Trends in Wind Energy Technology Development

Text Over the past 25 years global wind energy capacity has doubled every three years, corresponding to a tenfold expansion every decade. By the end of 2010 global installed wind capacity was approximately 200 GW and in 2011 is expected to produce about 2% of global electricity consumption. The huge potential of wind, the rapid development of the technology and the impressive growth of the industry justify the perception that wind energy is changing its role to become the future backbone of a secure global energy supply. Between the mid-1980s, when the wind industry took off, and 2005 wind turbine technology has seen rapid development, leading to impressive increases in the size of turbines, with corresponding cost reductions. From 2005 to 2009 the industry’s focus seems to have been on increasing manufacturing capacity, meeting market demand and making wind turbines more reliable. The development of new and larger turbines to some extent stagnated, and costs even rose due to high demand and rising materials costs. We believe, however – and this is supported by recent trends – that the next decade will be a new period of technology development and further scale-up, leading to more cost-effective, reliable and controllable wind turbines and new applications. This is partly due to increased international competition, but also because the industry is increasingly dominated by high-technology international companies. The move to install more capacity offshore also favours larger wind turbines and encourages new ways of thinking. In this paper we discuss the current status of wind power and its prospects up to 2050, including both existing and emerging technologies.