The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Making the case for wind, again

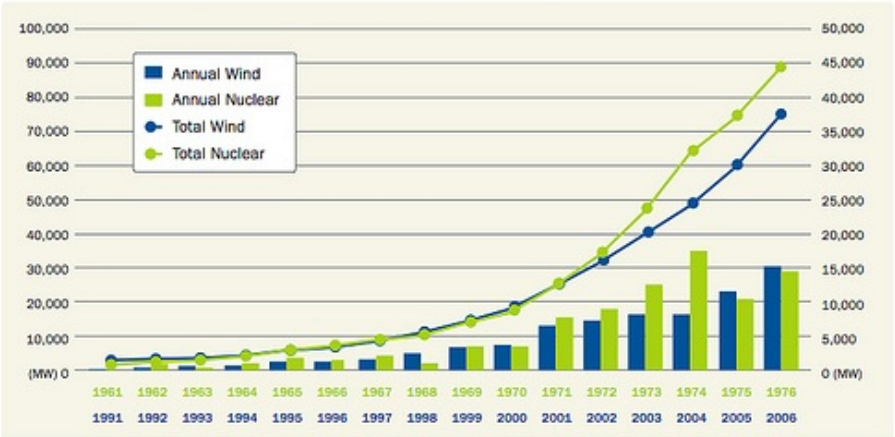
Posted by Jerome a Paris on October 21, 2008 - 10:06am in The Oil Drum: Europe
Topic: Alternative energy
Tags: original, wind [list all tags]

This is a simplified version of the presentation I will be making this Tuesday morning at the ASPO 7 Conference (the full presentation should be posted on that website in a couple of days). I must admit that I have been a bit nonplussed to see that the peak oil community seems to share the oil industry's dismissal of wind power as irrelevant and useless in the face of the currently energy challenge (maybe I am unfairly judging from a few individuals' comments, but it's definitely an existing undercurrent in the community).

So, in reaction, let me put up here a few arguments that suggest that wind could play a major role in solving our current energy woes - not a silver bullet, but rather more than a side show.

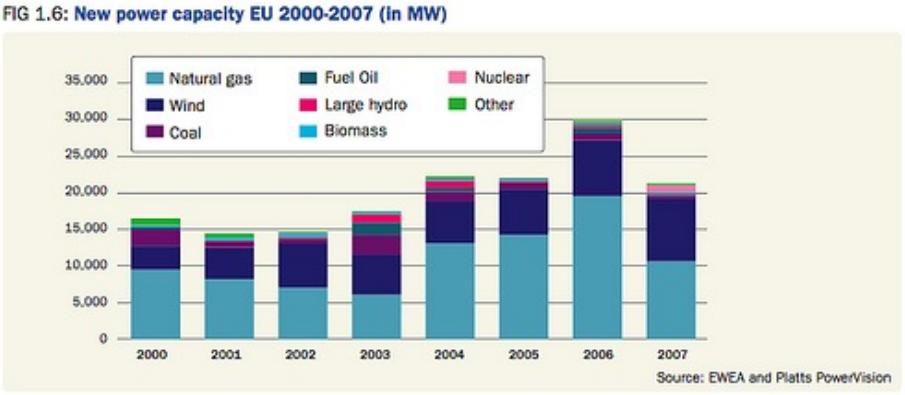
First, the "wind is too small to make a difference" argument: well, so was nuclear, until it got big enough. Wind is following the exact same growth trajectory:

FIG 0.1: **16 years of global wind energy development (1991-2006) compared to the first 16 years of nuclear development (1961-1976)**



Pure Power
EWEA, March 2008 (pdf)

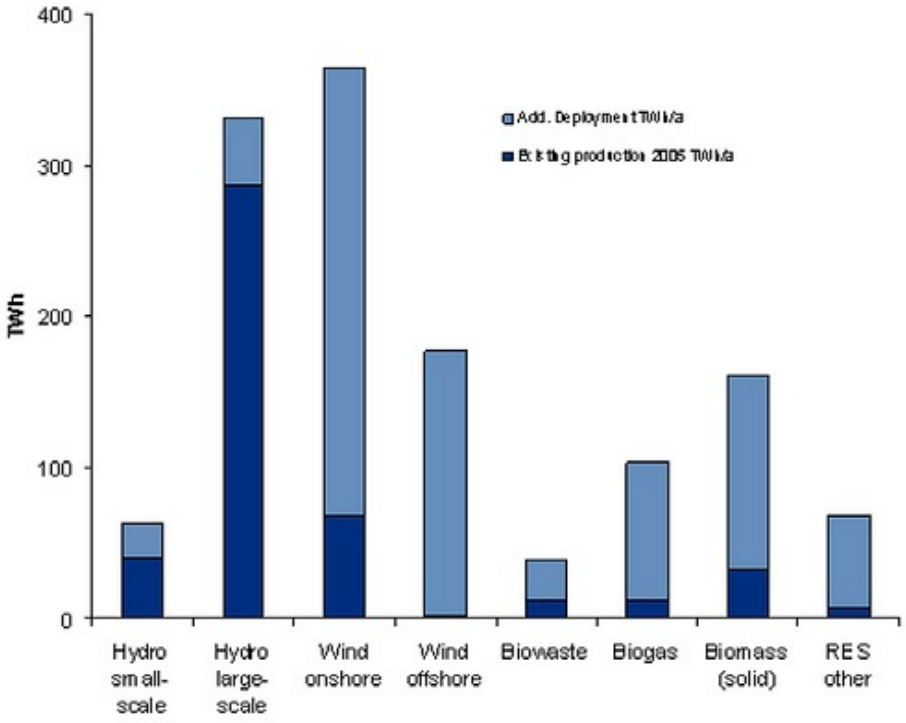
And, as the image show before, wind power has already been a large part of energy investments for a number of years now, at least in Europe (but the rest of the world is now catching up, with the USA and China booming):



Pure Power
EWEA, March 2008 (pdf)

Over the past 8 years, wind has represented around 40% of new installed capacity (which, it is true, represents a smaller fraction a new production, in MWh, which is probably closer to 25%). In terms of investment amounts, wind has actually been the biggest business for the power generation manufaturers like GE or Siemens, given that a wind MW costs about double what a gas MW costs (prices per MWh are something else, given that you still need to buy the natural gas to burn to generate using a gas turbine...).

Wind will be a core instrument for the EU to fulfill its stated objectives of reducing carbon emissions and improving energy independence.



Penetration, 2005 & 2020
Implication of Large-Scale Wind Power in Northern Europe
Klaus Skytte, Econ Poyry, presentation to EWEC 2008

So it is simply false to say that wind is too small to matter. It is the biggest power generation industry by turnover in Europe, and it is on a fast growing trend that will quickly ensure that it becomes a significant part of the installed generation base. The industry reached the level of 100 GW ofinstalled capacity this year, as well as the threshhold of being able to produce 1 exajoule per year of useful energy. In fact, wind is reaching the stage where nuclear was when it was hit by the

1973 energy shock (which lowered demand and killed new investment) and the 1979 Three Mile Island accident (which turned the public against the industry) and is unlikely to hit the same snags:

Public opinion, despite persistent anti-wind lobbying by the coal or nuke industries and a few well-funded NIMBY associations, is massively behind wind power:

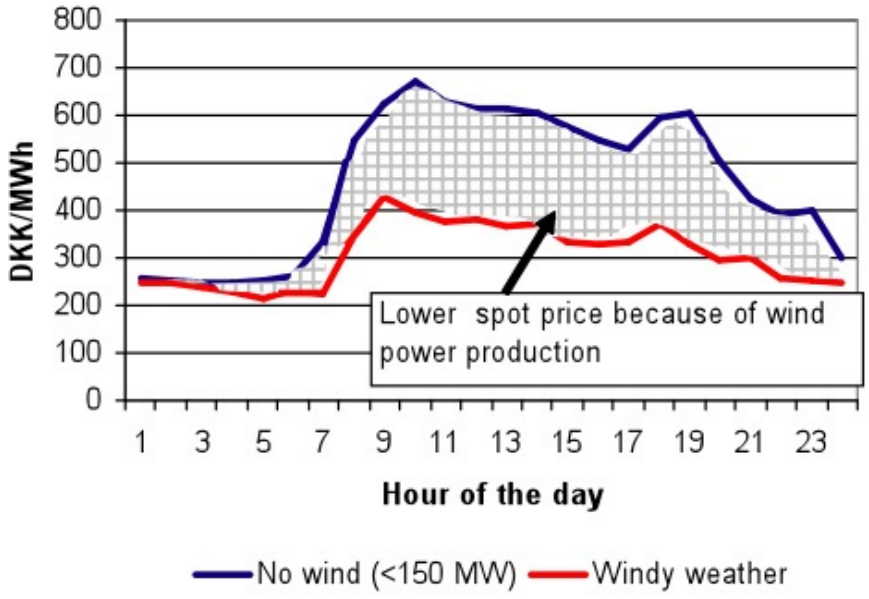
"How much do you favor or oppose a large increase in the number of wind farms in [the UK, France, Germany, Italy, Spain, the U.S.]?"

Base: All EU adults in five countries and US adults

	Great Britain	France	Italy	Spain	Germany	United States
	%	%	%	%	%	%
Unweighted base	1087	1076	1045	1109	1111	1020
FAVOR (NET)	**87**	**89**	**91**	**90**	**79**	**92**
Strongly favor	48	49	64	55	34	61
Favor more than oppose	39	40	27	35	45	31
OPPOSE (NET)	**13**	**11**	**9**	**10**	**21**	**8**
Oppose more than favor	9	8	8	7	14	7
Strongly oppose	4	3	2	3	7	1

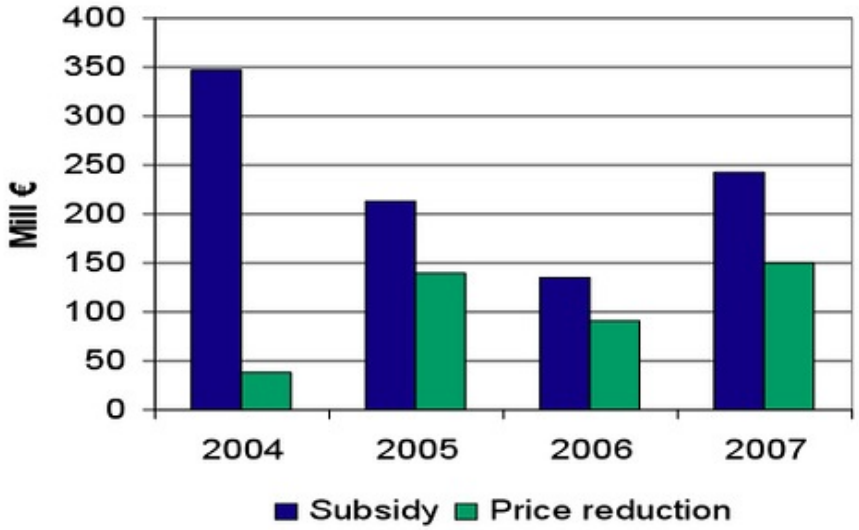
Harris Interactive

More importantly, wind has a major economic quality: the more there is, the lower electricity costs:



The effect of wind power on spot market prices (pdf)
Rune Moesgaard, Poul Erik Morthorst, presentation to EWEC 2008

Under market price setting mechanisms, wind power (which has a zero marginal cost) brings wholesale prices down when it is available, by avoiding the need for more expensive coal-fired or, more usually, gas-fired power plants that would otherwise be required to balance the system.



The effect of wind power on spot market prices (pdf)
Rune Moesgaard , Poul Erik Morthorst, presentation to EWEC 2008

The overall effect (price reduction multiplied by the relevant volume) now brings savings to consumers in Denmark that are equivalent to the gross cost of feed-in tariffs, and significantly higher than the net subsidy, as wholesale prices are now pretty close to, and increasingly often higher than, the feed-in tariffs guaranteed to wind power producers.

The same is already true in Germany, despite its somewhat lower wind penetration than in Denmark (11 (*ed: wrongly used the number for Spain*) 7% of electricity produced, vs 25%)

3. Results for the merit-order effect: Annual analysis

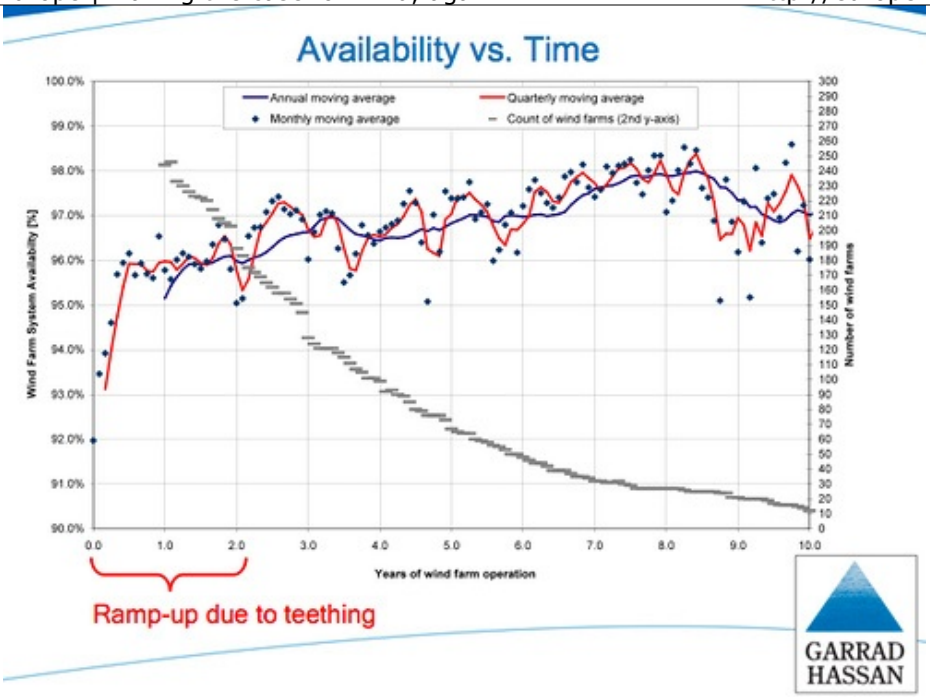
	Simulated renewable generation	Average price reduction	Volume merit-order effect	Merit-order effect per Renewable MWh	Average feed-in tariff
	TWh	Euro/MWh	Billion Euro	Euro/MWh	Euro/MWh
2001	24.3	1.7	1.07	44	86.9
2004	41.5	2.5	1.65	40	92.9
2005	45.5	4.25	2.78	61	99.5
2006	52.2	7.83	4.98	95	103

Assessment of the impact of renewable electricity generation on the German electricity sector (pdf)
Mario Ragwitz, Frank Sensfuss, Fraunhofer Institute, presentation to EWEC 2008

Note again that the cost noted above for the subsidy is the gross amount of the tariff, not the difference between the tariff and the wholesale price, which would be the correct amount of the subsidy granted to wind power producers

In other words, **wind subsidies demonstrably save money for eletricity consumers**, ie they are smart regulation.

An another interesting point to note is that wind power costs are now also well understood: industrial-size turbines now have a 15-year track record, and availability has been consistently in the 96-98% range, as shown by this meta study on 14,000 turbines:



Availability Trends Observed at Operating Wind Farms (pdf)
Keir Harman, Andrew Garrad, Garrad Hassan, presentation to EWEC 2008

And while offshore is slightly more expensive today than onshore wind, we're not about to run out of convenient spots at sea, away from whining onlookers, to continue the development of the industry:

photo by author
Thornton Bank, Belgium, August 2008

More stories about wind, and more discussion of other issues surrounding wind can be found on this page, of which I select a few noteworthy items:

> the real cost of electricity
> Alternative energies: wind power (an introduction)
> My job (financing wind farms)
> No technical limitation to wind power penetration (discussing the intermittency issue)
> Why wind needs feed-in tariffs (and why it is not the enemy of nuclear)
> Fierce price - yes it works! (first offshore wind farm to be financed is completed)
> Gore sets goal of 100% carbon-free electricity by 2020 (how it can be done)

The conclusion is simple: **wind power deserves to be taken seriously**