

A spark of genius

Alastair Martin, founder of energy technology firm Flexitricity, combines the cool, calm head of an engineer with the passionate heart of an environmentalist, helping his clients to use and generate electricity at the right time and in the right way

Simply flicking a switch to turn on the kettle or the television or the computer is something that most of us will take for granted. We expect the power to just be there when we need it to make a cup of tea or watch the match or send that all-important email.

But as commuters began driving home on the evening of 4 November, 2015, newsreaders on the radio were in a panic. National Grid, the appropriately-named company that runs Great Britain's national electricity network, had issued a 'notice of insufficient system margin' or 'Nism', asking power providers to generate extra electricity and calling on big customers to cut back on their usage as it prepared for a peak in demand.

The situation sounded very dramatic, with opposition politicians and other talking heads warning of the risk of blackouts over the winter amid fears that Britain's dwindling number of power stations wouldn't be able to cope with demand. With coal-fired plants being decommissioned and no gas-fired or nuclear sites being built to replace them, doom-mongers were warning that the situation was becoming dire.

"It was meant to be the winter of the Nisms," laughs Alastair Martin, founder and chief strategy officer at Flexitricity, an Edinburgh-based energy technology company that sits on

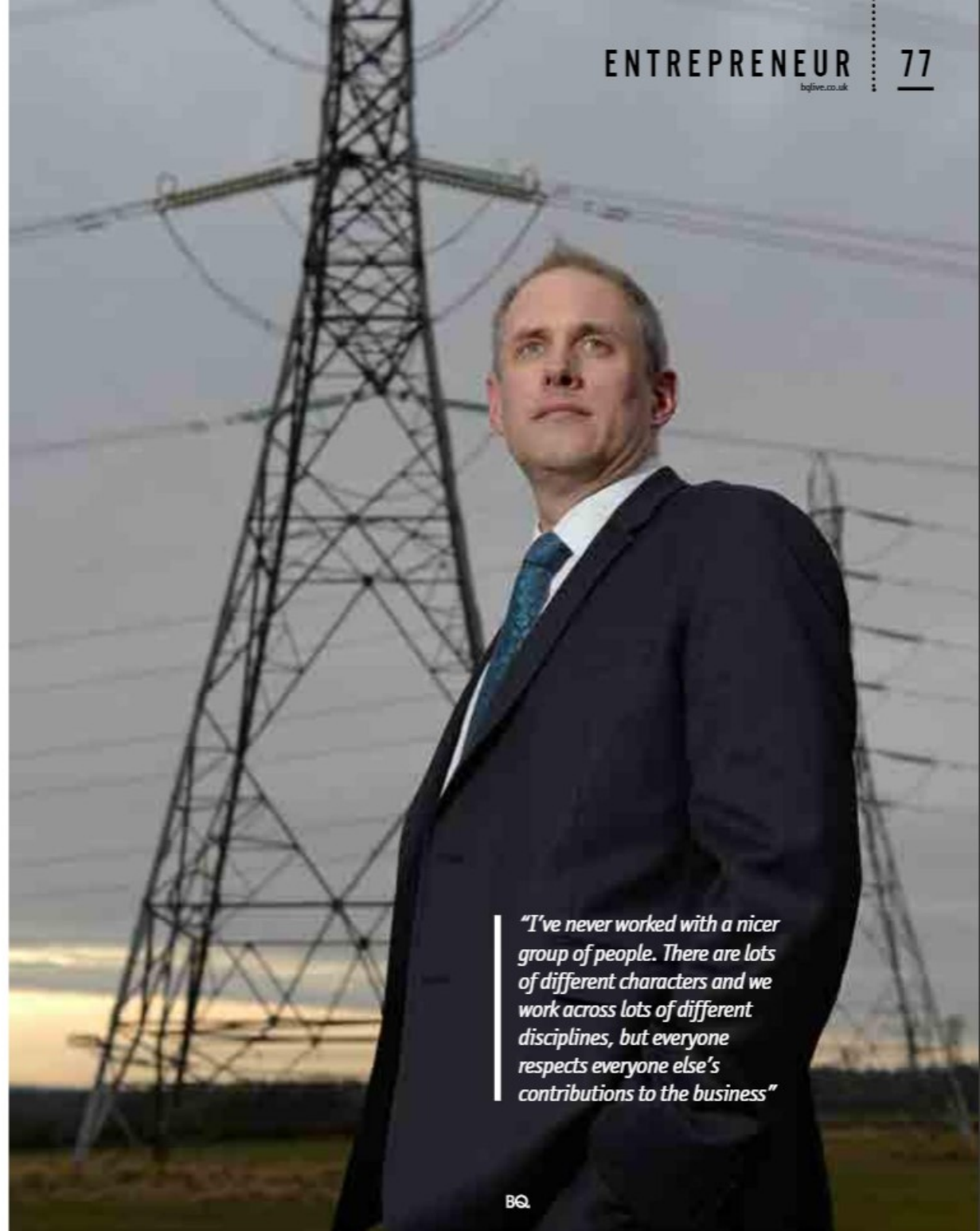
the frontline of the battle to keep the lights on. "But it wasn't a Nism-fest; even with a couple of cold snaps, the system coped and we got through without any problems."

Martin launched his business in 2004 after he spotted a gap in the market and began operating commercially in 2008. In a nutshell, Flexitricity helps the grid to cope with unexpected peaks or dips in demand for or production of electricity.

Using clever technology developed by Martin, the company can ask its clients to reduce their energy consumption at peak times or turn on extra generating capacity to feed electricity into the grid, both of which provide extra 'headroom' when traditional generating capacity – like big power stations – would find it hard to cope alone or would be uneconomical. Asking users with generators to produce electricity or getting them to reduce their demand is cheaper than firing up idle power stations and releases less carbon dioxide into the atmosphere.

"National Grid issued its Nism in November because seven coal-fired power stations had difficulties and weren't available for use," explains Martin. "A lot of power stations shut down over the summer for maintenance and normally come back online during October and November."

"The last time National Grid issued a Nism ►



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was in 2012, when seven gas-fired power stations failed to come on as they were expected to on one really cold Saturday morning – we nicknamed that their ‘duvet day’ in our office. That was because gas prices at the time meant power stations weren’t running at night, which isn’t what they were built to do.

“Our first year in business, 2008-9, really was the winter of the Nisms – there were loads of them. A Nism is just one of the standard tools used by the grid when you’re balancing a real system. A Nism isn’t that close to the edge. But it’s close enough to take action.”

During the recent Nism, Flexitricity supplied a ‘demand-side balancing reserve’ (DSBR), in which big energy users cut back on the amount of electricity they drew from the grid. It’s a relatively small service compared with the ‘short-term operating reserve’ (STOR) that the firm also operates for the grid.

“The security standard that the UK Government has set is for three hours of energy deficit per year,” Martin says. “That means that if the system is balanced in the way it should be then for three hours each year somebody is getting a power cut or a voltage reduction, which is called a ‘brown-out’.

“That standard was introduced by the Coalition Government. The previous security standard was less-formally stated, but National Grid liked to work to a one-in-365 standard, which essentially meant one power cut per year. In fact, National

Grid was running at just one every three years.

“So roughly speaking, we’re already three times better than the standard that’s three times better than the one we’re supposed to be working to. So according to the statistics, the Government should be expecting more power cuts, but in fact we’ve been having fairly few. Politicians obviously can’t promise that the lights will never go out – but we need to have pragmatism.”

Taking that pragmatic view is at the heart of Martin’s training. Born in East Kilbride, he studied electrical and mechanical engineering for his undergraduate degree, before completing his doctorate in offshore engineering, both at the University of Edinburgh. He carried on his research at Edinburgh and its neighbour, Heriot-Watt University, looking at process intensification at big sites like ExxonMobil’s Mossmorran chemicals plant in Fife. Industry then came calling, and Martin became a project engineer with Mitsui Babcock Energy, now Doosan Babcock, where he worked on assignments for nuclear power stations and on improving the efficiency of coal-fired power stations from an average of 36% to more than 50%; quite an achievement when considering a modern gas-fired power station only manages 60%. After working with power generators, he then switched to Scottish Water, one of the country’s largest electricity users, where he worked on energy efficiency and renewable

energy. His pragmatic view of the energy industry is also influenced by his interest in the environment. For a couple of summers during his time at the University of Edinburgh, he worked with Professor Stephen Salter, whose research group pioneered the development of wave power technology.

“That wee research group was really the engine room of Scottish renewable energy generation,” Martin remembers. “It was very influential and had a profound effect during the 1970s and 1980s. I think the modern version of that group at the University of Edinburgh could become just as influential in the future.

“Even though I only worked with him during the summer holidays for a couple of years, Professor Salter was probably the biggest influence on my take on engineering during my time at university. He is the archetypal genius. He has an incredible mind and will apply it to pretty much any problem.

“I think a lot of energy engineers share my enthusiasm for protecting the environment. The way the energy industry is shaped is often due to the policies put in place by governments rather than the actions of engineers on the ground. Sometimes those policymakers are too detached from the reality and experience of those who are working at the coalface and could actually help solve these problems.” While he was working in industry, Martin spotted the opportunity to vary the demand

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from energy users in an intelligent way – so-called ‘demand-side response’ – rather than just simply building more and more power stations. He saw that if a power station was to be made more efficient then it would lose some of its flexibility, whereas on the demand side power users could be more flexible without compromising efficiency. He came up with the idea for the technology used by Flexitricity, which receives data signals from the grid when it needs big customers to cut their power usage or fire-up their generators to send electricity back into the system. Flexitricity is now also offering ‘foot-room’ to the grid, meaning it can ask customers to increase their electricity usage if a lot of power is being generated by wind turbines, solar panels or other renewable energy sources. For example, instead of letting the free fuel from nature go to waste, manufacturers can adjust their production processes to use more electricity when there’s a peak in renewable output on windy, summer’s afternoons. But Martin is quick to point out that giving extra “foot-room” is not about using electricity for the sake of it; instead, it’s about shifting use that would be happening anyway to peak times, or getting sites with their own generators to use renewable electricity from the grid instead of lighting their gas-fired boilers.

On the ‘headroom’ side of the coin, customers like the Royal United Hospital Bath and Rotherham Metropolitan Borough Council can supply standby generating capacity when needed, while other clients can turn down their power requirements when requested, like the Excel exhibition centre in London, cold storage and logistics company Norish, the Thamesway combined heat-and-power plant in Milton Keynes, and Dutch company Rainbow Growers in Kent, which operates a greenhouse complex with enough glass to cover 80 football pitches. “One of the biggest challenges in setting up the company was finding the initial finance we needed,” Martin remembers. “Scottish Enterprise gave us a relatively-small grant to begin with, but it was very important because it

involved very heavy due diligence work.

“Once other investors saw the due diligence that had satisfied Scottish Enterprise, it made it much easier for us. HSBC was very supportive from the start and we still bank with them now. “Archangel, the business angel group, then invested in us and they were very patient investors. The landscape around us changed quite a lot and they were very understanding and listened as we explained what was going on and how we needed to change.

“Having started out with just us in the space, other companies then began to spring up. But that actually helped us to increase our own customer base because there were more people out there talking about demand-side response.” The company now has 30 staff and turns over £2.4 million a year, while it has around 50 customers. Together, they can vary the amount of power they take from or pump into the grid by 300MW.

Harnessing the intellectual power locked away inside Scotland’s universities has also been an important part of Flexitricity’s story. Interface – the public body that runs a match-making service for entrepreneurs looking for academic partners – put the company in touch with Dimitri Mignard and Professor Gareth Harrison at the University of Edinburgh to collaborate on research.

Early on, Martin and his investors realised that Flexitricity would need a large industrial partner if it was going to be able to scale its business. In April 2014, the company was sold to Swiss utility firm Alpiq, which is involved in energy trading and sales as well as power generation. So why did Martin choose to stay on at Flexitricity after the sale instead of sitting back and enjoying the cash from the sale of his shares? “The team,” he replies without hesitation. “I’ve never worked with a nicer group of people. There are lots of different characters and we work across lots of different disciplines, but everyone respects everyone else’s contributions to the business.

“We knew Alpiq was the right partner because

they saw that utility companies needed to come ‘beyond the meter’. In the modern energy market, it’s not enough for utilities to just sit there generating power and counting their money. Those days are over.

“Our approach is to go to a customer and speak to everyone who’s involved in energy, from the financial director who pays the bills to the person wearing the blue collar whose problem it is if a piece of machinery stops working. We didn’t need to explain that to Alpiq – they instinctively understood that demand-side response was about more than just having a spreadsheet with a list of names of customers who could turn down their power usage.”

Much of Martin’s job now involves energy policy. He works with the Association for Decentralised Energy (ADE) – the trade body formerly known as the Combined Heat-and-Power Association (CHPA) – to help influence government policy. “The Department of Energy & Climate Change (DECC) often has many competing priorities,” Martin explains.

“Energy policy doesn’t fit nicely into one election cycle. Politicians are never going to win an election anyway based on their energy policy, so they need to take the politics out of energy policy and concentrate on long-term solutions. “No government has ever taken energy efficiency seriously. That’s a really important step, both for saving money and reducing carbon dioxide emissions.

“It’s hard to believe that we’re thinking of spending so much money on the Hinkley Point C nuclear power station when we’re not asking new gas-fired power stations to start recovering the heat that they will generate. That could be used for district heating systems or for industrial uses.

“But there’s been a gap in energy policy for many years that’s only now beginning to be filled. So we are where we are. It comes back to pragmatism again.”

As the interview ends, Martin is preparing for a trip to Inverness for some hillwalking in the Highlands, heading out to enjoy the environment that Flexitricity is helping to protect. “I’ve spent too much time in business and not enough time in the hills,” he laughs. “I haven’t found my favourite range of hills for walking yet and that’s something I want to do.” ■