

## **RO Reform Consultation – BWEA response**

### **Annex A: Wind turbines – future costs and availability**

A key issue affecting the delivery of wind power in the UK, both on- and offshore, is the development wind turbine costs. The past few years have seen steep price rises due to increases in raw material costs and an explosion of new wind build in the US, which has exposed supply chain bottlenecks. While turbine manufacturers are still striving to improve their products, thus increasing their productivity and exerting downward pressure on the cost per kWh, commodity prices and strong demand are still strong pressures in the near to medium term. Turbine prices will thus continue to be at current prices or higher up to 2010. How the price of turbines might develop beyond this is hard to forecast: what is certain is that the cost of turbines for UK projects will be determined by factors outside the control of UK Government or industry.

This Annex examines the three main factors driving turbine prices – commodities, the ability of the supply chain to meet demand, and technological progress – and analyses how they may develop post 2010. This gives a qualitative feel for how prices may move in this period: in our quantitative analysis of wind costs elsewhere in this submission, we have assumed flat prices for wind power costs both on and offshore; that numerical analysis should be put in the context of the discussion in this annex.

In addition, we discuss below how investment in nacelle assembly and the vital component manufacturing facilities may develop, and thus how plentiful turbines will be generally on the world market. This is of most importance for the offshore sector: the greater the capacity of the industry to meet onshore demand, the greater the turbine makers' incentive will be to seek out new markets offshore to exploit their manufacturing capabilities.

#### Commodity price development

Over the last two years all of the major turbine manufacturers have increased the ex-works prices of their products and year-on-year price increases during 2005 and 2006 have been as much as 15%.

Whilst some may view this development in pricing as short-term opportunism on the part of the manufacturer given that global demand for wind turbines greatly exceeds the ability of the market to supply (and will continue to do so until 2010) it must be recognised that manufacturers are also facing steep increases in raw material costs. The fast-growing Chinese economy is bringing great pressure to bear and dramatically pushing upwards the prices of commodities such as steel, copper and carbon-fibre – all materials to be found in the major sub-components of wind turbines. The manufacturers have no option but to pass through such cost increases to the buyer and typically most wind turbine supply contracts for projects to be executed

between 2007 and 2010 contain detailed price indexation clauses or indeed place the risk of the effect of increasing raw material costs wholly with the buyer.

As an example, the price per tonne of hot rolled plate for towers was as low as €320 during 2004 but as high as €650 per tonne during 2005 and still increasing in 2006. Therefore the raw material costs involved in the manufacturing of towers for wind turbines have more than doubled in two years.

It should be borne in mind that all power generation equipment manufacturers are facing these increases in commodity prices, and thus all new generation capacity is getting more expensive. Due to the highly capital intensive nature of wind power, the effect is likely to be more marked here than for fossil-fired capacity, but nevertheless there is upward pressure on the capital cost of all generators.

#### Supply chain investment trends

The trends in supply chain management show that it has become imperative in terms of competitive advantage for each turbine manufacturer to secure the full supply chain for their finished product. With ever-growing demand for wind turbines globally, increased pressure has been placed on major sub-component suppliers, especially those who provide gear-boxes (a sub-component where there is an acknowledged world-wide shortage). Most turbine manufacturers are proceeding with caution in terms of increasing global manufacturing capacity due to sub-component shortages, and clearly suppliers of major sub-components are facing the same price pressure due to increased costs of raw materials as the wind turbine manufacturers themselves.

There is evidence of trends developing in supply chain management insofar as turbine manufacturers have recently made strategic acquisitions of gear-box or generator suppliers or have entered into long-term supply arrangements with independent suppliers of wind turbine blades to supplement their own blade manufacture.

Unfortunately, the ability of the wind turbine manufacturer to supply the demand in the market-place will remain constrained until long-term supply chain problems can be overcome, and there is a body of evidence gathering in that currently there are lead-times that are being quoted for deliveries of wind turbines as far out as 2008 and 2009 on most projects served by major suppliers.

#### Technological progress

Clearly, all major turbine manufacturers are striving for technological advancement and enhancement of their product range to distinguish their

product from that of their competitors in the eyes of the buyer. Technological progress comes at a price, however, and the significant financial investment necessary in Research and Development has to be funded. It therefore must be recognised that such funding comes from only one place and that is from the annual profits of the turbine manufacturer.

Fundamentally, the market pays the price of improving the quality of the finished product and for technological advancement. Therefore, it should be recognised that part of the 15% year-on-year price increases for wind turbines can be apportioned to ongoing and future investment in R&D.

The upside of this investment is that wind turbines will become more productive. Existing models will be refined, with improvements to blade aerodynamics, control systems etc. New, larger models will come forward that promise to reduce costs, particularly offshore where foundation costs are much higher than for onshore. While these effects are currently being overwhelmed by commodity prices and supply chain bottlenecks, they still apply; should the other two factors abate significantly, technological development will once more dominate and bring down costs. It will be some time into the next decade before this becomes possible, however.

#### Turbine supply and manufacturers' offshore appetite

Not all wind turbine manufacturers have an appetite to supply offshore wind projects, and those who do so will only now supply projects on their own terms and conditions; this in the main means that another party has to take the installation risk. This is largely due to experience gained and financial losses suffered on early offshore wind projects.

Those manufacturers who continue to serve offshore projects need the necessary financial strength to overcome a problem that may arise in the operational phase, and that is why the major suppliers carry high warranty provisions in their accounts which would cover the cost of serial component failure or defect offshore.

The potential financial losses from downtime on an offshore wind project due to a combination of ease of accessibility – or otherwise – and availability of replacement sub-components due to the afore-mentioned supply chain problems again means that financial penalties for lost production are high. Only the major wind turbine suppliers can live with this type of risk, therefore there are fewer potential suppliers of offshore wind projects within the existing manufacturing base.