

The 40% energy gap

An IMechE report claims the UK may experience an energy supply gap as high as 40-55% by 2025. But how valid are its observations? Khai Trung Le investigates the 'Armageddon scenario'.

Claims of an energy supply gap as high as 40-55% by 2025 have been met with conflicting opinions on the likelihood of such a vast gap. But while the severity of the future shortfall is contested, there is widespread agreement that an increasing supply gap remains a problem within a wider energy sector struggling to reconcile carbon targets, the state of renewables and role of bastion sectors such as nuclear and gas.

The 40% figure was extrapolated from observing demand from a single day in December 2015. Lead author and IMechE Head of Energy and Environment Dr Jenifer Baxter noted that coal fulfilled 22% of demand, with nuclear fulfilling 23%, reaching the approximate figure of 45% by assuming these sources will be absent by 2025. The remaining 12% is derived from supply fulfilled by wind farms, which is similarly discounted on the lack of supply guarantee.

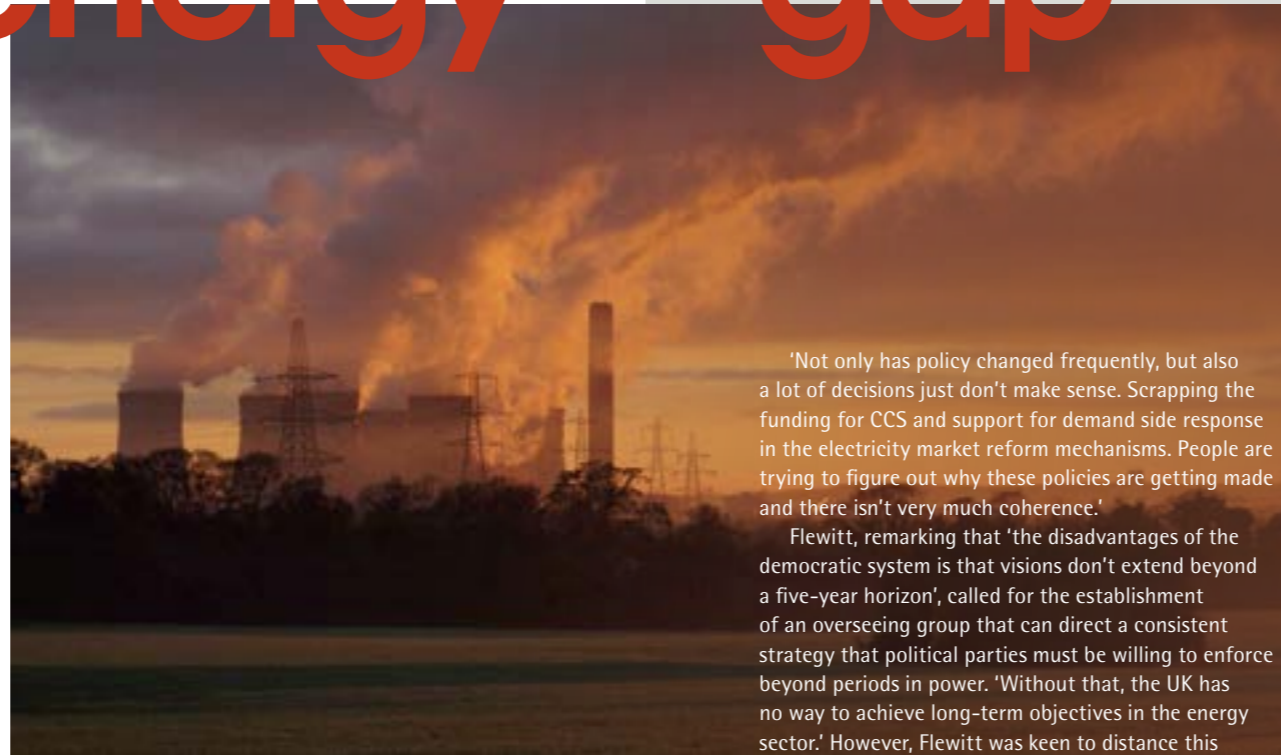
The 40-55% chance

Baxter said that the report, *Engineering the UK energy gap*, was 'not a big research project. It's just a small report based on information that's easily accessible.' But among industry experts speaking to *Materials World* – Research Assistant Emily Cox, speaking independently from the Sussex University Energy Group, and IOM3 Energy Materials Group Chair and Vice Chair, Professors Stuart Irvine, Glyndŵr University, and Peter Flewitt, University of Bristol, UK – there was no consensus on the likelihood of the report's dramatic figure.

Referring to the 40-55% figure as the 'Armageddon scenario', Irvine believes it represents worst-case circumstances. 'With plant closures, inaction and the delay in nuclear, I wouldn't want to put my money on when this will be resolved.' Similarly minded was Flewitt, who declined to comment on the legitimacy of the figure but stated, 'I fully agree with IMechE that there will be an energy gap. There is a need to bridge that gap and to bring things forward to ensure that the lights don't go out.'

However, Cox disputed a number of 'fairly simplistic assumptions' in the report, including the premise that all nuclear and coal-fired power stations would close by 2025 regardless of whether replacements for the missing capacity were established, as well as other

Right: Cox believes the closure of three units at Fiddlers Ferry is indicative of the issues with energy policy.



claims including expected demand increase – 'Demand has been decreasing fairly consistently. It obviously dropped during the economic crash but never rebounded' – and the negative impact of interconnectivity on energy security. Cox said, 'It's very difficult to work out where that idea came from. The infamous notification of inadequate system margin the National Grid had to issue on 4 November 2015 showed that interconnection is really capable of dealing with supply gaps, should they arise.' Cox refers to the emergency call for firms to reduce their power demand, following warnings that there was not enough reserve power to prevent blackouts in an emergency. An extra 40MW of power was quickly fulfilled by interconnectors.

However, all three were adamant that the Government was unlikely to allow the energy supply situation to deteriorate to the extent that a 40% gap would be experienced, with Cox remarking, 'I don't see any system manager, politician or energy secretary risking their political legitimacy by letting there be a supply shortfall. We haven't had a generation shortfall since the 1970s global energy crisis, and they all know it was one of the things that led to the change of government.'

Legacy of under-investment

On 26 January, Energy Secretary Amber Rudd issued a response to an open letter published in *The Times* on the same day from a coalition of business leaders calling for 'clear leadership and stable [energy] policy', with Rudd listing actions intended to tackle 'a legacy of under-investment'. This legacy has not gone unnoticed by Cox, Flewitt and Irvine, who each spoke on the uncertainty produced by the instability of energy sector policy.

Speaking on 'the speed at which policy is being changed', Cox was uncertain of the kind of stability being provided in the long term. 'We had a change of administration, and within four months of that, we had an energy policy reset. Golden rule of policymaking – don't reset everything. The subsidy regimes have also been subject to rapid, enormous decreases in prices for renewables. Second golden rule of policy – don't create a cliff edge.'

'Not only has policy changed frequently, but also a lot of decisions just don't make sense. Scrapping the funding for CCS and support for demand side response in the electricity market reform mechanisms. People are trying to figure out why these policies are getting made and there isn't very much coherence.'

Flewitt, remarking that 'the disadvantages of the democratic system is that visions don't extend beyond a five-year horizon', called for the establishment of an overseeing group that can direct a consistent strategy that political parties must be willing to enforce beyond periods in power. 'Without that, the UK has no way to achieve long-term objectives in the energy sector.' However, Flewitt was keen to distance this recommendation from the resurrection of entities such as the Central Electricity Generating Board and Atomic Energy Authority.

Reiterating Flewitt's demand for a long-term strategic approach, Irvine also believes the Government has a 'very shortsighted view' regarding renewables, and said the discussion on their contribution is too often misdirected towards short-term pricing, referring to the development of the Swansea Bay tidal lagoon. 'It may seem expensive to start, but there are things that can be done to improve it. We've seen it with solar – the price has come down more than 50% over the last few years. From being seen as one of the most expensive means of generating power, it could become one of the cheapest in the next 10 years. Government needs to back a range of energy generation, even if it appears expensive now, but with a roadmap to how it will go down later.'

Bridging the gap

Movement to prevent the vast supply gap posited by IMechE has already begun. The closure of coal-fired power stations was always stipulated on the establishment of replacement gas-fired stations – a position Irvine reservedly described as 'an interesting twist', noting how 'switching from coal to gas will reduce carbon emissions. But of course it is not low-carbon. It's a short term fix.'

In the nuclear sector, EDF plans to extend the life of four nuclear reactors – Heysham 1 and Hartlepool by five years until 2024, and Heysham 2 and Torness by seven years to 2030 – although Hinkley Point C itself remains



Above: An artist's rendition of the 225 MWe small modular reactor design designed by Westinghouse.

in uncertainty despite a high-profile partnership with state-owned China General Nuclear Power.

At the time of writing, EDF has yet to finalise the investment, with Paul Dorfman, Senior Research Fellow at the University College London Energy Institute, UK, saying to the BBC, 'Chris Bakken, the man charged by EDF to construct Hinkley Point, has quit to spend more time with his family, EDF shares have crashed to half their value [at the start of 2015 and] the budget for Hinkley alone is bigger than EDF's entire market value.' However, Flewitt thinks nuclear still has a contribution to make in bridging the supply gap within the next two decades.

'There is already great interest in small modular reactors (see *MW September 2014* for more information on SMRs). You can build, operate and generate an income stream quickly. There is flexibility to an operator and they could potentially reduce the large investment associated with the current generation of reactor types.'

Flewitt also called for more decisive action in securing energy supply, by taking an inward approach. 'We can import at the moment, but I have a fundamental belief that for an advanced technological society, security of supply is crucial, by which I mean, our supply of energy is independent of outside influences. Nuclear and photovoltaics allows you this. We need independence, not to be subject to the vagaries of the wider political scene.'

On the other hand, Cox believes that distancing the UK from outside influence is detrimental for supply security. 'All of this talk of a Brexit is really not helping! If we could just stop trying to leave Europe and actually get fully involved in the third energy package, with the integrated energy market that they're trying to create in the EU, and actually help that process instead of hindering it, it would not only be good for our energy security but also for affordability and carbon reduction.'

While there is no consensus on the means to resolve the widening supply gap, there is widespread agreement that now is the time to confront it, 40% or otherwise.

The IMechE report can be read at bit.ly/1VmHaOE. For full interviews with Cox, Flewitt and Irvine, download the *Materials World* app. The IOM3 Energy Materials Group annual lecture will be held on 22 June. See bit.ly/1KrR1SW for more details.