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The value of wind

HOW MORE RENEWABLES MEANS LOWER ELECTRICITY BILLS

“Achieving a target of 20% of electricity generated by wind power... would cost consumers at least an extra £1.2 billion each year, and over £2 billion annually on less favourable assumptions, over and above the costs of a conventional generation portfolio.”

D Simpson, *Tilting at windmills: The economics of wind power*, David Hume Institute 2004

There is a common perception – illustrated above – that increasing the deployment of renewable generation in the UK will increase the price of electricity for British consumers. However, the reverse is true – adding to the diversification of a country's generation portfolio with the addition of significant amounts of wind capacity leads to lower overall generation costs, and to lower bills.

There are five main elements that contribute to this phenomenon, known as the 'value of wind'. In short they are:

1. A reduction in the marginal cost of electricity; known as the 'merit order effect'.
2. A reduction in the spot price of fossil fuels.
3. A lower system risk due to the fact that wind power introduces greater cost stability the more it is employed.
4. A 'portfolio effect' where renewable energy reduces the system risk in a country's generation portfolio.
5. A positive impact on GDP through the reduction of the oil-GDP effect.

MARGINAL COST REDUCTION – THE 'MERIT ORDER EFFECT'

Wind is a free source of fuel. When the wind blows the electricity system has access to this free source and the power generated is automatically accepted onto the system. That electricity system is a combination of generation plants using different fuels and technologies, each with its own marginal cost. Operators bring plants on line in an ascending order of marginal cost and employ the same methodology when reducing output. In short, the most expensive plants are the last to be brought onto the system and the first to be shed.

When introduced, wind replaces the most expensive fossil fuel plants; the plant replaced is a low merit or peaking plant. The economic effect is that wind reduces both the marginal and average cost of power. Recent studies in Germany have

shown the consumer benefit of this effect, in that the reduction in domestic electricity prices brought about by fossil fuel displacement exceeds the amount paid out by the consumer in support mechanisms for renewable generation.

REDUCTION IN SPOT PRICE OF FOSSIL FUELS

When wind energy is available in significant quantities it causes the demand for fossil fuels to fall and if it continues to blow for a prolonged period, as frequently happens in Northern Europe during winter, the forward price falls. A recent report in *The Guardian* illustrated this phenomenon with reference to the energy market in Spain over the early months of 2009:

Prices being paid for electricity on the spot market, meanwhile, are reported to have dropped by 11% as production looks set to increase relative to demand. Spanish energy companies are obliged to buy electricity produced from renewable sources before they turn to other sources such as coal, oil or nuclear plants.

During November and December last year when wind was blowing strongly across Texas the price of electricity on the local electricity exchanges regularly fell below zero. Every unit burning fossil fuel on the system had its price reduced because the inclusion of wind reduced demand for fossils.

Thus there is a leverage effect on the value of each unit of electricity made from wind. It does not just have a zero marginal cost, it causes every other unit of electricity to be made cheaper as well.



Alstom erects a 3MW wind turbine in Tarragona, Spain