Executive summary

This assessment of the wind turbine component supply chain, along with the prospects for short term demand in the industry, has produced the following conclusions:

- On the negative side, supply constraints are being created by lack of production capacity further down the supply chain
- On the positive side, efforts are being made to cope with rapidly increasing demand by both the wind turbine suppliers and their sub-suppliers, who can see a robust and steadily growing market stretching some way ahead. This has made them willing to enter into heavy investment in additional production capacity.
- For the first time in the short history of wind power development a situation has occurred where it is no longer political decisions which are determining for growth but the industry's own ability to building up sufficient production capacity fast enough.

More specifically the following findings have been identified about the supply chain:

Blades
The production capacity of blades is currently being increased all over the world. Therefore the shortage of blade supply should soon be over. Supply of carbon fibres for blade production might be a problem for a few manufacturers at the higher end of their product range, but alternative solutions exist. Capacity by now (2006) is around 20.000 MW, increasing to 25.000 to 30.000 MW in 2010.

Gearboxes
The supply capacity of gearboxes is expected to increase by 50 to 100% by 2010. A 75% increase should be sufficient to meet the expected demand. However, due to the pattern of ownership of the gearbox manufacturers (importance of other demand sectors) and the increase in wind turbine sizes, there will be lack of sufficient supply in the next two years (up to 2009). Capacity by now (2006) is around 15,000 MW, increasing to 21,000 to 32,000 MW in 2010. It is assumed that a 20% over capacity is necessary to not experience bottleneck in the supply.

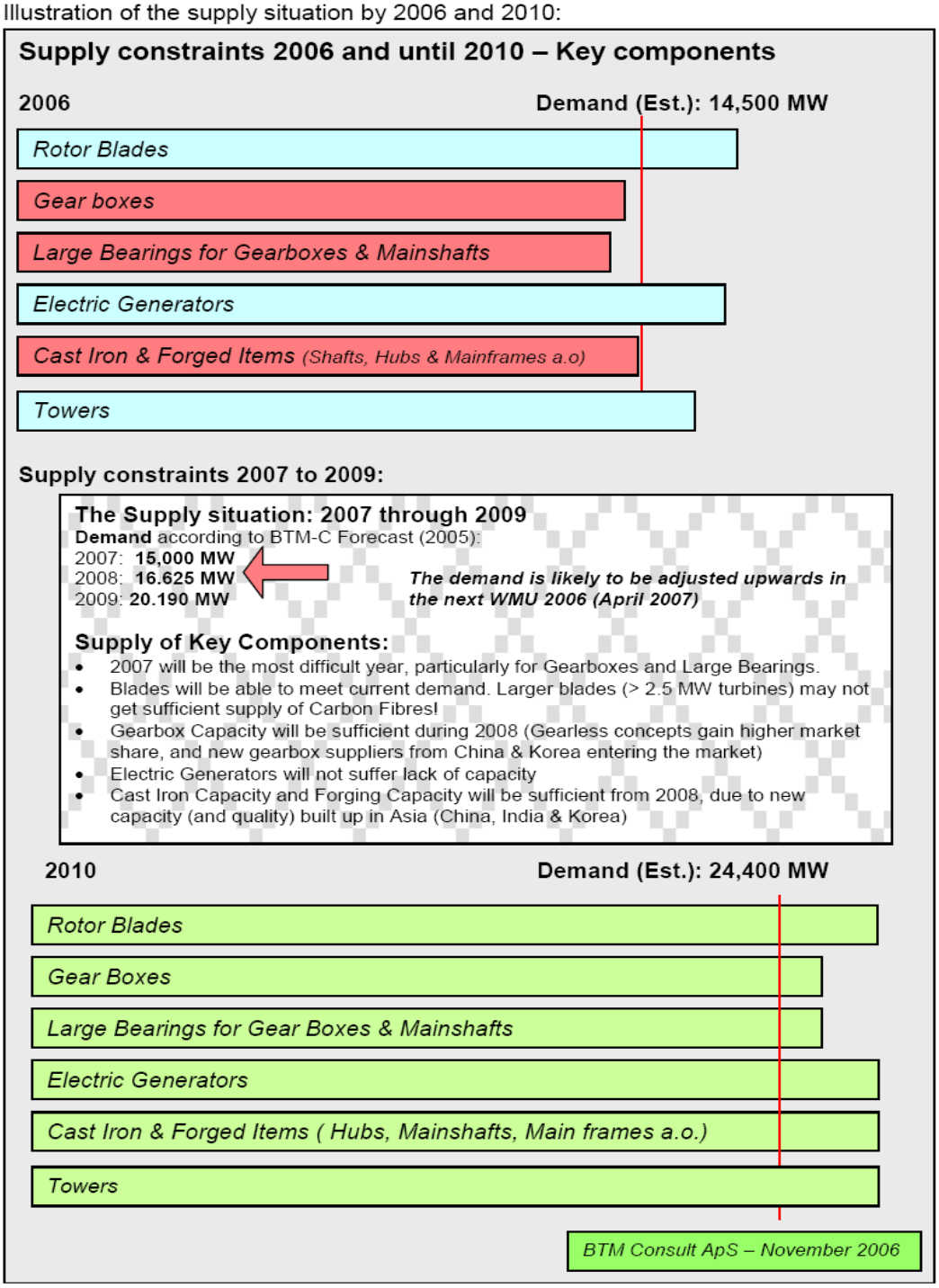
Large bearings
Supply to key components such as gearboxes and generators is influenced by the generally high level of activity in heavy industry. Supply of large bearings may therefore cause problems from time to time until 2008, when sufficient capacity is expected to be in place. The two leading suppliers, SKF and Schaeffler, will have extended their capacity by that time. Other manufacturers have announced building up additional production capacity. The supply situation is very sensitive to the demand regarding sizes, as only a few can deliver bearings for the largest WTGs

Electric generators
Generator concepts in current use will be available in sufficient quantities. More advanced and/or tailored applications may change the situation. Such concepts will, however, be designed in partner alliances between generator suppliers and wind turbine manufacturers.

Cast iron and forged items
The supply situation for large cast and forged parts is also under strain. However, there appears to be enough production capacity in the Far East which, with some improvement in quality, could enable production capacity to increase considerably. Large items of forged parts, such as main shafts, can only be supplied from European sources for the time being.

Towers
The capacity of tower manufacturers in Europe and in the US is being utilised almost 100% at present, but there are possibilities for finding local sources in other world markets. Towers are not likely to create supply problems.

Illustration of the supply situation by 2006 and 2010:



Overall, the wind industry is expected to build up installed capacity from today's 14-15,000 MW/year to around 25,000 MW/year by 2010. Beyond that the indications are that the supply chain will be able to adjust its size to support current growth. From 2007 through 2009 the available supply of components will be determined by the actual growth in terms of annual new installed capacity.