REEL ENERGI OPLYSNING (REO)
www.reo.dk reelenergioplysning@mail.dk

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Wind turbines supplied 8.5% of electricity consumption in Denmark 2004

It is frequently reported - both in Danish and foreign media - that wind turbines supply about 20% of electricity consumption in Denmark. The correct number i 8.5%. The reason is that 55% of wind generated electricity in 2004 was exported. The erroneous data continues to circulate, probably due to political tailwind!
This fact sheet is an attempt to clarify the situation.

Table 1 shows key numbers for Danish energy supply. The numbers in the shaded area have been copied from the reference (Danish Energy Authority). Numbers in the upper part are corrected for climatic fluctuations.
In column D, REO has calculated the contribution (in %) of each source. It can be seen that renewable energy accounts for 15.3% of total (field D6). Wind power contributes 2.83% (D9) and waste - with a remarkable 4.4% (D13) - is the biggest renewable energy source.

Table 1 Total energy consumption.

	A	B	C
	Energy consumption in Denmark 2004		
	Data from www.ens.dk		
	Consumption of energy (gross) in		**% of**
	fuel equivalents, corrected [PJ]	**2004**	**total**
1	**Total**	**836**	
2	**Contribution of different fuels**		
3	Oil	347	41,50
4	Natural gas	197	23,51
5	Coal and coke	165	19,70
6	Renewable energies	128	15,28
7			
8	**Renewable energies**		
9	Wind energy	23,7	**2,83**
10	Straw	17,9	2,15
11	Wood	28,7	3,43
12	Biogas	3,7	0,45
13	Waste	37,0	4,42
14	Heat pumps and other	7,5	0,89
15	correction	9,5	1,14
16	Total renewable	128,0	

Table 2 shows data for electric energy supplied to the market (GWh). The numbers in the shaded area are based on data in the reference (www.danskenergi.dk). REO has added contributions from plants of the same kind but with different owners.

A crucial number is not to be found in the public data.: the fraction of wind energy exported.
This number was published by the leading weekly paper, Weekendavisen, in November 2005[1], but has since then been neglected in the public debate.
It was found that, for the year 2004, this number was 55%. This means that only 45% of the wind generated electricity was used by Danish consumers. The reason is that at high wind speed more electricity is generated by the wind turbines than can be sold in Denmark.
Based on this number (55%) the wind generated electricity exported and consumed, respectively, can be calculated (fields D14 and 15). The amount consumed in Denmark can then be seen relative to the total consumption in Denmark (D11). It turns out to be 8.5%.

Table 2 Electricity supply.

A	B	C	D	E	F
	Danish Electricity supply				
	Net elproduktion	MW	GWh	%	
1	All thermal plants	8937	31770	82,8	
2	Hydro	11	27	0,1	
3	Windturbines	3119	6583	17,2	
4	Produktion i DK i alt		38380	100	
5					
6	Exchange 2004				
7	Import		8673		
8	Export		11545		
9	Transmissionloss		657		
10					
11	Consumption i DK (D4+D7-D8-D9)		34851		
12					% af
13	Windgenerated electricity 2004	%			cons.
14	Fraction exported	55	3621		10,4
15	Consumed in Danmark	45	2962		8,5

The electricity generated by wind turbines was 17.2% of gross electricity production. Based on data from The Danish Energy Authority this number is 18.5%, due to a slightly different treatment of losses.

[1] Frede Vestergaard: Bistand til Tyskland, Weekendavisen 4-10. Nov. 2005, correction 11-17. Nov.