The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Offshore Wind

Posted by Jerome a Paris on December 10, 2007 - 10:55am in The Oil Drum: Europe
Topic: Alternative energy
Tags: electricity, offshore wind, renewable energy, wind [list all tags]

I spent most of this week at the big conference organised every two years by EWEA (European Wind Energy Association) on offshore wind, which took place in Berlin over this week.

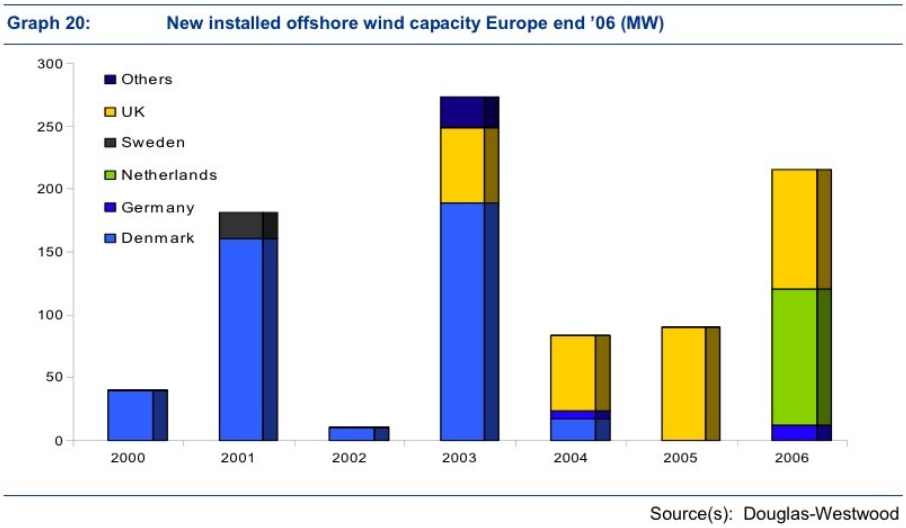
all photos by author

(*And yes, in case there is any doubt, I work in the industry, finance it and spoke at the conference*)

It was a huge event, with close to 2,000 participants and a palpable energy and a sense of - finally - progress. The conference was attended by the ministers for energy or senior political representatives from several countries (the UK, Germany, several Nordic countries - see the link above) and happened at the same time as an important German government meeting that decided to increase offshore tariffs to 14c/kWh, a strongly supportive measure which is likely to be the starting point of a massive wave of investment in the sector in that country. Interestingly, despite that decision, and the excitement it generated, the UK market is still seen as likely to be bigger than the German one over the next 10-15 years, with all other markets being somewhat smaller.

in black: existing wind farms; in blue: those scheduled for construction by 2009. Click to enlarge.

Just over 900MW of offshore wind had been built by end 2006 (compared to 74,000 MW onshore), as shown below, but the plan is to get to 40,000 MW of offshore wind in Europe by 2020, with approximately half in the UK, a quarter in Germany and the rest spread across Europe, mostly in the North Sea (which has good winds and shallow waters).



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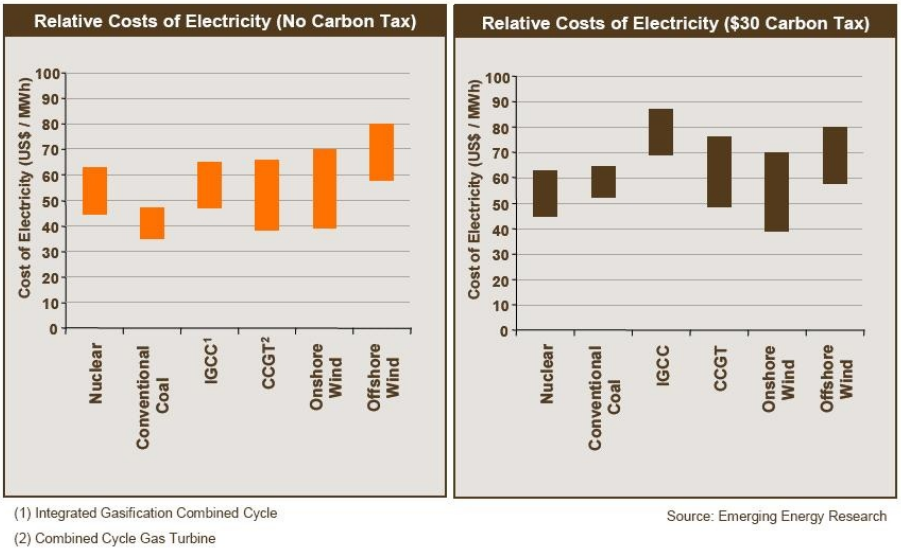
The industry, like others, has suffered from rapidly increasing costs in recent times, from increased commodity prices, overstretched suppliers and, it must be said, still unresolved technical difficulties with some turbine models that have been withdrawn from the market after encountering technical difficulties. There is a lot of focus on reaching a scale sufficient to rationalise and standardise both manufacturing and offshore installation, after the early years of projects designed on a case-by-case basis.

The graph below reflects costs prior to commodity increases - but these apply equally to other sectors, so all technologies are more expensive today. The great advantage of wind in that respect, of course, is that once it is built, the cost is fixed: you only have to repay the initial investment, a fixed amount, and not to buy fuel, whether coal, natural gas or oil, whose prices can also increase - and indeed have. And an other overlooked advantage is that wind's marginal cost (the cost of production of an additional kWh) is close to zero, so whenever wind blows, this takes out more expensive producers and reduces prices for everybody. In fact, a Danish study has demonstrated that the resulting savings for that country are now larger than the subsidies provided to wind...

Even if it is unreliable due to its intermittency, wind still has a real effect on both electricity prices as well as on carbon emissions, as each kWh of wind will usually displace a marginal kWh generated by a gas or oil-fired plant.



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Offshore wind is still more expensive than onshore (thus the need for additional support in the early years of this new industry), but it responds to the fact that Europe is quite small and densely packed, and some areas will not be able to take more wind turbines, especially the huge models now available, which tower more than a hundred meters above ground. With winds at sea being stronger and more regular, it is the obvious place to put industrial size wind farms, and the hope is that economies of scale will eventually make it cost effective (it is already competitive compared to gas-fired power, given natural gas prices) - and of course, that production that can be scaled to levels that allow the sector to represent a significant fraction of total energy production. The European goal for 2020, 20% of all energy from renewable sources is quite ambitious, as it means that more than 20% of all electricity should come from wind by then.

Table 1: European offshore vs. onshore wind

	Onshore	Offshore	Comment
Wind speed (m/s)	4-8+	8-12+	
Average plant scale	15MW	300MW	
Technical availability	98%	95%	
Capex € / kW	1,200 - 1,600	2,200 - 3,000	
Operating hours	~ 2,100	~ 3,400	
Capacity factor	29%	40%	
Opex per kW	30,000	75,000	
Lifetime (years)	25	25 (unproven)	
Installed capacity in Europe MW (end '06)	47,072	904	98% onshore
Installed capacity in Europe MW (end '15)	115,919	10,444	92% onshore
CAGR 06-'15E	10%	30%	
Installed capacity in Europe MW (end '30)	150,000	150,000	50% onshore
CAGR 06-'30E	5%	24%	

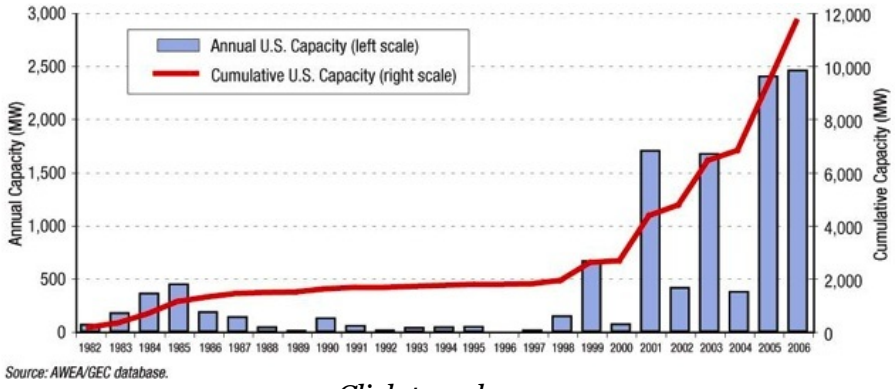
Click to enlarge

Another obvious trend was how the industry is now dominated by the large players, in particular on the investor side - the business is essentially run by the big utilities, with a few independent developers remaining (and those that have good prospects are usually take-over targets for the bigger players right now). On the manufacturing side, the presence in the business of GE (currently absent from offshore as they have no appropriate turbine, their 3.6MW model having shown unsufficiently reliable performance), French nuclear energy giant Areva (via Multibrid, still in the early stages of integration), German engineering group Siemens (the dominant player offshore) shows that concentration is well under way, and the fate of Vestas (still the largest wind

turbine manufacturer overall, but a small company compared to the big indistrial groups) and Repower (focused on offshore, but whose main shareholder, Indian-based Suzlon, is itself a pure wind player and thus quite small as well) will certainly become a hot issue in the future.

Offshore wind is heavy industry: a nacelle weights 100-300 tons, a blade is 50 meters long, a tower is 80 meter high, etc... Managing 20-30% p.a. growth rates in heavy industry is extremely hard to do - logistics, supply chains and financial commitments are complex, and a wrong bet on where demand will be (on the high or on the low side) can have devastating consequences.

Thus we need to ensure at least a level-playing field, with stable regulation over many years (the opposite of what has happened in the US over the past ten years, with the PTC, the main support mechanism for the industry being renewed haphazardly and for short periods only, leading to collapsing production in some years. The current version of the Energy Bill, as approved by the House, extends the PTC for 4 years, which is the best that has been done this decade, so it's progress.



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Offshore wind is less urgent in the US than it is in Europe, as there is still plenty of room onshore to grow (and with a much better wind resource than in Europe) and thus less need to pay the higher cost of offshore, but there could be some projects in areas like the Great Lakes or in the densely populated North-East.

In any case, there is no silver bullet, and wind (and a fortiori offshore wind) is not by any means the only solution. But today, it is the technology with the best prospects to have a real impact on our carbon emissions, at a low economic cost, and with very real positive effects on overall employment, redevelopment of isolated areas, and security of supply.

Wind is free, clean, indigenous, and available today.

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