

Balancing supply and demand

Flexitricity's demand-response service provides energy across the grid

INDUSTRY VIEW

What's the government's top environmental priority? That's debatable, but "the establishment of a smart grid" headed the environment list in the May 2010 coalition agreement. And they really mean it. It's hard to get a government minister – or a shadow – through a meeting without some mention of this game-changing concept.

Smart grids are about smart customers. By adapting when they use electricity, customers can make better use of wind energy, or help out at short notice when electricity demand shoots up unexpectedly or when large power stations fail. This is demand response, and it's the smart grid's cornerstone.

In February last year, the traditional electricity industry had a duvet day. Blaming cold weather, seven gas-fired power stations failed to start, leaving the grid shorter than it had been in years. As demand

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rose rapidly, National Grid signalled Edinburgh-based energy company Flexitricity to fill the growing gap.

About a second later, the first industrial site connected to Flexitricity had taken its load off the grid. Within minutes, flexible electricity loads across Britain had turned down, while district heating generators and standby generators had switched on. Within a couple of hours, it was largely over: other power stations were warmed and started, and life returned to normal.

Demand response

Although they are not always quite so dramatic, demand-response events are routine. Flexitricity launched Britain's first demand-response portfolio in 2008, managing flexible resources at industrial and commercial partner sites over secure networks from its 24-hour control room. Since then, National Grid has issued over 2,000 calls to Flexitricity for additional power.

Most sites expect events once or twice a month. But some are an almost daily part of balancing supply and demand. Greenhouses, cold stores, datacentres, hospitals, offices, even an Olympic venue (during the Olympics) all participate, offering their capacity for occasional use by National Grid in

return for an attractive fee. The more flexible and lower-carbon the source, the more often National Grid uses it.

What National Grid is paying for is reserve capacity – somewhere to go when things go wrong. It doesn't need to buy this from demand response, but the alternative – keeping large power stations warm, or running them at reduced output so they can turn up when required – is wasteful. Gas power stations are efficient at full power, but per-unit emissions climb sharply if National Grid dials them back to provide reserve. Flexitricity's portfolio provides reserve capacity with no additional emissions – participating sites simply get on with their day jobs.

The smart grid doesn't yet reach domestic customers in significant numbers. But it's better that demand response is being honed by industry first. Industrial energy managers don't believe in free money – they know everything worth doing takes effort – and they put financial and environmental claims to the test.

Demand response

One conservative estimate sees demand response reducing CO₂ emissions by 300 tonnes annually for every megawatt of



reserve provided. Today, 3,500 megawatts are needed, but the low-carbon economy will need more, to cover nuclear generators – which can drop output suddenly – and varying wind generation. That's reason enough for the smart grid to be the UK's top environmental objective.

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