RENEWABLES FACT SHEET
WIND – COMMERCIAL/INVESTMENT

JHWalter
SUSTAINABLE RESOURCE MANAGEMENT

What are Wind Turbines?

Wind turbines are essentially aerofoils linked to a generator/turbine which produces electricity when sufficient wind is present to power the turbine. The power generated can be used immediately, stored in batteries or sold into the grid.

How does it work?

The turbine will have a given power output. For "mid range" turbines this may be around 50 to 300kW. With a 100kW turbine, at around a winds peed of 13m/s, for every hour the turbine turns it would generate 100kW i.e 100kWh. However, variable wind speed clearly means this is not the case in practice. Because wind power is proportional to the cube of wind speed, small changes in wind speed have a significant effect on power output. In the UK those sites which have reasonable wind speeds are more likely to generate 25% to 30% of the potential output The aerofoil which may be of the conventional "propeller" type or a vertical rotor drives a generator either directly or via a gear box.

Wind turbines produce power over a wide range of wind speeds. They cut in at between 3 and 4 m/s, reach their rated output at about 11 - 13 m/s and are regulated to produce their maximum output through to 25 m/s, when they typically shut down to protect the drive train, gearbox and structure from potential damage. This maximum speed is equal to 55 mph, which is above gale force 9, (tree branches break). In the UK wind environment a wind turbine will be producing useful power for 70-85% of the year, equating to 6,000-7,500 hours per year.

Where will it work?

The UK has some of the best wind resources in Europe, if not the world, in both onshore and offshore locations. This makes the British Isles a very attractive location for wind developments, as high average wind speeds and good reliability results in more power output and lower costs. For much of the East Midlands and up through Yorkshire average wind speeds of around 6 m/s may be achieved at 40m above ground level and up to 7.5m/s for more exposed areas.

In addition to wind speed, the other essential factor for wind, and indeed any power generator, is an adequate grid connection. Whilst it is generally possible to establish such a connection, upgrading the grid can be extremely expensive and impact significantly on the economics of the project.

Regulations

Applying for planning permission for large wind farms has frequently created much local anxiety and objection. Perceived issues of negative landscape effects, noise, devaluation of properties etc. have caused local residents to start up action groups which have frustrated the windfarm's progress through planning. There is of course some difference between a single or small number of turbines at lower heights than some of the very large wind farms.

The military and civil aviation authority have concerns over air traffic radar systems and shadowing. These concerns can be overcome, and practice (speaking with air traffic controllers) suggests that the problem is not an issue "on the ground". That said as statutory consultees the MOD and CAA have to be convinced that the proposal does not present any

undue risk. Once again one or two turbines do not create the same issues as a large scale windfarm.

Income/Savings

The income generated from a turbine is directly related to the size of the turbine installed. Actual average wind speed is all important and monitoring wind speed for a period of time prior to investment is highly advisable and in certain instances imperative. Whilst power prices have slipped back a little recently, declining reserves of fossil fuels mean that inevitably the forward price for power will be upwards. The business model now with improving technology and FITs can provide attractive pay back periods and long term returns. The returns of such schemes will also depend upon the offset percentage i.e. how much power is used on site.

FITs

The introduction of FITs from 1st April 2010 provides a support structure that in the main will be considerably more attractive than ROCs. In essence there are two potential payments, one for power generation (see table below) and then an optional guaranteed export tariff i.e. a guaranteed payment for electricity transferred into the Grid of 3p/kWh. Alternatively generators can sell into the open market. Tariffs are to be paid for 20 years.

Table of generation tariffs for first year of FITs (2010-11) Technology	Scale	Proposed initial tariff (p/kWh)
Wind	≤ 1.5kW	34.5
Wind	>1.5–15kW	26.7
Wind	15–100kW	24.1
Wind	>100–500kW	18.8
Wind	>500–1.5MW	9.4
Wind	500kW–5MW	4.5

Capital Costs

Capital costs for a turbine of around 300kW installed and commissioned can be some £600,000 or around £300,000 for a 100kW turbine. Clearly site conditions, grid connection and turbine specification will affect the overall capital expenditure. This figure includes a provision for pre-application enquiries and the planning application. However cost of planning varies significantly dependent on location and circumstances.

The useful life of wind turbine installation will vary depending on the quality of the turbine installed. A well maintained turbine should last over 20 years.

Grants

The Feed-in tariffs Order 2010 indicates that if a FIT is to be claimed no other public funding can be claimed. If it has it will need to be repaid. However there are still some uncertainties as whether this is in fact the case for some funding sources.

Partners

We generally look for clients to source turbines direct where possible although work with a number of partners in certain circumstances. We are therefore able to offer a complete package including feasibility assessment, planning, installation and commissioning of Wind Turbines.

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Scoping Feasibility Project Management Planning
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