Tackling The Intermittency Myth

By Corin Millais, EWEA Chief Executive

Watching a single wind turbine stop and start, it might seem logical to conclude that, as more of these machines are built, the result can only be an unreliable supply. Looking at electricity pylons, it's just as easy to conclude that the electricity flowing down the wires is always there, always reliable.

The fact is that the entire electricity system is variable, like wind energy. Both supply and demand of electricity are influenced by a large number of planned and unplanned factors. The changing weather makes millions of people switch on and off their supply. Millions of others expect instant power for lights, TVs, computers. Transmission lines break down on an irregular basis or are affected by extremes of weather. Trees fall on power lines, causing sudden interruptions of supply.

Conventional power sources are intermittent

On the supply side, no power station of whatever type is totally reliable. Large power stations that go off-line, whether by accident or design, do so instantaneously, causing immediate loss of power. When a fossil fuel or nuclear power plant trips unexpectedly, it takes a capacity of up to 1,000 MW off the network. That is true intermittency. But power systems have always had to deal with these sudden output variations, as well as variable consumption, and the procedures put in place by network operators can be applied to deal with variations in wind power production as well.

Variability and intermittency are different concepts

To describe wind energy as intermittent is misleading because at a power system level wind power does not start and stop at irregular intervals. Wind energy is a technology of variable output.

Variations in wind energy are smoothed by the fact that there are hundreds or thousands of units in operation, making it easier for the system operator to predict and manage changes as they occur. The system will not notice the shut down of a 2 MW wind turbine, but it will have to respond to the removal of a 500 MW coal fired plant or a 1,000 MW nuclear plant. Wind energy does not suddenly trip off the system.

So the issue is not one of variability in itself, but how to predict, manage and ameliorate electricity variability and what tools can be utilised to improve efficiency. Wind power is variable in output, but this can be predicted to an increasingly accurate extent.

The electricity system, not the turbine, is what matters

It is the net output of all wind turbines on the system or large groups of wind farms, that matters for electricity needs. Wind power has to be considered relative to the overall variability of demand and the intermittency of other power generators.

The wind does not blow continuously in one place, yet there is little overall impact if the wind stops blowing somewhere – it is always blowing somewhere else. And as weather forecasting is constantly improving, this makes it easier to predict in advance what wind can deliver.

Therefore wind can be harnessed to provide reliable electricity even though the wind is not available 100% of the time at one particular site. In terms of overall power supply it is largely unimportant what happens when the wind stops blowing at a single wind turbine or wind farm site. The more wind farms that are built over a wider geographical location, the more reliable wind energy is.

Moving forward

The EWEA report *Large scale integration of wind energy in the European power supply*, published this month, analyses these issues in depth, marshalling all the available studies from academics, industry and the conventional power sector. EWEA is collaborating with all the main electricity stakeholders in order to move these issues forward.

The report's main conclusions are that the capacity of Europe's power systems to absorb significant amounts of wind power is determined largely by economics and regulatory rules rather than technical or practical constraints. This was also the conclusion of the IEA (International Energy Agency) report published earlier this year (see *Wind Directions* August 2005). Already today, it is generally considered that wind energy can meet in the region of 20% of electricity demand on a large electricity network without posing any serious technical or practical problems – as proven by the example of Denmark.

Barriers to expansion

Wind energy does face barriers - not because of its variability but because of a series of distortions in electricity markets that are neither free nor fair. Opposition to the expansion of wind energy is about the commercial status quo rather than technical constraints. One of the simple truths behind the myth of wind's intermittency is that it is being deployed by opponents with a commercial axe to grind. But if wind energy really doesn't work why are the opponents so concerned? Because it is well known that wind is a major power source and it is feared precisely because its technical credentials are impeccable, rather than unreliable.

The constraints of wind energy are nothing to do with technical problems with wind technology per se. The barriers are mainly a matter of regulatory, institutional and market modifications, and should be dealt with in a broader power market context. The real challenges lie in the need for a secure, indigenous, de-carbonised and economically efficient European energy system.