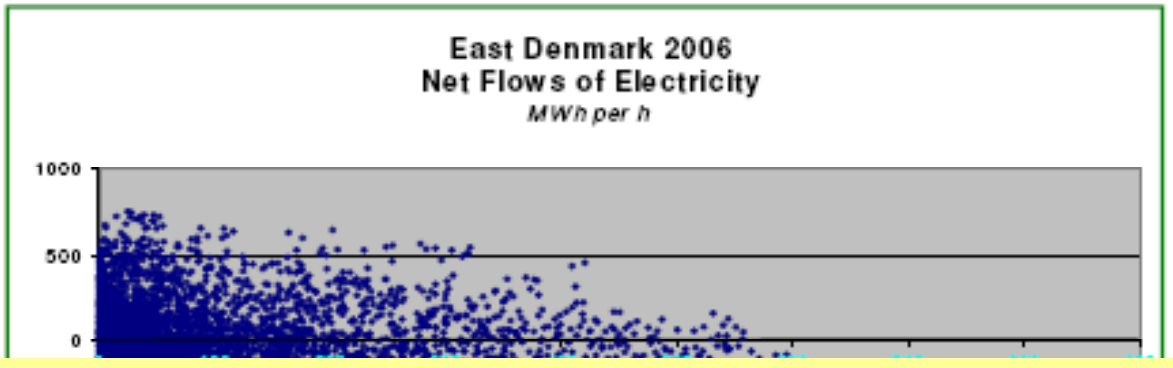

CEPOS
Center for Politiske Studier

CEPOS Landgreven 3, 3. Copenhagen, Denmark +45 33 45 60 30 www.cepos.dk

CEPOS generel regneregel: Eksport er som udgangspunkt vindkraft

large component of wind energy in the outflow, indisputable".

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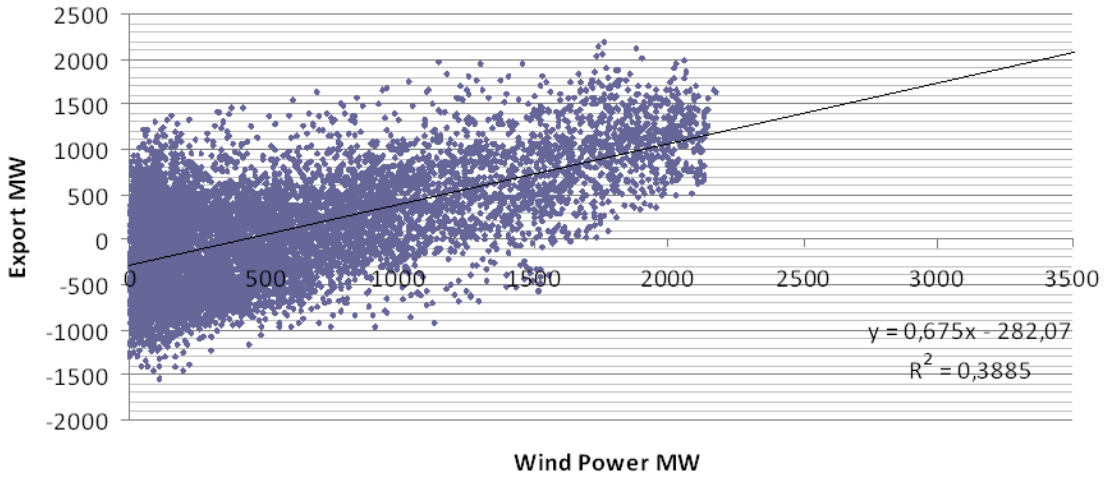
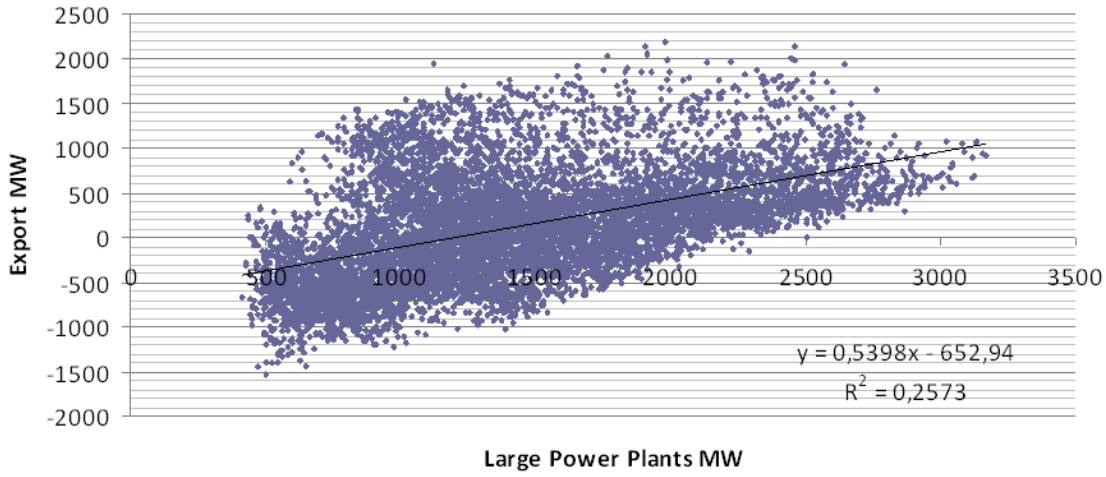
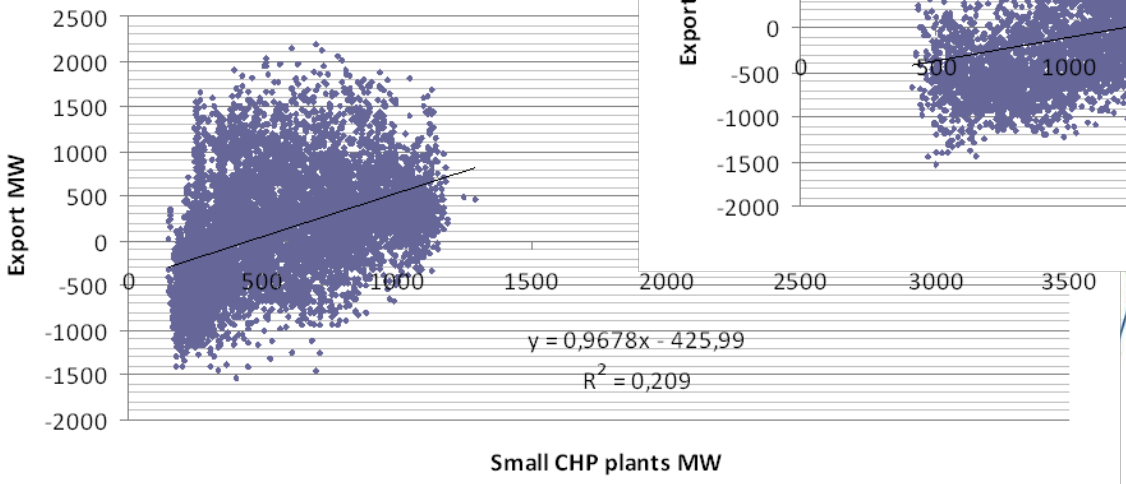
Wind Power and Export in 2008



Large Power Plants and Export in 2008

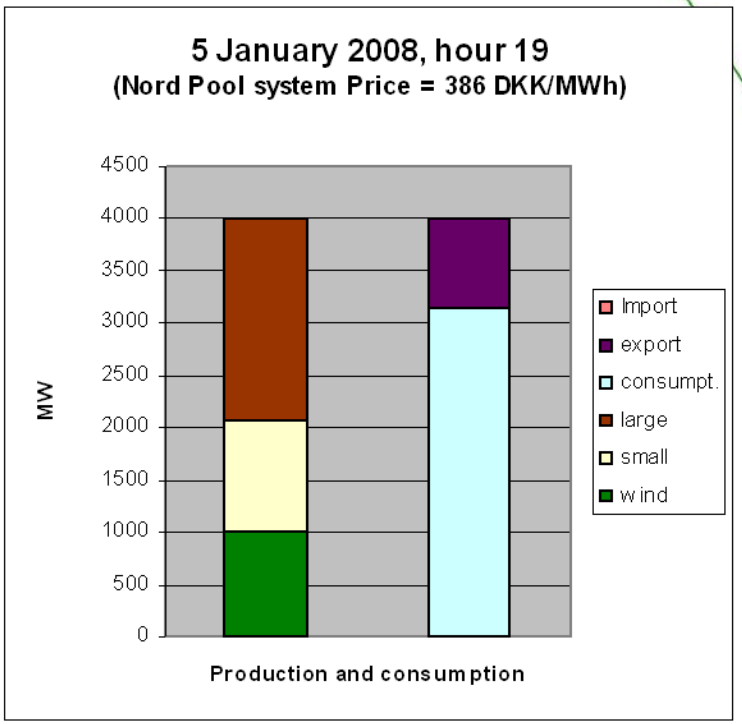


Small CHP plants and E



Eksempler på problemer med CEPOSs generelle regneregel :

386 DKK/MWh on January 5th & 234 DKK/MWh on March 10th



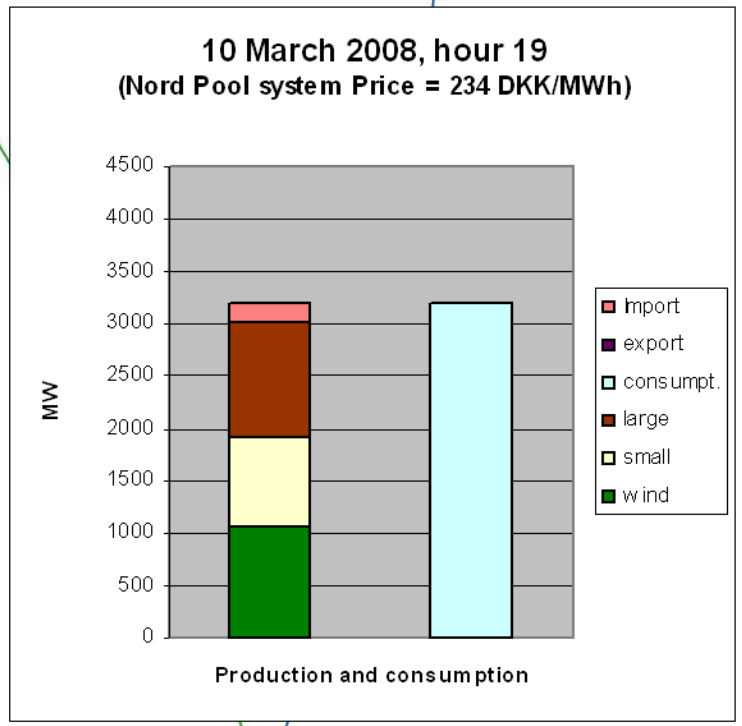


Fig. 3: Consumption and production in two 2008 situations with the same wind power production but different export figures.

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Nord Pool Prisen stiger I perioden hvor de store kraft- og kraft/varme-værker vælger at øge produktionen og topper i tidsrummet mellem kl. 11 og 13.

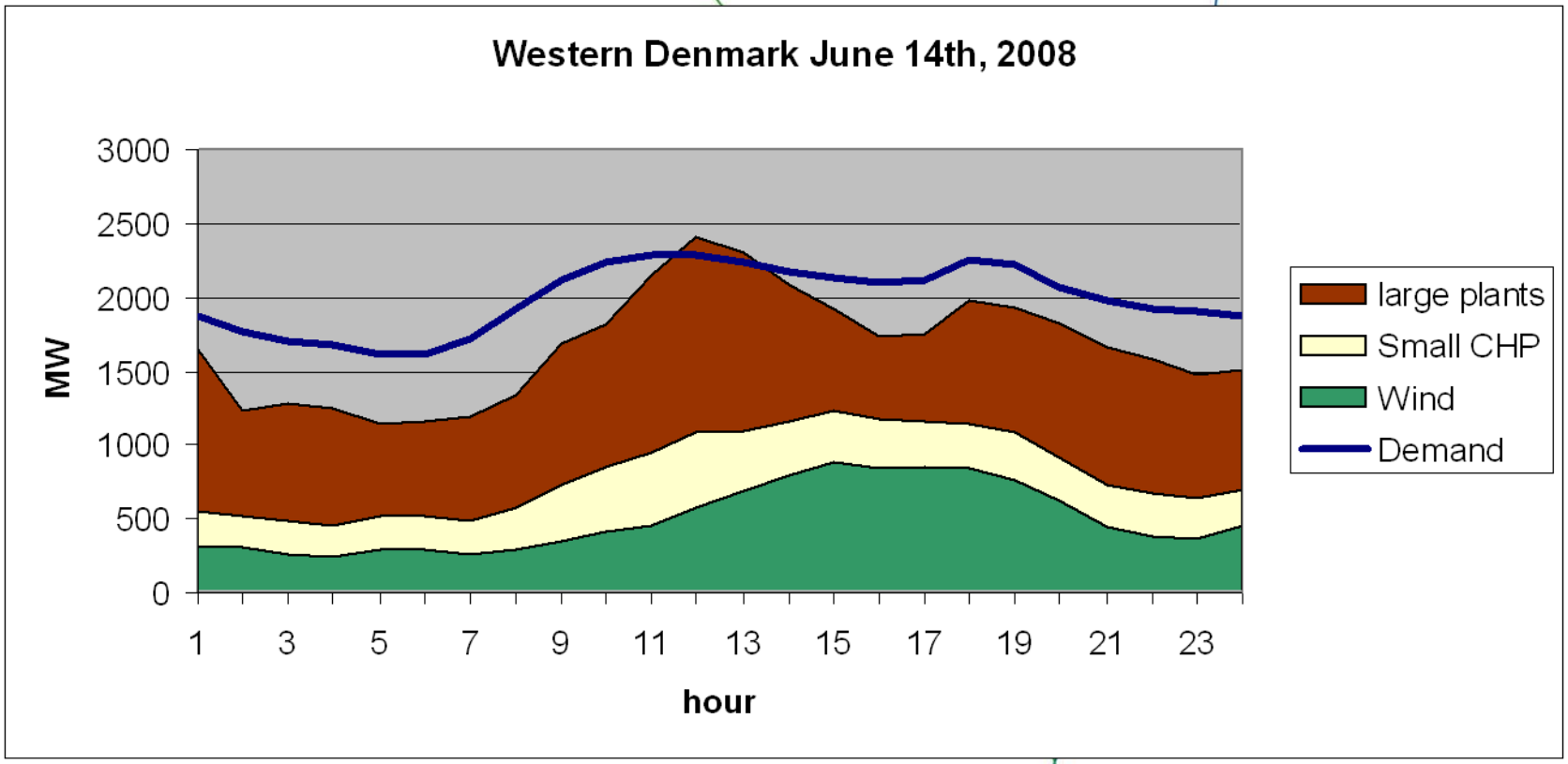

Fig. 4: Actual Danish electricity demand and production on June 14th, 2008.

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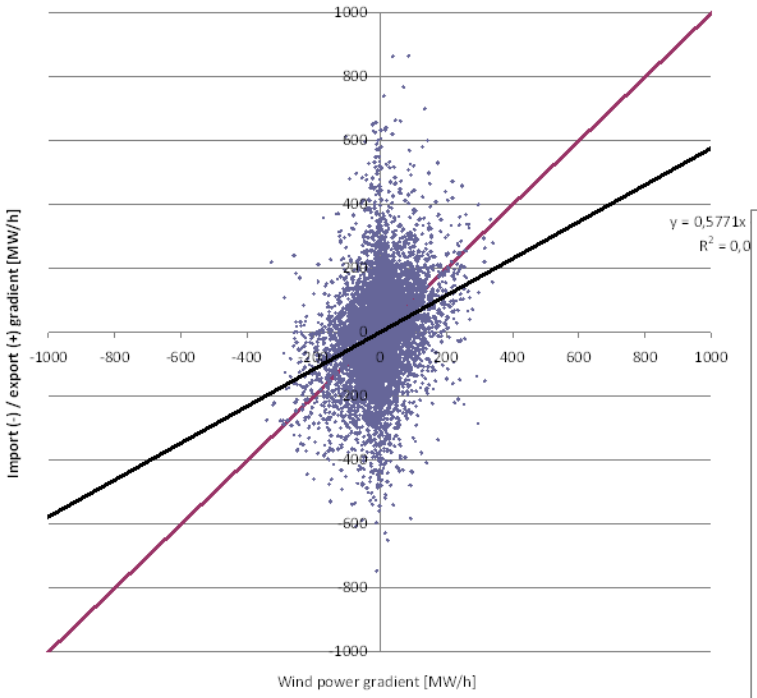
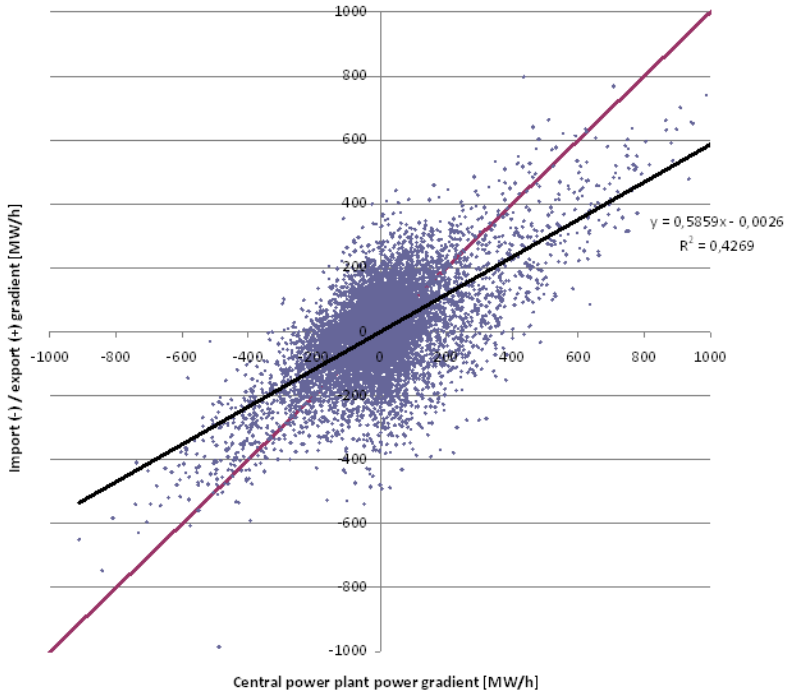
Korrelation mellem ændringer i vindkraft og eksport





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Konklusion:

- Den statistiske korrelation er svag for alle enheder, i.e. R^2 er mindre end 0.4 (Skulle være 0.9 eller mere til at begrunde en stærk korrelation)

- Man kan ikke afgøre noget om ”de 36,9 procent” eller om fra hvilke enheder eksporten kommer fra ud fra sådanne korrelations-analyser. Man er nødt til at afdække de bagvedliggende årsagsmæssige sammenhænge (kausaliteten).

Den kau

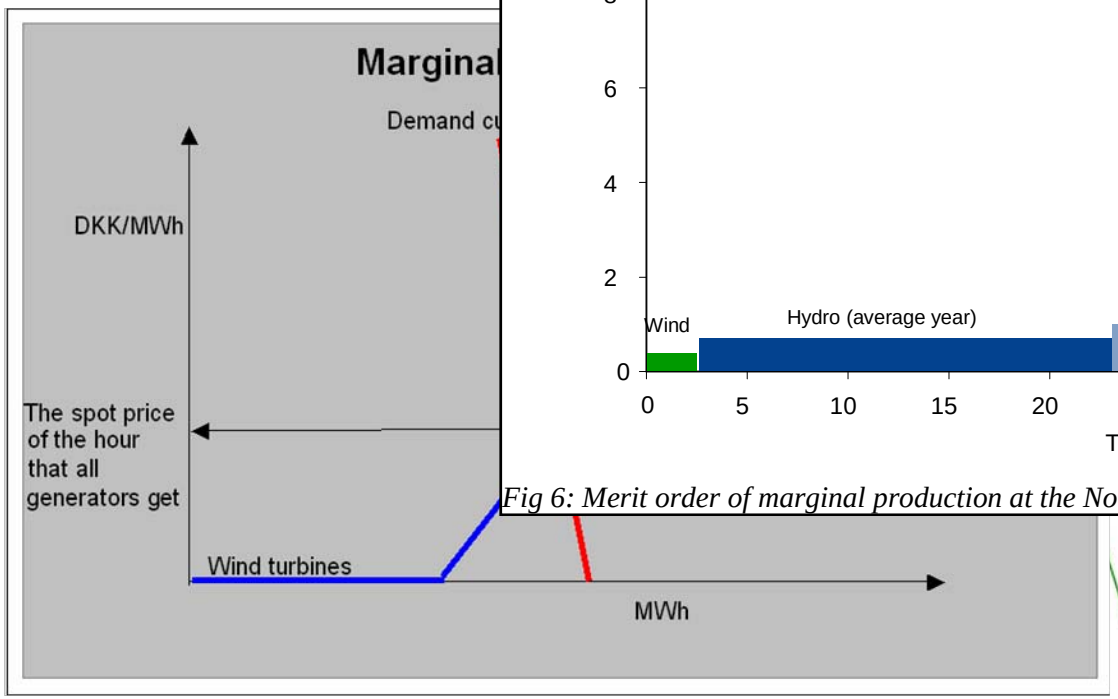

Fig. 5: Price setting in a marginal cost electricity spot market.

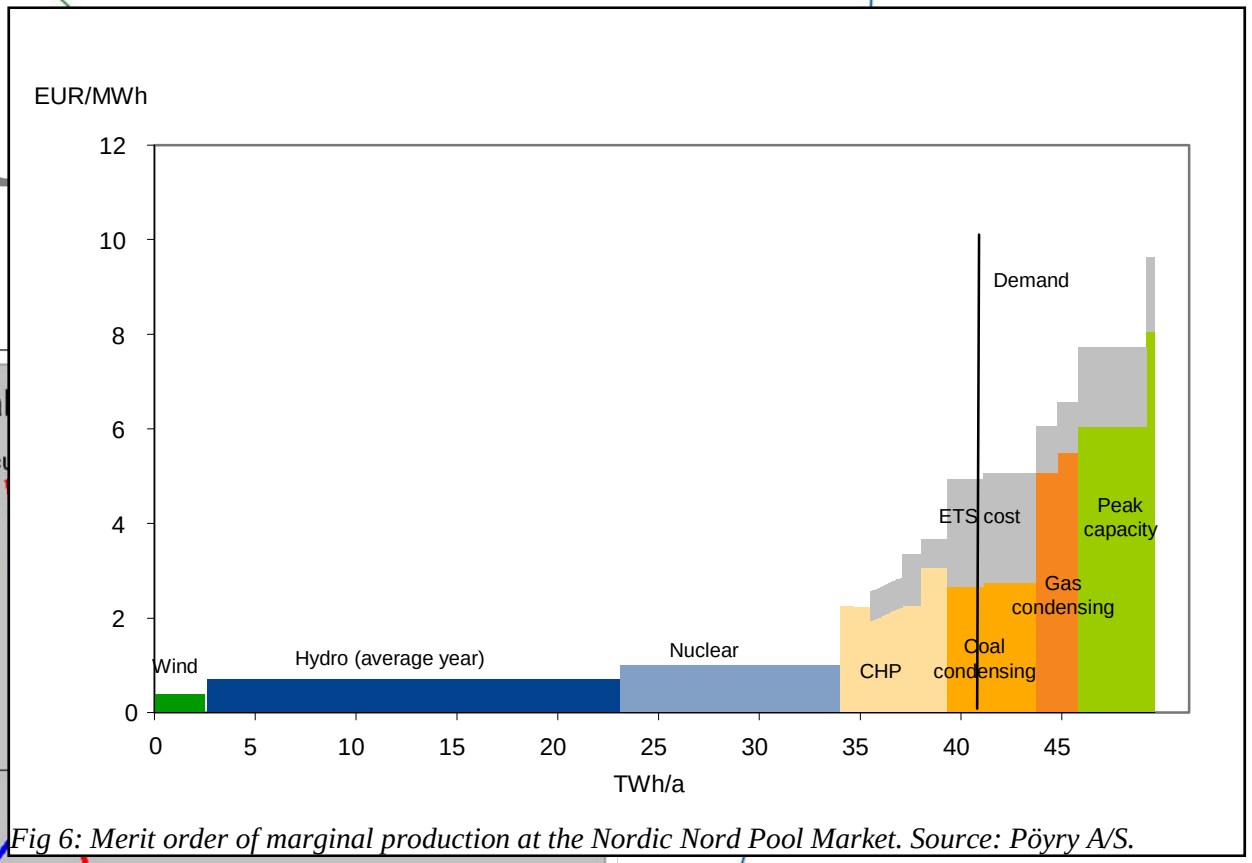

Fig 6: Merit order of marginal production at the Nordic Nord Pool Market. Source: Pöyry A/S.

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NordPool Spot

Simple example of spot trade in a certain hour tomorrow

No connection between the two price areas

	Price area 1	Amount [MWh]	Bidding price [DKK/MWh]	Price area 2	Amount [MWh]	Bidding price [DKK/MWh]
Buying offer:		2000	Price indep.		2500	Price indep.
Sale offers:	Wind turbines	1500	0	Power plant 5	500	50
	Power plant 1	500	200	Power plant 6	500	100
	Power plant 2	500	250	Power plant 7	500	350
	Power plant 3	500	275	Power plant 8	500	400
	Power plant 4	500	325	Power plant 9	500	435
				Power plant 10	500	450
Spot price of the hour			300			435

NordPool Spot

Simple example of a spot trade in a certain hour tomorrow

1000 MW transmission capacity

	Price area 1	Amount [MWh]	Bidding price [DKK/MWh]	Price area 2	Amount [MWh]	Bidding price [DKK/MWh]
Buying offer:		2000	Price indep.		2500	Price indep.
Sale offers:	Wind turbines	1500	0	Power plant 5	500	50
	Power plant 1	500	200	Power plant 6	500	100
	Power plant 2	500	250	Power plant 7	500	350
	Power plant 3	500	275	Power plant 8	500	400
	Power plant 4	500	325	Power plant 9	500	435
				Power plant 10	500	450
Spot price of the hour			275			350

Tekniske begrænsninger:

- Minimumsproduktion på centrale enheder: I 2008 var der tidspunkter hvor de centrale værker opererede med bare 415 MW i vest og 181 MW i øst.

- Minimums ratio mellem vindkraft og kraftværker: I 2008 var der tidspunkter hvor ratio var 3.53 i vest og 3.03 i øst.

Resultat år 2008

- I 2008 blev bare 61 GWh svarende til ca. 1 procent of af vindkraften (eller mindre end 0,2 procent af el-forbruget) eksporteret.

- Analysen er baseret på den årsagsmæssige sammenhæng med udgangspunkt i markedet. Modellen forklarer de statistiske observationer.

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”… but really, there isn’t any thing you can replicate..”

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Denmark's Wind Power Experience: Costs and Consequences

”… Danish consumers pay a fifty percent premium over the market price.. . To produce the electricity by wind..”

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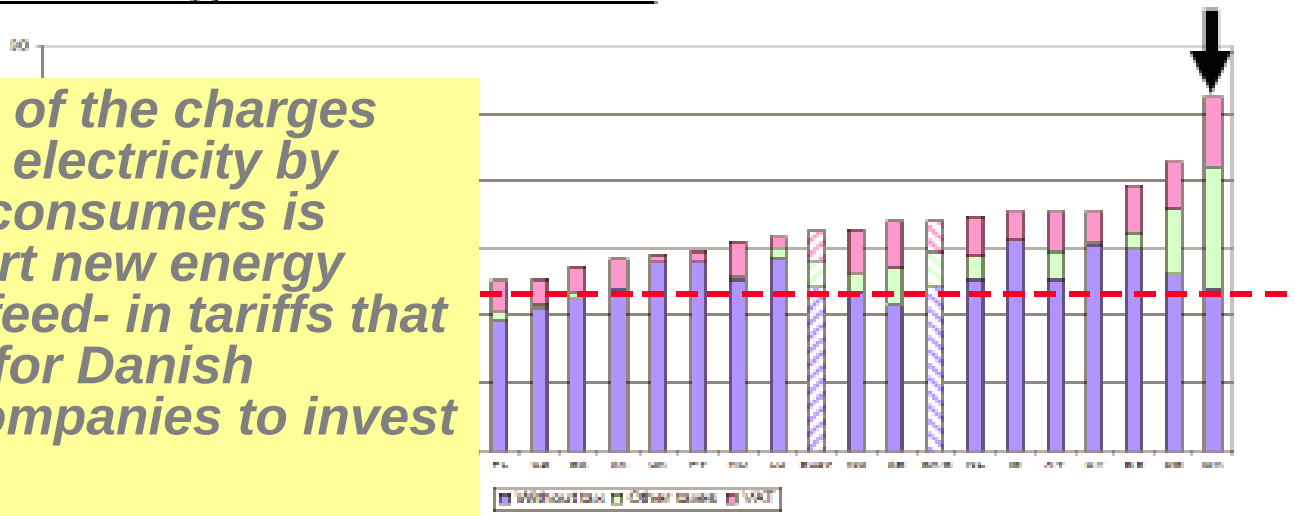
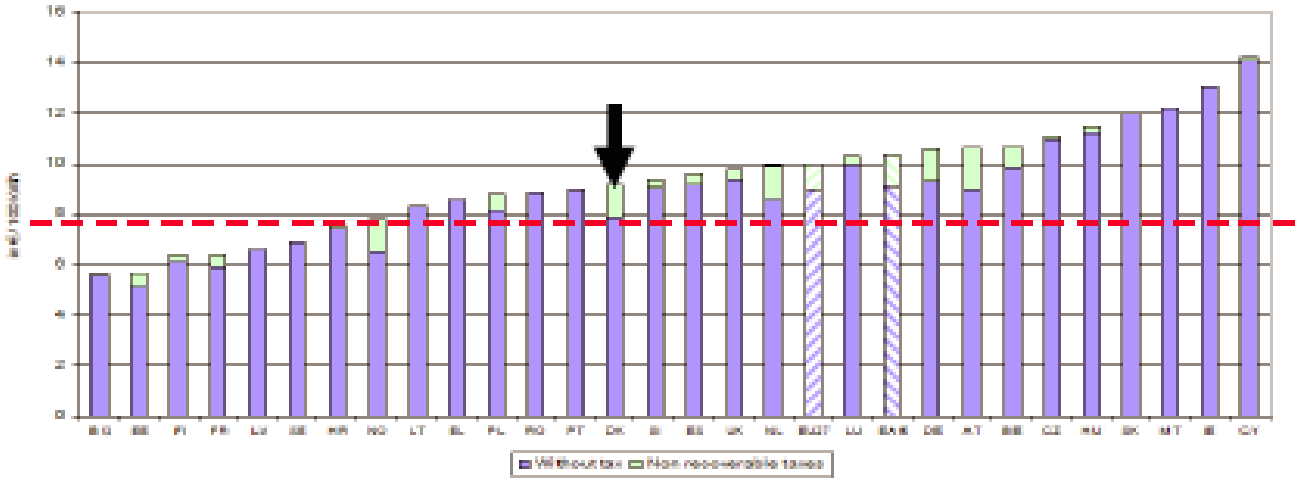
A significant fraction of the charges and taxes paid for electricity by Danish domestic consumers is recycled to support new energy research and the feed- in tariffs that make it attractive for Danish individuals and companies to invest in wind power.

Figure 8: Electricity prices for household consumers *



* 'Household consumers' refer to consumer band Dc (annual consumption between 2500 and 5000 kWh)

Figure 9: Electricity prices for industrial consumers **



** 'Industrial consumers' refer to consumer band Ic (annual consumption between 500 and 2000 MWh)

To fejl:

- ***Fejl no. 1**:* Ekstra-betalingen til eksisterende vindmøller for CO2 fri energiproduktioner kommer ikke fra skatteyderne.

- ***Fejl no. 2**:* Ekstrabetalingen for CO2 fri energi fra vindmøller betales ikke alene af husholdningerne men også af industrien. (er med i den blå del af søjlen).

netto-omkostning: 2 øre/kWh

Year	(1) Wind power production / electricity consumption	(2)Average consumer payment per consumed electricity	(3)Average reduced market price due to wind power	(4)= (2)-(3) Net price impact of wind power	(5) Annual net cost	(6) Tonnes CO_2 saved due to wind power	(7) Cost per tonne CO_2 reduction.
	(TWh/y)	(€e/kWh)	(€e/kWh)	(€e/kWh)	(M€)	(1000 t)	(€/t)
2004	6.55/*33.06*	0.58	0.096	0.48	158.7	4.585	34.6
2005	6.62/*33.53*	0.677	0.35	0.327	109.6	4.634	23.7
2006	6.11/*33.92*	0.429	0.19	0.24	81.4	4.277	19.03
2007	7.17/*33.73*	0.73	0.38	0.35	118.1	5.019	23.5
2008	6.93/*33.37*	0.284	0.33	- 0.046[2]	-15.4	4.851	-3.17
Sum 2004-08	33.4/167.6				452.4	23.366	
Average 2004-08		0.54	0.27	0.27			19.4

Table 4: Price and CO_2 effects of wind power production 2004-2008. Source: Pillar (2) calculations based on data sent from Energinet.dk. Pillar (3) based on data sent from P.E. Morthorst, and [21].

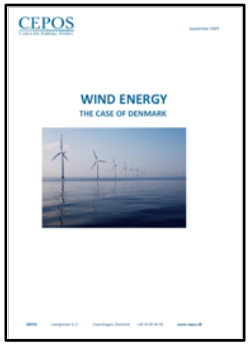
Konklusion:

- Den direkte betaling for vindkraft har forøget forbrugerbetalingen med ca. **4 øre/kWh** i gennemsnit i perioden 2004 - 2008.
- Vindkraften har via markedet reduceret forbrugerprisen med ca. **2 øre/kWh** i gennemsnit i perioden 2004 - 2008.
- Netto-indflydelsen på forbruger-prisen var således ca. **2 øre/kWh** i 2004 – 2008 svarende til 1-3 percent.
- I 2008 var netto-indflydelsen endog positiv om end meget lidt.

Konklusion

- Der er ikke belæg for (som CEPOS gør) at påstå at 50 procent af Dansk vindmøllestrøm er eksporteret.

- Feed-in tariffen til vindmøller koster ikke skatteyderne noget og øger ikke el-prisen for husholdningerne med 50% som CEPOS påstår.



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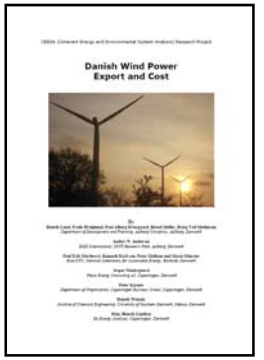
Konklusion

- Ca. 1 procent af Dansk vindmøllestrøm eksporteres. Resten anvendes indenlands til at dække dansk elforbrug.

- Omkostningen betales alene af el-forbrugerne og påvirkede i perioden 2004-2008 prisen med så lidt som 1-3%.



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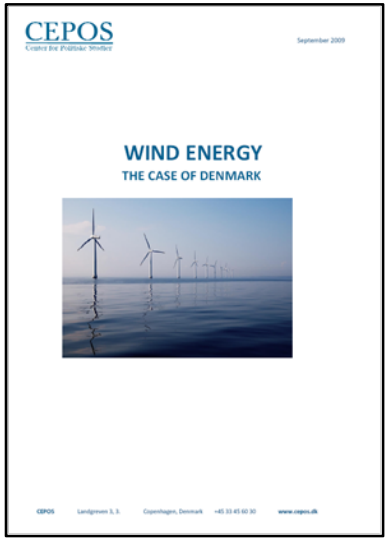
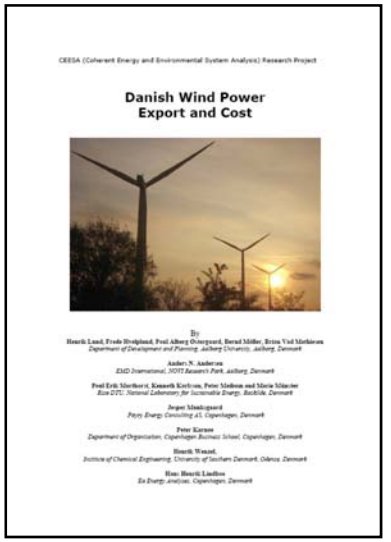
Dansk Selskab for Vindenergi Konference 2010

Vindstedcentret 25-26 august 2010



Bag om CEPOS rapporten



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