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Editorial

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It is not unusual to hear people in the energy sector using, misusing and abusing data as they try to argue that one approach to solving the world's energy problems is better than another. All too often performance data for Denmark's wind farms is invoked in a very different UK context, figures on solar photovoltaic (PV) embedded carbon are applied to wind turbines, and performance figures for large combined heat and power (CHP) systems are applied to small ones. There is also a tendency to lift calculated theoretical performance figures and imply that they represent reality without much real evidence. This issue of *Energy* demonstrates some best practice in how to use data in a very precise, relevant way. It also contains a rich seam of data drawn from practical experience which is contrasted to excellent effect with more familiar theoretical data that we might ordinarily rely on. And along the way it de-bunks some of the more prevalent myths that surround the energy sector.

Staffell *et al.* (2010) provide a wide-ranging assessment of the status of three groups of micro-generation technology – low carbon heating, renewable electricity and CHP – concentrating mainly on the single-family residential scale and covering nine technologies in the process. This is very timely when the UK is responding to the introduction of a feed-in tariff for microgeneration and a renewable heat incentive is imminent. One unusual and welcome aspect of the paper is the wealth of real-world data on the cost of procuring and installing microgeneration equipment. It is interesting to see how a basic solar thermal system costing US$200 in China can turn into a sophisticated UK system with new heat storage, extensive retrofit work, ancillaries and backup costing up to £8000 installed. The other fascinating aspect is the wide array of data on how practical, in-service system performance compares with manufacturer data developed under idealised conditions. The data showing wind turbine output at about half the claimed value across much of the wind-speed range is particularly striking. There are numerous practical tips on how to size a Sterling engine CHP system, the importance of re-setting PV inverters, when not to replace existing radiators, the need to de-frost air source heat pumps in winter, and so on. And along the way it challenges common assertions about the inadequacy and unpredictability of solar insolation in the UK and similar myths.

There is a wealth of performance data in the paper by Feng *et al.* (2010), looking at how the UK's first Round 1 offshore wind farms have performed in service. Before providing installed cost, operation and maintenance (O&M) costs, achieved capacity factors, measured wind speeds, specific energy yields, cost of energy, etc., they do two very useful things. The first is to define exactly what they mean by the terms; the second is to provide a summary of the main problems that arose on each wind farm during the first year or two of operation. It then becomes possible to interpret the data more wisely, extrapolate some figures for what might be achieved on Round 2 and Round 3 wind farms and draw out some relevant learning for those developments. It is interesting to see O&M costs coming out at 18% of the cost of energy – higher than a 12% onshore wind figure but lower than figures like 25%, 30% or 36% that had been forecast by some. There are clearly some practical challenges in optimising maintenance policy and some research challenges in handling higher wind speeds effectively.

The paper by Gerber *et al.* (2010) introduces some of the statistical techniques and spectral analysis techniques that are common in the world of signal processing and explores ways of using them in the context of wind farms and collections of wind farms. They point to some limited use of the techniques by academics in the UK and some of the Nordic countries, but make the point that they are rarely used in practice by engineers who plan, schedule and operate power systems that contain an increasing level of stochastic generators such as wind farms. Perhaps their approach of explaining the techniques using simple data, then moving on to real wind-speed data from real sites but simplified wind turbine power curves will make the topic sufficiently accessible to practising engineers. It is interesting to see how this approach can bring some rigour to discussions about how much spinning reserve is required to back up wind-power generation that is dispersed across a large geographic area, how much output smoothing occurs across a geographically dispersed set of assets, how to estimate the level of correlation between variations in adjacent wind farm outputs, etc. It is a useful reminder of some of the insights provided earlier by Gross *et al.* (2007) in these pages. And citing the data that shows that low wind-speed events affecting 90% of the UK occur on average for less than one hour per year helps de-bunk another unhelpful myth.

So perusing a *tour de force* of nine microgeneration technologies, a close examination of performance data from the UK's first round of offshore wind farms and a demonstration of the power of statistical analysis when seeking to understand the variations inherent in onshore wind power, there is much food for thought. Perhaps this issue of *Energy* will encourage a more effective approach to using data to influence the future direction of energy policy.

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