

## FOR IMMEDIATE RELEASE

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## ONSHORE WIND ENERGY TO REACH PARITY WITH FOSSIL-FUEL ELECTRICITY BY 2016

London and New York, 10 November 2011 – The cost of electricity from onshore wind turbines will drop 12% in the next five years thanks to a mix of lower-cost equipment and gains in output efficiency, according to new research from Bloomberg New Energy Finance.

The best wind farms in the world already produce power as economically as coal, gas and nuclear generators; the average wind farm will be fully competitive by 2016.

The wind team at Bloomberg New Energy Finance estimates that manufacture of onshore wind turbines displays a 7% "experience-curve" – that is a 7% cost reduction for every doubling of installed capacity – as economies of scale and supply chain efficiencies reduce costs. Global average turbine prices have fallen in real terms from EUR 2.0m/MW in 1984 to below EUR 0.88m/MW in H1 2011. In 1984, there were only 0.3GW of installed wind capacity in the world, but by the end of 2011 there will be over 240GW.

However, there is a second factor driving down the price of wind-generation: at the same time as turbine costs have been falling, the power output achieved by each turbine as a percentage of nameplate capacity – the so-called capacity factor – has been rising steadily. This has been driven by the long-term move to bigger and taller turbines, better aerodynamics, better controls and gearboxes, as well as improved electrical generation efficiency. These improvements have increased capacity factors by 13 percentage points to 34% over the past 27 years.

The operations and maintenance cost of wind farms has also decreased in real terms, on average over the lifetime of the project from EUR 50/MWh in the 1980s to EUR 11/MWh today, as operators have become more experienced and the quality of turbines has improved. As a result of all these improvements, each megawatt of wind capacity built on land in the 1980s could be expected to deliver 1,800MWh of electricity per year; one megawatt of today's more efficient and taller wind turbines can be expected to deliver 2,900MWh each year — an impressive achievement by the industry.

Taking these factors together, the levelised cost of energy — the cost of energy before any subsidies or support mechanisms are applied — produced from onshore wind turbines has fallen by 14% for every doubling of installed capacity between 1984 and 2011. So the levelised cost of energy from onshore wind has fallen in 2011 real terms over this time period from EUR 200/MWh to EUR 52/MWh. This is only EUR 6/MWh more expensive than the average cost of a combined-cycle gas turbine plant in 2011. That figure for gas-fired power excludes the cost of carbon emitted - if that were included, wind would already be at grid parity.

Due to structural overcapacity and growing competition in the wind industry, we expect turbine prices to continue to fall over the next few years. At the same time as designers roll out yet larger turbines

with longer blades designed to capture more energy, even in low-wind locations, capacity factors will continue to increase. These two changes will drive the cost of wind energy down further, to parity with conventional energy sources. Assuming specific learning rates for these components, we expect wind to become fully competitive with energy produced from combined-cycle gas turbines by 2016 in most regions offering fair wind conditions. That would be the case with wind turbine prices at EUR 0.80m/MW by then. Any increase in the cost of gas, which will consequently raise the cost of energy of gas-fired turbines, would bring forward the timing of grid parity for wind.

Justin Wu, lead wind analyst at Bloomberg New Energy Finance, said: "The public perception of wind power tends to be that it is environmentally-friendly, but expensive and intermittent. That is out-of-date - in the best locations, where generation is already cost-competitive with fossil fuel electricity, and that will be the case for the majority of new onshore turbines installed worldwide by 2016.

"The press is reacting to the recent price drops in solar equipment as though they are the result of temporary oversupply or of a trade war. This masks what is really going on: a long-term, consistent drop in clean energy technology costs, resulting from decades of hard work by tens of thousands of researchers, engineers, technicians and people in operations and procurement. And it is not going to stop: In the next few years the mainstream world is going to wake up to wind cheaper than gas, and rooftop solar power cheaper than daytime electricity. Add in the same sort of deep long-term price drops for power storage, demand management, LED lighting and so on — and we are clearly talking about a whole new game," Wu added.

Bloomberg New Energy Finance publishes detailed analysis on the pricing and costs of different renewable energy technologies as part of its Renewable Energy Insight Service.

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