

**“Wind Energy – Technology and Politics”**  
**Dr Andrew Garrad of Garrad Hassan & Partners.**

Sources of alternative energy have become a political necessity in recent years because of increasing concern over rising costs, the need to reduce emissions and security of supply.

Dr Garrad briefly summarised the development and technology of wind turbines from the first US built “windmill-based” machines through a wide range of alternative designs up to the early 1990’s. At this time science was linked with commercial experience and consensus was reached on the basic wind turbine design – tower and blades coupled, 3 aerodynamic blades attached to hub linked to a generator via a gearbox. Application of electronics has enabled the development of “intelligent” turbines with control over loads on individual blades and also powers and speed. More recent developments include the use of direct drives and the use of permanent magnet generators. Individual turbines are now 100 metres tall with diameters of 120 metres and would be expected to have a 20-year life (15 years actual running time) with about 40 hours per year maintenance.

Applying statistical analysis to meteorological data, an excellent correlation is shown between the hour by hour output of the total UK wind capacity predicted 24 hours in advance and the actual. Thus although the output is very variable it is predictable and therefore manageable.

Europe currently has the highest installed wind turbine capacity but will be soon overtaken by both the USA and Asia. The majority of this is land based but where space is at a premium, as in the UK, offshore located wind farms will predominate. However offshore is probably only about 10% of the total installed capacity. Although offshore locations have the benefit of better wind and no problems with noise or space, current costs are more than double and access for maintenance is crucial. The current UK conventional energy capacity is 83GW. Dr Garrad estimated that to produce about 30GW from wind farms would require a total area of 54km x 54km which is either unacceptably large or not really that big depending on your attitude to wind turbines.

Problems of integration with the grid remain and there are many other outstanding political issues. Dr Garrad emphasised that wind energy would never be the total answer but he was sure that it should play a significant role in future energy policy.

The highly political issues of cost/subsidies were not covered in any great detail and it was apparent from the questions that Dr Garrad had not convinced all of the audience that wind energy was a genuinely viable proposition as a large-scale component of a future British energy policy.

*Given on Wednesday 11 November 2009 at the Royal Agricultural College*