the energyst

"There is a £4bn profit opportunity for UK firms that take energy efficiency seriously" p40

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**Gas volume, Cornwall Energy, April 2016

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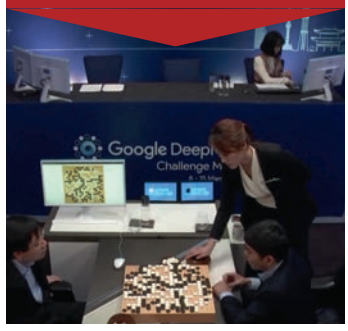

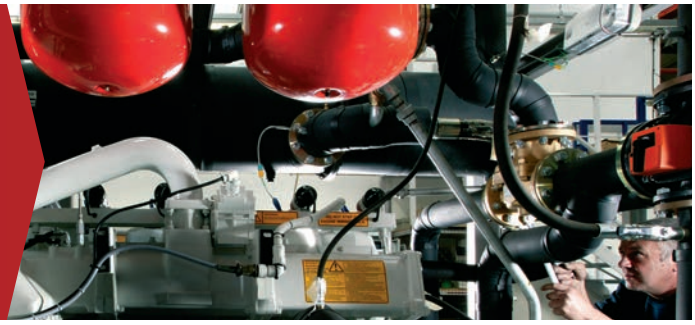

> ***The request for funding should be treated as a process and not an event***

Uncertainty, faster, better

If you'd told me last January that the UK would be heading out of Europe and Donald Trump would be heading into the White House I'd have laughed.

We live in interesting times. Can we predict what will happen in 2017?

From an energy perspective, it looks likely that the capacity market rules will again be tweaked – or a new mechanism introduced – if incentivising large new gas plant is government's intended outcome.

Wholesale energy prices rose in the second half of this year and this winter has seen some serious price spikes. What the market does in 2017 is anyone's guess, but for certain, bills will rise due to increasing non-commodity costs.

> ***State Aid approval for Drax's Contract for Difference subsidy may alleviate increases in the RO, but will simply rob Peter to pay Paul***

Next winter, prepare for a significant bill impact from the cost of the capacity market. Renewables Obligation costs will also increase substantially, as to a lesser degree will the cost of Feed-in Tariffs. After that, State Aid approval for Drax's Contract for Difference subsidy may alleviate increases in the RO, but will simply rob Peter to pay Paul, as the cost will just be classified as a different bill item. For more detailed analysis on non-commodity costs, see p18.

Whether pro or anti Brexit, UK firms are arguably facing the most uncertain year for some time.

Meanwhile, everybody I know professionally is being asked to do more for less, faster.

The good news is that there has never been such a confluence of factors to allow firms to mitigate uncertainty and maximise return from available resource. Money is still cheap, at least for now, and we have literally more data than we know what to do with – much of which can be accessed, analysed and actioned from a mobile phone. While it has been said that a wealth of information creates a poverty of attention, it would be a shame not to make the most of what we already have – an issue which is leading some firms to hire a different breed of energy manager (see p11).

Beyond rising prices, more and more data being pumped into datacentres (which already consume more than 3% of the world's power) and an uncertain political and economic climate it is impossible to say what next year will bring.

So we're hoping you can tell us – and would appreciate the views of directors and managers to form a consensus outlook in our 2017 Directors' Report.

Please take our five minute survey at: http://bit.ly/2hddkRn – or find it on theenergyst.com. In return we will give you a free report – and some more data to play with.

All the very best for 2017.

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the energyst

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UK manufacturers say Esos not working, DSR too complicated and Triad needs reform

Only 13% of UK manufacturers think the government's flagship energy efficiency policy, Esos, is helping to improve the business case for energy efficiency investment. Meanwhile, just 9% are involved in demand-side response. Manufacturing body EEF says this is a huge missed opportunity and has called on government to rethink policy and support.

However, its latest report also says businesses should take the initiative and realise substantial savings by implementing proper energy management.

Doing so, and undertaking low- and no-cost measures identified by energy audits, would reduce electricity bills by an average of 4%, the report found. Additionally, analysis of 70 member sites identified that using capital expenditure to replace equipment such as lighting, drives and motors, building energy management systems and to optimise compressed air and heating and ventilating systems, would deliver significant energy savings with an average payback of 20 months.


Manufacturers are missing a huge opportunity, says EEF

The report points out that in four years' time about £13bn will be added to energy bills to support low carbon generation and the capacity market.

However, says EEF, there is no government support for energy efficiency. It also calls for incentives for smaller companies (SMEs), including tax breaks for energy efficiency investment.

EEF has suggested a 10-point plan, including fully fledged Electricity Demand Reduction programmes, as well as reforms to the Esos scheme, to drive demand reduction and enable UK manufacturing to become more robust in the face of increasing economic uncertainty.

While demand-side response appears to have made significant gains within the capacity market, the report also suggests more work must be undertaken by National Grid to level the playing field for demand-side participants in the balancing markets.

It also calls on National Grid to reform the Triad charging system as part of a broader review of network charging.

Carlton Power misses capacity market deadline and gives up Trafford contract

The developer behind the proposed 1.9GW new gas plant at Trafford in Manchester has given up its capacity market contract as it struggle to secure backers continues.

Carlton Power told the government it was unable to meet a deadline extension for the financial commitment milestone (one of the rules in the capacity market) and was not certain of its ability to deliver its contracted power.

The contract is worth about £30m a year. Carlton Power had been given a three-month extension on its original September deadline by the then energy secretary, Amber Rudd, last July.

That deadline passed on 19 December and the company issued the following statement: "This decision has been taken with regret but we understand that the government needs to have a clear picture of what generation capacity is going to be physically available in the future and we did not have sufficient certainty that our Trafford combined-cycle gas turbine project (1.93GW CCGT) would be completed in the time required.

"Since securing the Capacity Market agreements in December 2014, we have invested significant resources to complete the development of Trafford with our chosen EPC contractor GE and we had reached the stage that we would be ready to start Trafford's construction in January 2017, which would deliver much needed low-cost electricity in early 2020.

> ***The government needs to have a clear picture of what generation capacity is going to be physically available***

"The economics of the Trafford project are expected to provide returns of close to 16% and we have had detailed discussions with a wide range of UK and international investors over the past two years to seek the required capital funding. Investors have consistently commended the Trafford project in terms of construction readiness and technical capability; however, it is clear that they remain very concerned about the uncertainty of merchant revenues for new CCGT projects.

"It has been acknowledged by the government and others that new high-efficiency CCGT plant are essential for the UK market in order to achieve the aims of security of energy supply and low cost of energy with the smallest possible environmental impact. However, it has become increasingly apparent that the current arrangements for supporting the development of new generation capacity do not give sufficient comfort for this to be brought forward without substantial and unacceptable risk to investors.

"Despite this decision, we will continue to pursue our development of Trafford and our power project at Thorpe Marsh (near Doncaster) and we look forward to discussing with BEIS ways in which much-needed overseas investment can be encouraged to participate in this essential regeneration of reliable, low-cost GGCT capacity."

Most read stories of 2016 from theenergyst.com

1. Trading standards and police raid BES Utilities and Commercial Power

2. Is Triad past its peak?

3. National Grid to tender for 200MW of superfast balancing services next month

4. National Grid buys 475MW of demand response to cover next winter

5. SSE urges smart meter rethink as costs spiral and benefits tank

6. National Grid signs 20MW frequency response contract with battery storage operator

7. Dong Energy enters demand-side response with wind power balancing service

8. Environment Agency publishes full list of firms that made Esos deadline – see them here

9. National Grid to tender for two lots of enhanced frequency response

10. 2016: The year P272 will hit your power bill

Most shared stories (via LinkedIn)

1. SSE urges smart meter rethink as costs spiral and benefits tank

2. Trading standards and police raid BES Utilities and Commercial Power

3. Government sets out UK smart grid plan, moots 5GW of DSR by 2020

4. Dong Energy enters demand-side response with wind power balancing service

5. Bergen Energi and Utilities Exchange rolled into mega TPI Kinect

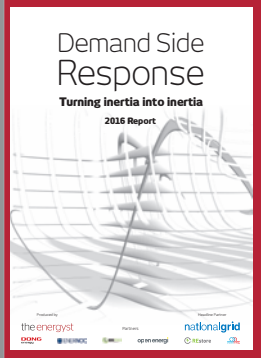
Readers' comments

"My worry is the ending of CRC and transfer of costs from bottom line to supplier invoice will actually reduce the visible case to employ an energy manager. Many companies employed an energy manager because of CRC" **Danny Clark, JLL** *on Esos and the slow death of energy management*

"Energy professionals think the largest sources of heat, transport and electricity in 2030 will be gas, oil and gas respectively. This is in line with many existing scenarios. It implies a [heat] system reliant on gas, which has significant implications for the energy system out to 2050" **Gareth Parkes, Energy Institute**, *on Energy Institute urges retrofits and equipment upgrades to make quickest efficiency gains*

"I wonder how many plcs actually look at their energy spend closely in order to improve their bottom lines. You would think a focused approach would 'maximise shareholder value'" **Duncan Craig, DC Comms**, *on British Gas: £4bn energy efficiency opportunity for UK firms*

"Shortage of money is evidently not, however, a barrier to energy waste" **Vilnis Vesma, vesma.com**, *on UK firms say finance remains key barrier to energy efficiency*



The most downloaded report of 2016 was the DSR report

Bergen Energi and Utilities Exchange rolled into mega TPI Kinect

US fuel giant World Fuel Supplies has brought together energy management and procurement firms Bergen Energi and The Utilities Exchange under a new global brand called Kinect Energy.

The firm acquired Bergen last year and fellow third party intermediary The Utilities Exchange in July. US consultancies US Energy, KTM and Beachfront Energy have also been rolled into the Kinect brand.

Announcing the move, Kinect touted access to a worldwide energy network, as well as comprehensive procurement and risk management services to reduce energy spend and increase predictability as core customer propositions. It also promoted end-to-end sustainability services to meet carbon footprint goals.

Michael Crosby, EVP of the Global Land segment at World Fuel Services Corporation, said: "Kinect Energy Group reflects our commitment to sustainable energy solutions.

"We are proud to provide energy management expertise to diverse organisations and assist in managing complex energy challenges on a local and global scale."

Todd Overgard, SVP of Kinect Energy Group, added: "We are committed to solving energy challenges. Kinect Energy Group allows us to deliver on our customers' energy vision for their operations."

Drax mounts £340m takeover of business energy supplier Opus Energy

Drax is set to acquire business energy supplier Opus Energy for £340m.

Drax said Opus, which last year generated sales of £323m to small and medium businesses, as well sales of £214m to corporates, would complement its existing supply business, Haven Power.

Opus chief executive Charlie Crossley Cooke, chairman Fred Esiri and managing director Louise Boland will leave the business following the takeover, which was subject to Drax receiving EU state aid clearance for the Contract for Difference it was handed by the UK government. That deal was waved through in December.

Haven Power CEO Jonathan Kini will now have overall responsibility for Drax's two retail businesses.

The acquisition will be of interest to third party intermediaries. Opus currently deals with about 160 TPIs, largely for its SME sales operations.

Opus Energy is the UK's largest non-domestic energy supplier outside of the Big Six, with a non-domestic market share of 8% (by meter count) as at 30 April 2016.

Kini: will have responsibility for Drax's two retail businesses

Opus Energy is the UK's sixth largest non-domestic electricity supplier (by meters) and the eighth largest gas supplier (by meters).

For the financial year ended 31 March 2016, Opus Energy had a turnover of £573m, achieving year-on-year growth of 9%. Its average annual turnover growth rate over the past two years is c.15%.

Gross profit for the year ended 31 March 2016 was also up 10% from the previous financial year to £107m and gross assets totalled £16m.

Bristol Energy seeks to reassure customers after 'irresponsible' GB Energy goes bust

Bristol Energy has sought to reassure customers that it has hedged its position going into winter following the demise of GB Energy.

The municipal energy company also warned that small energy suppliers will have to hike prices in order to stay afloat in the face of rising wholesale markets – and called on regulator Ofgem to ensure new players have adequate resource to last the distance.

"We want to reassure our customers, and anybody looking to switch to us, that you will be safe with us this winter," said the company.

Backed by the local council, Bristol Energy has a solid credit rating and significant financial resource, enabling it to hedge its position. While regulator Ofgem has been keen to foster competition, and has sought to taper social and environmental responsibilities for new market entrants, few small suppliers enjoy that degree of solvency.

> ***We call on Ofgem to demand more rigorous suitability criteria for new suppliers***

Wholesale energy prices have been depressed for the past few years, allowing small suppliers to compete by trading on the short-term markets, which have lesser capital requirements.

However, prices have risen in the second half of this year. That development could cause terminal problems for insufficiently capitalised suppliers that have failed to manage exposure to price fluctuations – and which have priced fixed one-year deals very cheaply in order to win customers.

Bristol Energy said it is "very different" to GB Energy.

"Despite being smaller, we have been able to forward buy energy for our customers, meaning we have all the energy we need for this winter and beyond," said the firm.

Suppliers that do not have the means to hedge their position were "gambling", said Bristol Energy, and will be forced to hike prices for new customers, or risk going out of business.

"This is not responsible practice – and those who will now be suffering are GB Energy's customers, the industry and their own colleagues, who will lose their jobs," the company said.

"We call on Ofgem to demand more rigorous suitability criteria for new suppliers as part of the market entry process, to include how the new supplier plans to buy their customers' energy, how they plan to look after their energy needs, and to evidence the knowledge and experience their senior team have in the energy industry."

Bristol Energy is one of a number of new-breed municipal energy companies. Nottingham City Council launched late last year, and the company which holds its supply licence, Robin Hood Energy, is set to launch Liverpool City Council's energy company, 'the Leccy', next March.

Elsewhere, the Greater London Authority has been ploughing on with its 'licence lite' model for the past five years. The idea is to supply cheap energy to TfL. However, the venture appears to be facing severe delays.

UK energy consumption rose 1.7% in 2015, BEIS data shows

Final energy consumption across the UK in 2015 rose by 1.7% compared with 2014, according to latest government figures. However, industry consumption fell to its lowest level since 1970.

Final energy consumption has largely trended down in the past 40 years. However, lower mean temperatures during 2015 lay behind the anomaly, government data suggests. On a weather corrected basis, consumption increased but only slightly (0.1%), largely driven by transport.

In the non-domestic sector, final consumption by industrial users fell by 124 kilotonne of oil equivalent (ktoe) or 0.5% between 2014 and 2015 to 23,594 ktoe, the lowest level since 1970, with the industrial sector accounting for 17% of overall UK consumption. Energy intensity fell by 1.5% year on year.

Across the industry sector as a whole, energy intensity (energy consumed per unit of output) has decreased by 38% between 1990 and 2015. However, falls in output also cut consumption.

In the services sector, final energy consumption rose by 1.8% between 2014 and 2015 to 19,403 ktoe. The sector accounted for 14% of total final consumption in 2015, with the commercial sector responsible for two thirds of that total.

Despite the year-on-year rise, consumption by the services sector peaked in 2001 and has since fallen by 13%, according to BEIS figures.

Solar tax hike outcry

A group of UK retailers, academics, politicians and renewable companies have urged government to take swift action to avoid hobbling the solar PV industry with a potentially huge hike in business rates on commercial rooftop solar installations.

The change, which may come into effect in April, is due to a periodic re-evaluation of business rates, where the Valuation Office Agency looks at how assets are valued, the income they generate and how costs have evolved over that period.

The Solar Trade Association has been lobbying hard against the hike. In December it published an open letter to the Treasury, signed by dozens of members and other concerned organisations, urging a rethink.

"Businesses, schools and others with solar face a sharp six-eight-fold tax hike from next April," wrote the STA. "If this proceeds it will also restrict future investment in solar rooftops all over the UK. New ministers have described climate change as 'one of the biggest – if not the biggest – threats to our national and global security'. We agree. It would be extraordinary if the government penalised businesses and communities for taking positive action. We urge you to stop the solar tax hike."

Reduced surface tension improves system efficiency

It is well-established that imperfections in a heat exchange surface can have a negative impact on heat transfer. Tony Willis of Sabien Technology explains how a CIBSE award-winning additive to reduce the surface tension of the heating fluid can improve performance.

The efficiency of heat transfer from a heating fluid in radiators, air handling units and heat exchangers is influenced significantly by the condition of the heat exchange surfaces. Anything that reduces the contact between the heating fluid and the inner surface of the heat exchanger will inevitably reduce the rate of heat transfer.

This is a well-recognised phenomenon and common procedures to mitigate it include power-flushing to remove sludge and scale and the addition of inhibitors to prevent further scale formation.

However, even in the cleanest, scale-free wet heating system there will be microscopic crevices and imperfections on the internal heat exchange surfaces. These effectively create gaps between the heating fluid and the heat exchange surface – gaps that the heating fluid is normally unable to enter because of its natural water surface tension.

Now, a heating system additive called EndoTherm (recently the recipient of CIBSE's 2016 Energy Efficiency Award) reduces the surface tension within the fluid, enabling it to fill these 'micro-gaps' and make closer contact with the heat exchange surface. Qualifying organisations can take part in a free pilot programme to evaluate the effectiveness of Endotherm (see below).

EndoTherm is an organic-based inert system additive that is fully compatible with existing heating inhibitors and heating system water treatment. Typical dosage to the system would be 1% of the total system volume, and will not require further dosing for five years under normal system conditions.

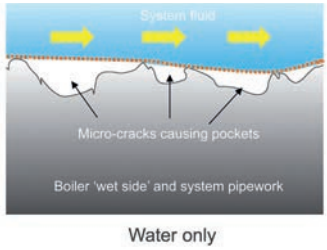
Independent 'in field' verification on more than 50 projects has demonstrated energy savings of between 10% and 25% and paybacks typically within two years. These projects involved many different building types, ranging from schools and leisure centres to offices and care homes.

System efficiency

As a result of the improved heat transfer, set-point temperatures within the heated spaces can be achieved more quickly so that plant usage and fuel consumption are reduced. In addition, the increased heat transfer can result in lower return water temperatures (delta T) to the plant room to support improved condensing by condensing boilers. Low return water temperatures may also help to improve the efficiency of low carbon heat sources such as heat pumps and CHP.

Sabien Technology is the exclusive UK distributor of EndoTherm for commercial multi-site applications and is offering a **free pilot programme** of EndoTherm this heating season to assist organisations trial and identify potential energy savings from installing the fluid in their estate. A dual pilot programme with both Endotherm and Sabien's M2G boiler load optimisation controls is also available.

Visit our website: sabien-tech.co.uk/endotherm/



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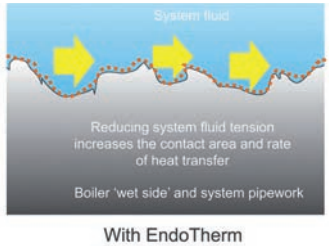


With EndoTherm

Nissan and Eaton to roll out commercial scale battery storage units in 2017

Automaker Nissan has outlined plans to upscale its battery storage unit from household to commercial scale.

Alongside electrical partner Eaton, the firm also announced a 10-year deal to provide a 4MW battery storage unit to the Amsterdam Arena, home to football club Ajax.

The stadium unit will utilise some 280 used batteries from Nissan's electric Leaf vehicles to provide back-up power, store its solar and wind generation and enable the arena to earn revenues from grid balancing services provision.

With the memorandum of understanding inked, the contract for the project is to be signed in February with installation set to commence in mid 2017. The project will cost €2.5m (£2.1m) and take 10 years to pay back, according to Nissan. However, that rate of return is dependent upon the value of peak shaving and grid service provision – if peak prices rise, the payback period will be shorter.

Announcing the Amsterdam deal, Paul Wilcox, chairman of Nissan Europe, also confirmed that Nissan is now taking UK pre-orders for an expanded, six-strong domestic range of storage devices. Priced from €3.5k (£2.95m) to €6k (£5m), units of various size will be available using both 'second life' vehicle batteries and new units. However, that price does not include installation, which Eaton will handle.

Nissan will provide the Amsterdam Arena with a 4MW battery storage unit

Frank Campbell, president, corporate and electrical sector, Eaton EMEA, said domestic installation costs would range from about €500 (£421) to €1,500 (£1,260), depending on the complexity of works required.

> ***Battery storage will change the way we deal with energy companies, enabling peer-to-peer energy trading and, potentially, community scale aggregation models***

Orders placed today would be installed by mid-2017, the company said, with a similar timetable predicted for commercial-scale battery storage units, according to Campbell.

Nissan has previously stated that it aims to sell 100,000 domestic battery units by 2020. Neither firm would commit on further volume targets in the near-term, but Eaton's Campbell believes that battery storage – for both commercial and residential markets – is approaching a "tipping point". Payback periods, he believes, will come down rapidly over the next five years, potentially more quickly in the UK, given energy price volatility.

Nissan's Wilcox said battery storage will be "transformative", enabling customers to avoid peak power prices and to store power from onsite generation. Battery storage "will change the way we deal with energy companies", he suggested, enabling peer-to-peer energy trading and, potentially, community scale aggregation models.

Engie CEO: 'The revolution will not be centralised'

Engie UK and Ireland CEO Wilfrid Petrie has called for further devolution of policy to regions and cities in order to serve an increasingly decentralised energy system.

Speaking at the ADE's heat conference in London, Petrie added that the future for large utilities was in services, not generation. Half of the firm's revenues, he said, now came from services.

"There is more value to us today in reducing the amount of commodity customers use – and that is clearly where we position ourselves," said Petrie.

Market economics have forced the firm to take that approach. Engie, said Petrie, has written off €15bn (£12.6bn) of central generation assets, with the broader utilities industry dumping more than €100bn (£84bn), some splitting off business units, others attempting to reinvent themselves. Petrie described it as "a landslide, a dramatic change for most energy companies".

However, he pointed out that Engie's revenues remained steady. "€15bn [our write downs] may have surprised some people," said Petrie. "The good news is that we are the same organisation with the same net result. We just have to adapt and change."

To enable that transition, said Petrie, "policy must allow these adjustment locally".

Acknowledging that it was "a bit late for the Autumn Statement", Petrie said his "biggest wish" was for "energy and energy efficiency policy to be developed locally".

He also called for business rates that are "fair for heat networks compared to other utilities" over regulation of the heat network market. "We do not have an opinion" on whether heat networks should be a regulated industry, said Petrie. "Good regulation may provide clarification [for investors], but [more importantly], I would like a fair footing with other utilities."

BT energy chief: Data scientists are the future of energy management

BT is looking to hire data scientists in a bid to unlock greater energy efficiency throughout its operations.

Scott Balloch, BT's head of energy and environment, told delegates at XEnergy in London that the firm had already saved more than £200m a year through energy efficiency investment. Now it seeks further gains and Balloch believes a new breed of energy manager will be required to deliver them.

While there is "still a role" for mechanical engineers and traditional disciplines, Balloch said he sought an "evolution in the types of skill-set that we need from energy managers". That is, a "much more data-centric approach".

Hiring data scientists and training them in the fundamentals of energy management, he said, may pay greater dividend than vice versa, "because they have the ability to think about things in a different way and identify sources of efficiency that may not be obvious".

BT is looking for a new breed of energy manager

While attracting such skills is a "critical issue" for energy management, equally important is convincing boards to view energy as a strategic issue, according to Balloch. "I don't think enough firms do that," he said. But doing so can unlock significant savings in both the short- and long-term.

"We have taken about £220m of annualised cost out of the business as a result of energy efficiency and the opportunity is there for lots of other firms to do the same," said Balloch. "All [our energy efficiency] investments had a two year payback or better."

BT, said Balloch, consumed about 1% of the UK's total electricity, "so we have to pay close attention to it". He added that rising non-commodity costs rather than wholesale prices "keep me awake at night".

While sustainability benefits as a result of energy efficiency improvements are welcome, Balloch said he "did not get into this to save the planet. Energy is a key commercial risk for businesses."

Gazprom launches 'more transparent' platform for gas

Gazprom Energy has launched a gas buying tool for third party intermediaries (TPIs) and major energy users.

The Energy Risk VuePoint service aims to streamline the procurement process between Gazprom Energy and customers with flexible purchasing contracts, plus any TPI that manages the customer relationship.

It provides 24/7 access to live position data, bespoke reports, price triggers and 'what if' calculators plus the ability to transact gas online.

Gazprom Energy procurement manager Rebecca Sanderson said the service streamlines and automates the procurement process and enables customers to "make informed decisions faster, cut costs, reduce risk and increase productivity".

A "more transparent and cost-effective" service means more customers can look at flexible purchasing, Sanderson continued, suggesting TPIs could also increase market share via the platform.

National Grid calls for ideas on future of UK gas

National Grid has launched a major consultation exercise on the future of gas in the UK energy system. The system operator thinks gas has a major role to play out to 2050 and beyond, despite carbon targets requiring an 80% reduction in CO_2 emissions.

National Grid wants views from industry on how that might play out in order to provide government with 'no regrets options' so that policy and investment decisions, which will have a bearing on technology and fuel mix, can be made in time to hit those targets. Launching its 'Future of Gas' initiative, National Grid asks:

- How should the gas market develop?
- What gas assets will the UK need in the future?
- How does the UK manage the changing requirements of assets, commercial frameworks and arrangements to ensure that the NTS and the gas market frameworks are fit for future options?
- What commercial arrangements does the UK need to consider that encourage the right long term investment from industry parties?
- What services do customers want from the NTS and are willing to pay for?
- What might need to be considered around decommissioning parts of the network?
- What role does National Grid play in providing solutions?
- What role does gas transmission play in the future?

While National Grid sees a long-term future for gas in the transmission system, the firm is currently in the process of selling its gas distribution assets. Meanwhile, Ofgem senior partner for improving regulation Martin Crouch, told the ADE's November heat conference that gas distribution network owners should scale up hydrogen trials – or start to think about building decommissioning funds.

Energyst readers run the rule on

The Energyst asked readers for their views on energy efficiency. From Esos to engagement to finance, here is what you told us

Esos, the government's flagship policy aimed at improving the energy efficiency of larger UK firms, has been much maligned.

One of the charges levelled at the scheme is that audits – and auditors – varied in quality. Another is that, without requiring organisations to act upon their energy audits, there is little impetus to drive energy efficiency. Meanwhile, organisations that already view energy as a strategic priority suggested it was an administrative burden that they could do without.

However, readers surveyed by *The Energyst* in September and October were largely positive about the outcome of their audits.

Of 132 readers polled for their views on energy efficiency, exactly half (66) undertook an energy audit as part of Esos while a further 15 respondents complied via ISO50001.

Here are some of the key findings of the survey, sponsored by E.ON:

1. Was Esos a useful exercise?
Some 69% of those that undertook an Esos audit said it was a useful exercise, a reasonable score for legislation that has received its fair share of criticism.

While three in 10 said the audit was not useful, some 56% of those respondents said they had taken subsequent action.

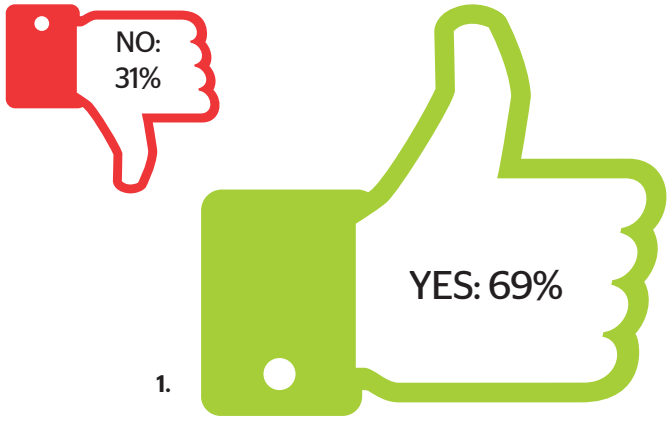
2. Was your audit thorough, did it provide an array of options?
While there has been some criticism of the nuances of Esos – and the Environment Agency's own analysis of 51 audits found only 35% passed without the need for remedial action – the vast majority (86%) of respondents believe their audit was thorough.

Some 62% said their audit suggested many energy efficiency improvements that could be implemented. Only 14% felt that their audit was effectively a tick box exercise.

3. Has board level engagement towards energy efficiency increased as a result?
Despite Esos having to be signed off at board level, 55% of respondents thought that there had been no change in the board's interest in energy efficiency. Asked why, many respondents said their board was already onside in actively managing energy costs. However, a similar number suggested energy plays second fiddle to core business investments.

An improvement in board level engagement at almost half of all organisations surveyed indicates a degree of success for the policy.

The survey forms part of a report on barriers to energy efficiency sponsored by E.ON. It is now available as a free download. For the full findings, please visit theenergyst.com



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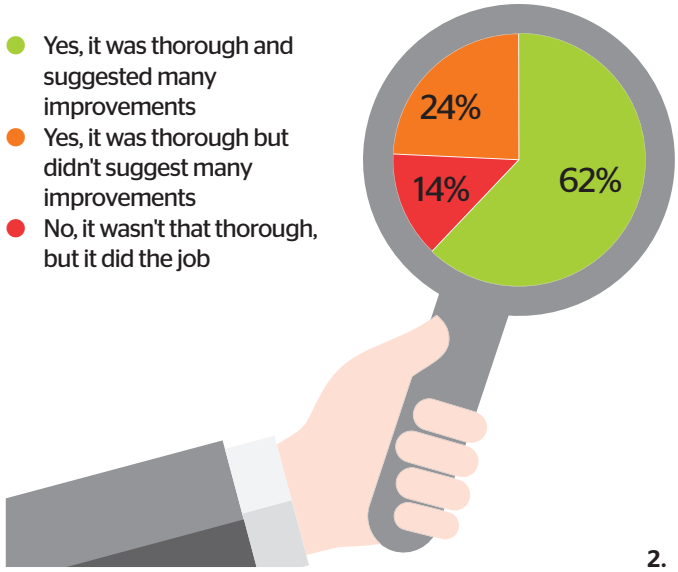

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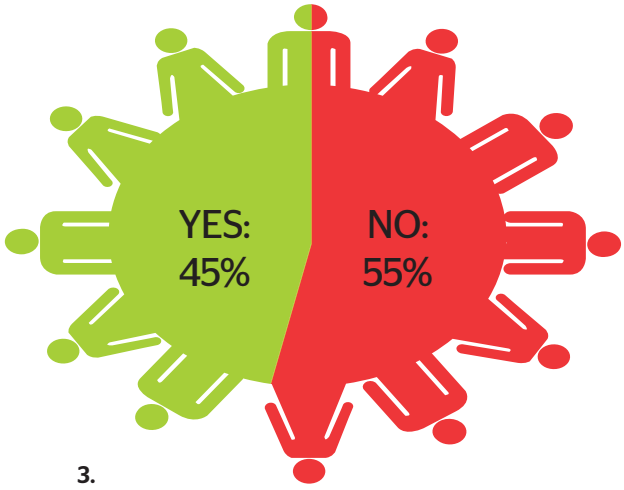

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Esos, efficiency and investment

Views from SMEs and the public sector
The survey also asked smaller firms not captured by Esos, as well as the pubic sector, for their views on energy efficiency.

Most (55%) were from small companies with fewer than 50 employees, while 31% were from the public sector, to whom Esos did not apply. Some of the key findings were as follows:

4. Have you conducted an energy audit within the past two years?
Despite not having to conduct an energy audit, two thirds have recently done so and around half subsequently took action.

Of 16 responses that specified actions taken, 10 included LED lighting.

5. Which technologies have you implemented?
LED lighting is now relatively mature and well understood. It is also possible to deliver short payback periods from lighting investments, particularly if procurement and maintenance are aligned.

A fifth of respondents have implemented BEMS, which, if correctly implemented and managed, can deliver significant energy savings.

HVAC upgrades tend to require greater investment and as a result, longer payback periods.

6. What are the barriers for your business in investing in energy efficiency?
At the SME level, finance is the biggest barrier with more than half citing this.

Filtering answers by public sector suggests finance is an even greater barrier, cited by 73%.

To a lesser degree, verification of savings, board level engagement and information on suitable technologies were all cited as barriers. Some 18% said there were no barriers at all. te

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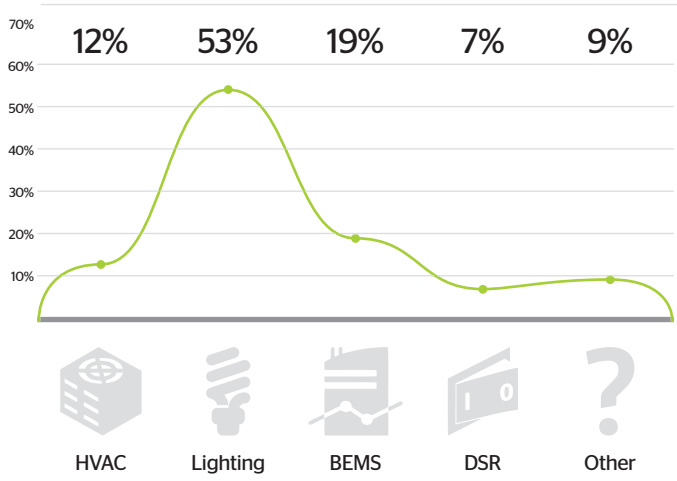

Opportunity knocks when you take the right partner

E.ON strategic account manager John Walsh caught up with Tim McManan-Smith to discuss how the big opportunities in energy efficiency can be realised by working with the right partners

During the past few years E.ON has been developing its energy management capabilities in an aim to become a fully integrated utility company rather than just a suppler. While engaging more in energy solutions it has partnered with *The Energyst* to survey attitudes to energy efficiency, how regulation affects them and particularly what Esos has achieved a year down the line.

"It surprised me that 71% of respondents have taken up opportunities identified by Esos, in that it was so high. In my experience the industry average would be a lot lower than that so it speak volumes about the type of people who filled out the survey," says Walsh.

E.ON acquired Matrix Control Solutions three years ago as a way to widen its presence and capabilities within energy solutions. Alongside technical skill in optimising building controls, This has flourished into E.ON's 24/7 technology enabled energy management approach, at present 30,000 sites are monitored from the Glasgow control room.

"We are able to offer a breadth of solutions that are so much more than putting in LEDs," comments Walsh. Although 71% have done something post Esos, the majority were making smaller low-cost or no-cost efforts and while that makes sense there are often bigger

savings that can be packaged alongside these to give a reasonable payback with larger long-term savings.

"A significant chunk of customers have strict criteria on payback. The counterbalance is to try and blend solutions; a solar PV solution may have a payback of in excess of five years while a variable speed drive project may only be 1.5 years – a combined energy efficiency scheme may offer a three to five years payback and meet the customer's criteria. By thinking like this we are trying to do the right thing and help our customers find the best, most energy efficient solution for them."

Does regulation work?

Walsh says Esos was important because it broke us into the audit environment in customer minds. "This gives them a greater understanding of what's possible. We are technology and solution agnostic, so it's about working

> ***We are able to offer a breadth of solutions that are so much more than putting in LEDs***
>
> **John Walsh**

the best result. Through this we are able to offer value to clients in this area.

"Esos has been wholly positive in that it got our customers engaged in energy efficiency. Now we just have to pick up the baton and take it to the finish, to make it easy for them to implement changes. There are incentives for energy efficiency that help such as Enhanced Capital Allowances that can make significant impacts on projects. For example we have used ECAs to bring an LED lighting project's payback from 3.8 years to 2.2.

The Issue of trust

"As the survey highlights, trust has been a problem regarding getting energy efficiency advice from suppliers and that is one of the reasons why we partnered with the Carbon Trust for Esos," says Walsh. "This enabled the use of their experienced auditors and following that we were able to take the results off the page and put them into action.

"We want to transition the relationship with the client from being their preferred energy supplier to become their preferred energy partner, offering a wider remit, including solutions to make energy savings. In this way we will become a fully integrated utility company and own and run energy assets on behalf of the customer."

Conclusion

Walsh adds: "We want to share knowledge and advice with customers and engage them in energy efficiency. When it comes to the procurement of energy as a commodity, procurement customers are already mostly very savvy. At the moment there is a much greater opportunity to influence the bottom line with energy efficiency. Our challenge is to change the customer's mindset, to educate them about the savings that can be achieved.

"It is about customers challenging themselves to make their businesses as energy efficient as possible. There could be a tendency to do the minimum, but if they engage with the right partner they can ensure they achieve their energy efficiency goals.

"Moreover in today's competitive environment it is crucial that customers are as lean as can be and with the right energy partners they can achieve that."

eonenergy.com

Smart meter rethink urged as costs spiral and benefits tank

SSE says delays to critical parts of smart meter infrastructure have hurt UK-wide rollout. The government's own assessment confirms this. Is BEIS planning to soften the requirements? Brendan Coyne reports

SSE has urged the government to reconsider the 2020 deadline for completion of the UK-wide smart meter rollout or risk further costs being piled on to consumers.

While government is sticking to its estimates, the rollout may well cost considerably more than the £11bn forecast two years ago year by the National Audit Office. The NAO suggested that programme benefits, while outweighing the cost, were unlikely to significantly reduce energy bills.

The government's own figures confirm that view, with projected benefits delivered by the programme already £415m down from 2014 estimates. Latest BEIS figures suggest annual bill savings for dual fuel households of £11 by 2020. The department says 'average' annual non-domestic savings for electricity and gas will be about £128.

MPs on the now defunct Energy & Climate Change Committee were more critical than the NAO, cataloguing a host of major problems with the rollout and warning that the project would become "a costly failure" if government did not take a more active role.

Since the committee's report, key elements of the programme, such as the central communications infrastructure provided by the Data Communications Company (DCC), have drifted further off course (to the tune of £378m in lost programme benefits, according to BEIS, with the knock-on effect wiping out £1.5bn in benefits). SSE, as it warned the committee last year, believes that makes the 2020 deadline unattainable.

"Combined with a range of other outstanding constraints, [the DCC delay] is undermining confidence in the programme and compressing the window in which suppliers can roll out the enduring solution at scale, driving up costs and creating challenges for the industry," said the firm in its November half year results statement.

"It is therefore SSE's view that a reconsideration of the delivery timetable is urgently required in order to protect customers and ensure benefits are delivered."

Government should honour "the commitment to the offer of a smart meter to all by 2020" but not insist upon suppliers "taking all reasonable steps" to install a meter in every one of the UK's 30 million households and business, the firm suggested.

SSE has 8.14 million energy customers and must install more then seven million smart meters. So far, it has installed 330,000, up from 100,000 in September 2015. That suggests SSE will need to increase the rate of installation by an order of magnitude to hit the 2020 deadline. Other energy suppliers are in a broadly similar position, which suggests that the call for pragmatism may eventually become a moot point.

BEIS secretary of state Greg Clark appears to have taken SSE's concerns on board. His speech at the EnergyUK conference in November confirms the 2020 deadline is for 'the offer' of a smart meter, which may potentially indicate a softening of the requirements on suppliers to take "all reasonable steps" to install meters by 2020. te

TABLE 1: OVERVIEW OF CHARGES TO ANALYSIS SINCE 2014 IMPACT ASSESSMENT (IA)

Section	NPV (£m)	NPV change (£m)	PV cost change (£m)	PV benefit change (£m)
Starting point (2014 IA)	6,214	n/a	n/a	n/a
Methodologic updates	6,810	595	1,151	1,746
Changes to exogenus assumptions	6,291	-519	-100	-619
Cost update for the DCC, its service providers, and other mandated organisations (excluding Smart Energy GB)	5,913	-378	378	0
Cost update for Smart Energy GB	5,818	-95	95	0
Updated rollout profiles and timing assumptions	4,805	-1,013	-534	-1,546
Updated installation and equipment cost assumptions	5,846	1,041	-1,019	22
DCC adaptor service costs for smaller suppliers	5,708	-138	138	0
Updated assumptions about Home Area Network solutions and costs	5,523	-185	186	1
Update of advanced meter volume and cost assumptions	5,483	-40	64	25
Revision of Nbetwork-related benefits	5,338	-145	0	-145
Updated assumptions about IHD costs	5,646	308	-308	0
Time-of-use assumption charges	5,749	103	0	103
SMIP Programme spend update	5,746	-4	4	0
2016 Cost Benefit Analysis vs 2014 IA		**-469**	**54**	**-415**

Source: BEIS

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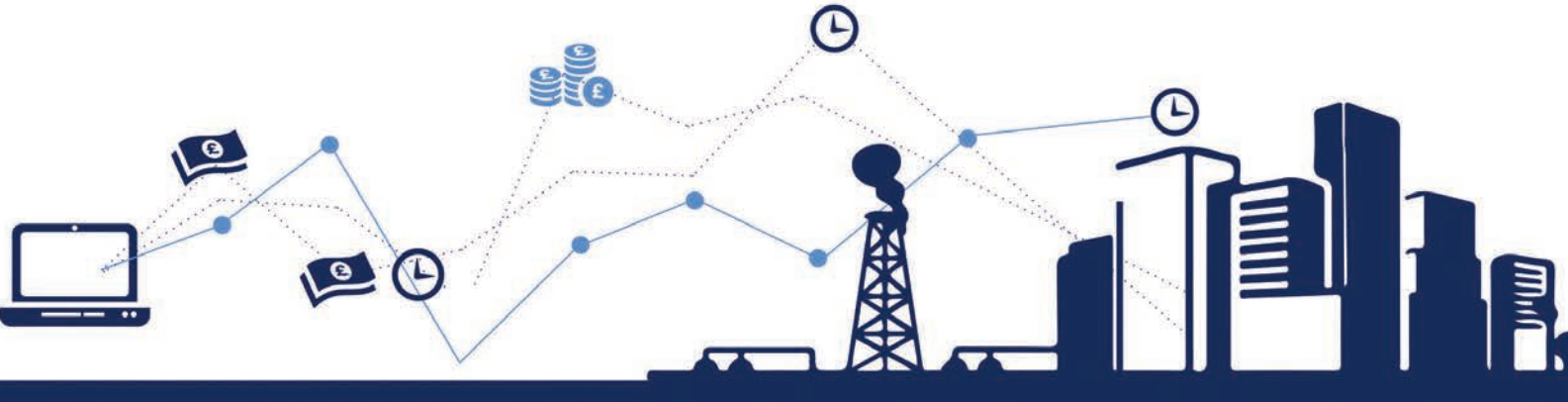

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Firms ill prepared for 'huge' capacity costs on energy bills

Rising non-commodity cost elements of power bills will start to hit home next year, warns SmartestEnergy. Brendan Coyne reports

UK firms appear ill-prepared for the impact of capacity market costs on power bills, which could increase almost a hundred times next year.

According to calculations by SmartestEnergy, a typical large energy user could take a £1m hit next year due to the government policy.

The capacity charge is levied upon energy use on winter weekdays (November to February) between 4pm and 7pm. Businesses consuming power during those times will face a steep increases in charges as a result, warned SmartestEnergy.

The firm outlined the kind of hike users may face in a recent webinar. For example, a large energy user consuming 100GWh per year may use 5%, or 5GWh during that winter evening peak, suggested Mark Cox, key account manager at the business energy supplier.

"This winter [given the small volume of DSR-based capacity involved in the mechanism], that would equate to a capacity market bill of about £12,000," he said. "Next winter, 2017-18, that £12,000 will become almost £1m."

Cox said the firm was trying to highlight the impact the capacity market would have on bills to customers and intended to levy a fixed monthly contribution throughout the year to avoid bill shock in April when actual capacity costs are calculated.

Despite those efforts, Cox said many firms could be caught cold. "Personally I am not too sure all businesses are ready for the scale of these costs coming through on their bills. Especially if you are a large energy user, this is a huge cost, which is coming through soon," he warned. "You must be making contingency in your budgets."

> ***Even a £3 charge, which we expect to see come through next year, is about an extra £30,000 for every 10GWh of power***

A poll by the firm suggests Cox's fears are well founded. Just 30% of respondents said they had accounted for the cost of the capacity market in next year's budget.

Rising Fits, CFD and RO

Meanwhile, the firm warned of rises for most other non-commodity costs.

Including the cost of exempting the most energy intensive industries from rising renewables costs, SmartestEnergy predicts Renewables Obligation costs will increase around 20% to £19.63/MWh for 2017-18, which would add £30,000 to an annual 10GWh power bill, the firm calculates.

SmartestEnergy predicts small-scale FiT costs will increase by about 14% in 2017-18, and a further 8% in 2018-19.

"Both [of those estimates] are up on our previous projections as we continue to hit deployment caps each quarter despite all the subsidy cuts," said Cox. "They don't seen to have dampened small scale solar investment as much as perhaps we thought they might."

Large-scale subsidies via the CFD FiT will also hit bills next year and harder the year after, from £0.76/MWh today to £3.78MWh next year, £6.01MWh in 2018-19 and £9.10MWh in 2019-20, according to SmartestEnergy.

"On current projections, the FiT CFD cost is really going to come through after this year – be ready for it is our message," said Cox.

"Even a £3 charge, which we expect to see come through next year, is about an extra £30,000 for every 10GWh of power – and by 2018/19 every 10GWh will be costing almost £60k in CFD payments alone," he added.

"So if you submit longer-term budgets, do account for the CFD charge. It isn't significant yet, but it is going to be soon."

> **30%**
> **of respondents said they had accounted for the cost of the capacity market in next year's budget**

Triad warning

The firm also warned I&C businesses to consider the impact of other market levers on the Triad mechanism.

While companies have become used to turning down for what they think will be the highest half hourly winter evening peak, Cox said the effect of the capacity market occurring simultaneously may mean the Triad period potentially "stretches beyond the traditional 5pm-6pm peak".

"It is going to be interesting," said Cox. "What we are saying is not to try and target any one half hour [to hit Triad], but try and keep that [reduction period] as wide as you possibly can." te

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The latest auction, for capacity to be delivered in 2020, looked largely like the previous one

Where does Capacity Market reform go next?

The Association for Decentralised Energy's head of policy Jonathan Graham discusses how the capacity market has been reformed and the collateral damage that may have been brought about by this

The Capacity Market auction results announced in December were the culmination of more than 12 months of effort by the government to reduce the role of diesel and increase the competitiveness of gas CCGT power stations.

Following a series of alarming press reports in autumn 2015, the government came up with a plan. Unable to change the scheme itself because it did not want to re-request State Aid approval, the government set a three-pronged attack to harm diesel generators, including blocking venture capital financing for Capacity Market participants; strengthening the air quality requirements for diesel generators; and increasing network costs for distributed generators. Added to this, the government significantly increased the amount of capacity it would procure, increasing the clearing price.

The problem with this three-pronged approach against diesel generation was that instead of hitting just the target, there was substantial risk of collateral damage to the wider decentralised energy sector, including demand response, backup generation, combined heat and power, and renewables.

So now that we are one year and two Capacity Market auctions later, how well has the government's three-pronged approach fared?

EIS and VCT

Limiting to the use of EIS and VCT by Capacity Market participants was likely inevitable, as HM Treasury had previously implemented similar rules for renewable subsidy recipients.

The final policy will see the government protect existing investments, and the new rules will target when the financing schemes are used to build generation assets, not when innovative smart energy companies use the schemes for their initial investments which had no relation to the Capacity Market. This approach is largely fair, although it is not fair that start ups using these financing schemes to start new businesses, which may happen to include a CHP energy centre as part of their business plan, are captured.

Air quality standards

While there has been industry worry that back-up generation could be unfairly targeted in new air quality rules, Defra's consultation sets in place a reasonable air quality standard for new plant, which has already been agreed at the European level through the Medium Combustion Plant Directive.

For genuine back-up generation, Defra proposes they run for up to 50 hours a year without a permit requirement, as this allows the owners to regularly test the back-up system while participating in triad avoidance and National Grid services. Again, this is a fair approach, will not result in any net emission increases, and ensures diesel backup assets are not overused. A loophole which allows mobile generators to escape the regulation will need to be addressed, however.

Network charges and the embedded benefit

So far, fairly good. But the good news ends when we reach network charges, and particularly the transmission network embedded benefit. This embedded benefit is a rebate suppliers receive from National Grid and pass to distributed generation who export during triad periods. Ofgem is considering ending the TNUoS embedded benefit, currently worth about £45/kW a year.

The assault on the embedded benefit was intended to harm diesel generation but will have an enormous impact on the other estimated 7.5GW of distributed generation available at triad periods, which includes combined heat and power (CHP), energy from waste, and battery storage.

These generators are located on manufacturing sites, hospitals and farms, and some industrial manufacturers would see their energy costs rise by 20%.

Ofgem is now weighing the recommendations of a transmission industry panel, some of which would reduce the embedded benefit down to zero. Unfortunately the industry process was rushed by the transmission industry and the regulator, and did not review any quantitative evidence about the impact of this change. The industry panel's Citizens Advice representative even said "there was insufficient time available to fully analyse the impacts of the proposed solutions on consumers". Ofgem's rejection of stakeholders' concerns on how these changes will impact security of supply is equally worrisome.

> *Instead of hitting just the target, there was substantial risk of collateral damage to the wider decentralised energy sector, including demand response, backup generation, combined heat and power, and renewables*

Whatever Ofgem decides to do, the impact of Ofgem's philosophy will be felt in every corner of the energy system. It has already committed to charge the residual to onsite generation "as a priority" and demand-led triad avoidance could also be reviewed.

Unlike the reforms to investment funding and air quality standards, the network charging reforms represent a fundamental change in how demand users interact with the transmission network and should never have been used to deliver such a narrow Capacity Market goal.

So until Ofgem has had the opportunity to undertake a more rigorous, holistic review, which the current process has not allowed, it needs to ensure it protects consumers, security of supply, and investor confidence by taking a cautious, compromise approach.

6GW
Capacity locked in for 15-year contracts

Essential reform

But most importantly, what has this three-pronged approach achieved where it was intended to, in the Capacity Market auction itself?

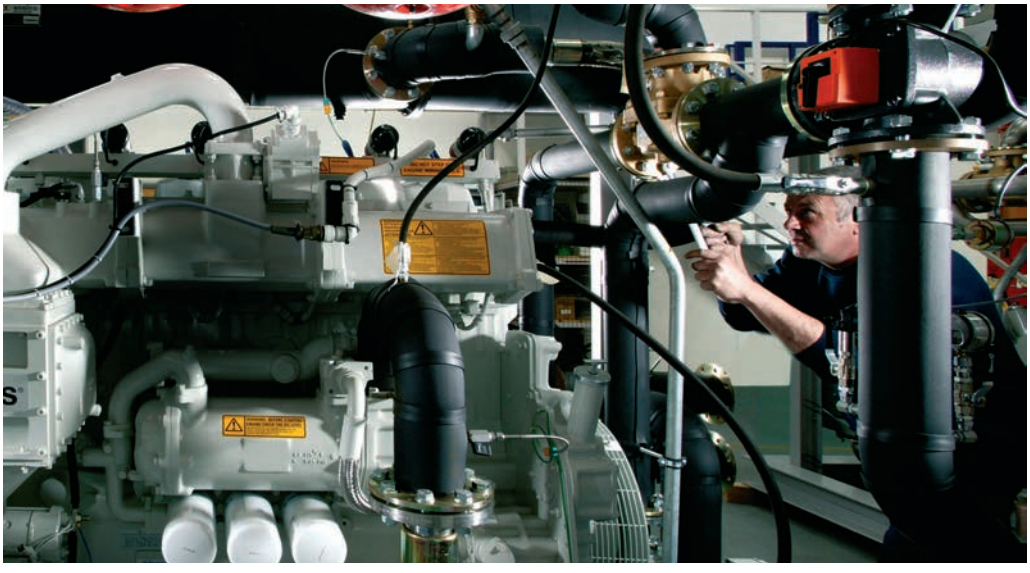
Even after all these reforms, the auction held in December, for capacity to be delivered in 2020, looked largely like the previous one. The auction cleared at a slightly higher price, and secured nearly 2.5GW of new build engines, one small CCGT, and one small OCGT station. So it looks like the reforms have not changed the auction results much, with continued strength from engines and few new CCGTs.

The big winner out of the auction was DSR, which faced continued policy and regulatory challenges, tripled its capacity to 1.4 GW.

If there is a warning sign from the most recent auction, it is about what kind of electricity system the Capacity Market is designed to deliver. There is now 6GW of capacity locked in for 15-year contracts. There needs to be careful consideration of whether the Capacity Market's unlevel playing field between new build generation and other participants will unfairly damage existing generators and demand response.

The problem with the Government's three-pronged approach is that it tried to end new build diesel generation without ever addressing the underlying problem, which is that the Capacity Market's design distorts the market towards cheap capital cost, low-efficiency new build solutions over longer-term, cost-efficient solutions that provide better long-term value for the consumer.

Unlike the reform programme to date, making changes to fix this issue would create a fair marketplace, where demand side and supply side, new and existing, can compete equally to deliver the best long-term value for the consumer. te



Embedded benefit changes are intended to curb diesel generation but the ADE fears they will also hurt other forms of generation, such as CHP. This unit is being installed at the tallest hotel in the UK, Novotel London Canary Wharf

Government sets out smart grid plan

The government and Ofgem are preparing in earnest for the rollout of a UK-wide smart energy system. The call for evidence signals major change for the power system. Brendan Coyne reports

The government is paving the way for all businesses and households to pay more for using electricity at peak times – and less when there is plenty to go around.

That message is contained within a raft of potential proposals in a call for evidence published in November by the Department for Business, Energy & Industrial Strategy (BEIS) and regulator Ofgem.

The document asks how policy and regulation might be rewritten in order to create a digitised power system in which factories, offices, batteries, cars and dishwashers help balance demand and supply.

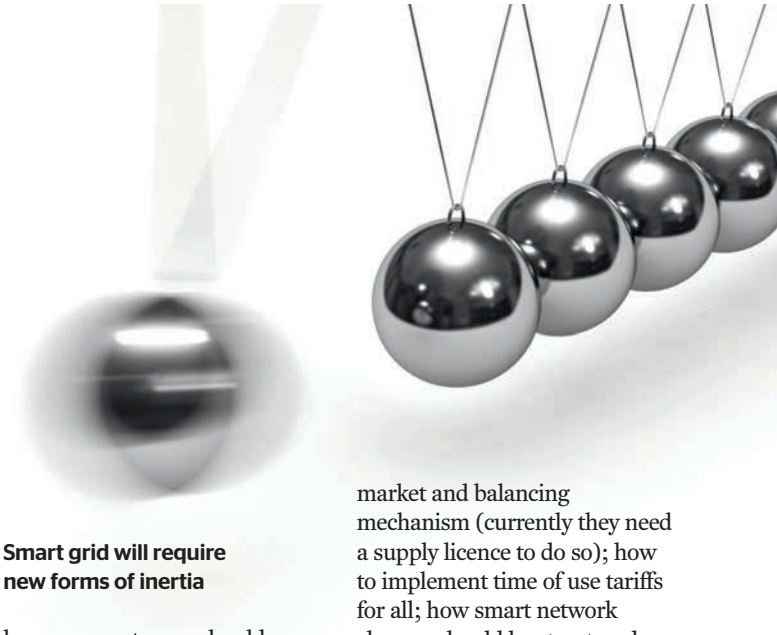
A smart power system requires both infrastructure and price signals. The government indicated it will decide whether to mandate all businesses and households are metered and settled half hourly by 2018.

If it does, all power users will be exposed to peak and off-peak pricing, although the consultation notes "the most vulnerable customers [will be] afforded suitable protections to ensure they are not made worse off by a more flexible electricity system".

A UK smart grid also requires new energy storage rules and a level playing field between generation and demand-side so that the power system no longer favours power stations.

To that end, BEIS and Ofgem outline options to create a more balanced regulatory framework, suggesting a flexible whole system approach could save the UK £17bn-£40bn cumulative to 2050 while meeting carbon targets.

Views are sought upon:



Smart grid will require new forms of inertia

how energy storage should be treated from a regulatory perspective; how demand-side response aggregators might participate in the wholesale market and balancing mechanism (currently they need a supply licence to do so); how to implement time of use tariffs for all; how smart network charges should be structured; and how government might improve policy levers including the capacity mechanism and renewables subsidies to better deliver a flexible whole-system approach.

The call for evidence also floats the idea of procuring 5GW of demand-side response (DSR) by 2020 and asks how to engage businesses not providing DSR, plus how and when to engage households. Suggestions on standards for interoperability for smart appliances are invited.

Meanwhile, the report says distribution network operators (DNOs) should waste no time transitioning to distribution system operators, effectively becoming regional system operators. te

See the full call for evidence at: http://bit.ly/2gyPOH5

More demand turn-up hours and more to be procured

National Grid will extend the period for its summer demand turn-up (DTU) service to run from March to October next year. The system operator has also confirmed it aims to double the 300MW it procured in 2016 and will provide two routes to market for providers.

While most forms of balancing ask businesses and power stations to adjust output or consumption when there is a power shortage, DTU aims to balance the system when there is too much power to handle. National Grid says that is a growing challenge. Last summer's DTU trial saw 10,800MWh of response called into action.

Procurement for next year's service will begin in February. However, after the first trial with distribution network operator Western Power Distribution, the system operator and the DNO have outlined plans to tweak the mechanism.

Providers can bid for 'fixed' DTU contracts in February, locking in prices for their availability throughout summer. They can also bid for 'flexible' DTU contracts on an ongoing basis every Friday and Tuesday between 27 March and 29 October. Providers can submit different availabilities within the same availability window.

The minimum clip size for providers will remain 1MW, but it will now be less constrained by location – so that megawatt need not be aggregated within the same grid supply point.

What are your 2017 energy efficiency resolutions?

Energy Services and Technology Association (ESTA) director Robin Hale looks at the opportunities that are on the horizon for energy efficiency

Will you be embracing technology? Understanding the ins and outs of an M&V plan? Considering new supply-chain partners? Or sharing your knowledge, experience and best practice 'nuggets' with your peers?

One thing is certain, the energy market is always a volatile one and, as such, a place for opportunity and innovation. Heat, light, storage, behavioural change, and much more is being measured and monitored as neverbefore to maximise use and minimise energy by understanding new ways to use it more efficiently and effectively.

Energy management is no longer taken in isolation and must be an integral part of an organisation's overall strategy.

So will 2017 be the year to deliver on the promises 2015 had to offer due to Esos audits and see further savings in heat, water and smart technology?

A busy year

With the EU's new European Energy Efficiency package set to complete negotiations on revisions to the Energy Efficiency Directive and Energy Performance in Buildings Directive by late 2017, it is going to be a busy year.

Heat networks in particular are going to have a major part to play in the future as advances in technology and heat delivery systems are making what is described as 'central heating for cities' a more efficient solution for high-density built-up areas, as well as campuses and more rural communities.

To encourage take-up and investment in heat networks, the government aims to provide £320m of capital support over five years, initially to the public sector with the first pilot phase worth £39m set to be paid to applicants by the end of March. Badged up as the Heat Network Investment Project (HNIP) and delivered by Salix, the main scheme is expected to open during 2017 and run for four years (hnip.salixfinance.co.uk).

Step-change in water

Water is also seeing a major step-change in 2017 with the onset of competition in water retail supply and wastewater services providing the ability for non-domestic customers to choose the right services and bundled packages.

The Open Water programme brings together Ofwat, Defra and MOSL to make this happen and its success will rely on consumers' appetite to embrace change in the search for better and perhaps more consolidated utilities services.

Will 2017 be the year the smart meter roll out succeeds in providing a solution to interoperability and communications? DCC go live date is scheduled for the end of the first quarter. Watch this space!

> ***With continued integration, communication and smart devices becoming even more apparent and traversing sectors, finding the right solution which has a degree of future-proofing is paramount***

With continued integration, communication and smart devices becoming even more apparent and traversing sectors, finding the right solution that has a degree of future-proofing is paramount to ride the wave of continued product evolution.

Helping you along that journey and being able to question in person the professionals behind the products, Esta moves forward into 2017 continuing with its respected event series.

First on the horizon comes our 15th Annual automated Monitoring & Targeting (aM&T) Conference and Exhibition, which will bring together the latest technology and software providers from 40 UK companies, with the expertise and knowledge to provide the right solutions for your business.

There will also be a full-day informative conference with both presentation and panel sessions covering the topics mentioned above and more than 250 other industry professionals to network with.

What better way to start 2017 than to get out of the office, listen to great speakers and discuss industry issues with like-minded professionals seeking the right tools and knowledge to secure a more energy efficient future.

Book your free place by visiting amt.esta.org.uk

Numbers game: Why energy efficiency plays second fiddle

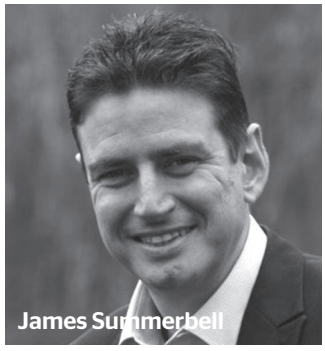
Energy efficiency investment faces higher hurdle rates than many other types of business expenditure. The Energyst asked seasoned consultants and energy managers why that is and what might shift the balance

Many boards insist on short payback periods for energy efficiency. Previous end-user surveys by *The Energyst* suggest strong preference for paybacks of less than two years within the private sector. Yet businesses are prepared to take paybacks of five to seven years on other energy projects, such as solar PV. So why the arbitrary two-year rule for energy efficiency?

James Summerbell, managing director at Noveus Energy and former energy manager at Tesco, says: "I think the simplest explanation is that energy projects compete with other draws on capital expenditure.

"Although energy is often one of the larger indirect costs within a business, energy investment is rarely considered as being strategic unless it is a large industrial user or CSR is a driver to the business."

> ***Payback is a poor criteria for evaluating and comparing energy-saving projects. It tells you nothing about the energy and cost savings over the project life***
>
> **John Mulholland**


James Summerbell


John Mulholland

That is particularly the case, he says, when the investment is "invisible". "Solar PV is tangible, you can see it on the outside of the business – and often there is a revenue component to that investment, it is not simply cost avoidance," says Summerbell.

"Businesses are setting quite a high bar [for energy efficiency payback periods] to ensure that they only capture projects with a really certain payback," he adds.

"Also, they are comparing these type of investments with procurement projects, which drive short-term cost reductions and which don't involve capital expenditure."

Short-termism is part of the problem, says John Mulholland, founder and principal consultant at

Credibility deficit?

As incorrect data leads to poor investment decisions, so inaccurate measurement and verification of projects can exacerbate boardroom distrust.

Ian Jefferies (pictured), head of performance management at energy efficiency verification specialist firm EEVS, acknowledges that the sector suffers from a "credibility deficit", which can have a knock-on effect.

"If companies are going to approach energy efficiency in a transformative way – estate-wide rather than on a piecemeal basis – they need greater assurance that they are going to achieve the numbers that they see presented. If that is not the case, why should they invest again?" he says."And then the business case suffers when the next project is presented. Having that certainty is critical to the investment case."

Accurate validation based on robust data addresses the issue, says Jefferies. But he thinks the public sector could help dispel historic distrust by taking a lead.

"If the central government estate was mandated to meet certain policy requirements with regard to energy efficiency, that could slingshot activity in the private sector through the case studies and data that would emerge as a result," he says.

"That does play to the point of improving UK competitiveness post-Brexit and there is no shortage of finance these projects. Lots of organisations are keen to fund them, yet it is unclear that finance has been used in any material way to drive energy efficiency forward."

If government is serious about improving energy efficiency, as BEIS secretary of state Greg Clark, says it is, "perhaps that would be a better focus for government action", than trying to reinvent the wheel, Jefferies suggests.

Price rises and rule changes

Speaking at the Energy Live conference in London, Mike Huggins, a director at Frontier Economics, predicted rises of 5-10% in the next 12 months due to the 20% fall in the value of Sterling over the past year.

Meanwhile, proposals to change distribution charges via a rule change called DCP288 may also affect the prices companies pay for power when it comes into force in April 2018. It maylead companies to refocus on energy efficiency rather than demand shifting to avoid peak charges.

DCP288 will, to a degree, flatten distribution charges so that red band prices are far less expensive, while making businesses pay more for using power in amber and green bands.

Whereas current red band prices are up to 100 times more expensive than green band prices, they will end up being between two and ten times the multiple, according to Utilitywise strategy director Jon Ferris (pictured).

He thinks businesses that are already load shifting to avoid peak charges will continue to do so, given a financial incentive remains. But higher charges throughout the day, as well as potential changes to the Triad methodology, may also lead people to reconsider their strategy.

"Businesses that have looked more recently at demand shifting are probably going to look again at energy efficiency and pure demand reduction," Ferris says. But, he adds, they should be doing that anyway.

"There is an underlying need to understand where and when electricity is consumed in the business in order to eliminate waste. DCP228 is not going to do anything to make that less important."

● *For more on DCP288 see feature on page 32*

Mulholland Energy Solutions.

"Business planning mentality is very short scale. It is also sometimes determined by who owns the business," says Mulholland. "If a private equity company is taking over a business, they impose that sort of criteria. So even if the energy manager realises how illogical that is, and even if the accountants are enlightened, the people above them apply that criterion because they could be selling the company next year and they don't want to plough capital into the business."

Wrong metrics

Even if businesses are prepared to invest in projects with longer paybacks, says Mulholland, they are applying the wrong measure of success to the wrong set of numbers.

"Payback is a poor criteria for evaluating and comparing energy-saving projects," he says. "All it tells you is when you get your investment back. It tells you nothing about the energy and cost savings after the payback period and over the project life."

Applying discounting using either Net Present Value (NPV) or Internal Rate of Return (IRR), says Mulholland, will tell you total savings over the project life in today's money, so that competing projects can be meaningfully compared. "Financial illiteracy" is therefore a key barrier to energy efficiency investment, Mulholland believes.

> *It is critical for energy managers to develop and protect a reputation for money-saving ideas and the request for funding should be treated as a process and not an event*
>
> Vilnis Vesma

For example, a project might have a three -year payback but have an IRR of 38%. So while it might fail a payback hurdle it might pass an IRR hurdle, says Mulholland.

Therefore it is wrong to use payback as a first filter on projects – otherwise some good projects will be rejected.

"I think it is up to energy managers to give boards the payback [metrics], if that is what they want. But also to give them an alternative and show them the savings over the life of the project," says Mulholland.

"The problem is, some companies have very set templates. You don't actually get in front of somebody to make a presentation, you just fill in a form and it goes into a spreadsheet."

"But if you have 20 energy projects and put them through this process – payback – you end up with a certain hit list. If you then put them through the machinery of discounted cash flow, you will come up with a different list," Mulholland adds.

"It is worth energy managers showing that to »

Start small

If companies are unwilling to spend capital on energy efficiency, energy managers have to look at what they can achieve with minimal revenue and maintenance budgets, says Vilnis Vesma, (pictured) a former energy manager turned energy consultant and trainer.

"My advice to an energy manager beginning their career would be: start with some unambitious dead certs that cost very little but make an impact. Measure the impact, verify it and keep a record. Then when you move onto things that require investment you can show what you have done, what you need to do, the internal rate of return, the risks attached, how to mitigate them and show precedent for the project within your industry, to ensure the board feels comfortable," he says.

It is critical for energy managers to develop and protect a reputation for money-saving ideas and implementations, believes Vesma – and the request for funding should be treated "as a process and not an event".

their [finance] people and being a little more bold about challenging the status quo."

Wrong costing

Energy consultant Mervyn Bowden, managing director of Intuitive Energy Solutions and former head of energy at Marks & Spencer, agrees that accounting treatment is part of the problem.

"In the private sector, most finance directors are just not up to speed with whole-life costing at all. Or if they are they ignore the opportunities it presents," says Bowden. "Because if you start tying-in maintenance savings with energy savings and other FM savings, your overall returns are far greater than they will be from the energy component alone."

Despite consultants banging the whole-life costing drum for many years, says Bowden, plus the fact that whole-life costing is strongly advocated by the Esos regulations, "most businesses, small or large, totally ignore the opportunities that whole-life costing presents".

> *You need to have a well constructed, logical, properly costed, longer-term energy plan. Which I think in the majority of cases doesn't exist*
>
> Mervyn Bowden

Capital versus revenue

Accounting treatment in terms of capital versus revenue budgets is also a key issue, says Bowden.

"Most schemes involve capital investment and, particularly in larger organisations, capital budgets sit separate from revenue budgets. If an energy efficiency scheme could achieve payback within 12 months, it will come out of the revenue pot. If it is longer then it is likely to come out of the capital pot."

However, for it to come out of the capital pot, says


Mervyn Bowden

Bowden,"you need to have a well constructed, logical, properly costed, longer-term energy plan. Which I think in the majority of cases doesn't exist."

Energy prices and Brexit

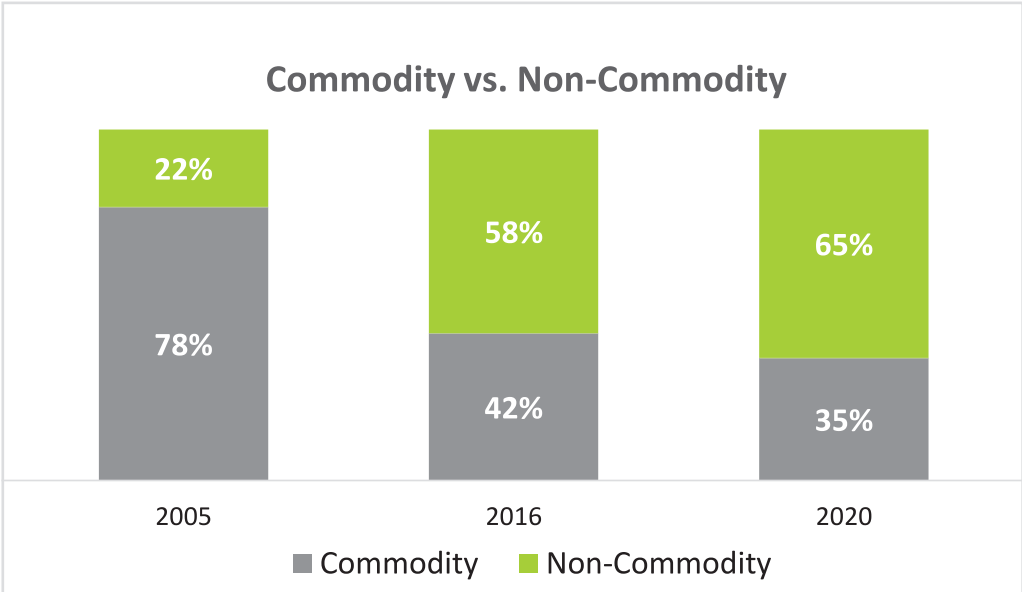
Energy prices play a critical role in determining the rate of return on energy efficiency projects – and it could be that market forces make energy efficiency a higher priority over the next few years.

Wholesale gas and power prices have largely been on a downward trend since 2013. But they are now appear to be on the turn with energy companies and economic consultants recently warning that companies can expect 5-10% rises over the next 12 months, partially as a result of the collapse in Sterling since the vote to leave the EU.

Meanwhile, non-commodity costs now make up more than half of the power bill – and are set to rise steeply over the next few years as the cost of renewables support ramps up, along with the costs of balancing the system and ensuring security of supply through the capacity market.

Simultaneously, uncertainty over the terms on which the UK leaves the bloc is starting to affect business confidence and expenditure, according to the bank of England's latest inflation report.

Those factors could lead businesses to refocus on good husbandry – and make energy efficiency investments more attractive. That is, however,



The rise of non-commodity costs

Non-commodity costs are predicted to make up about two thirds of the total power bill by 2020. Next winter, businesses may face significant non-commodity cost increases from the capacity market charge. Meanwhile, the cost of the renewables obligation is predicted to increase by about 20% for 2017-18 with small scale Feed-in Tariff costs simultaneously set to increase by more than 10%. Levies for the government's contract for difference scheme, while currently a small charge, are set to increase fivefold next year. As a result, businesses can expect to see double-digit price increases in the next few years. This may encourage UK firms to refocus on energy efficiency.

Need for rapid returns: An energy manager's view

An energy manager at a large high street retailer told *The Energyst* that the only real barrier he faces is payback – and having to compete with other projects for the fastest return.

"If I make a request for £1m in funding, it goes into a hopper with other projects, all of which are judged on how quickly they pay back."

While projects must stack up financially, he says other benefits, such as year-on-year carbon reductions and other environmental considerations, are also important to making the business case.

So far, he says that approach has proved successful and the firm managed to reduce energy bills by 4.8% in 2015-16, largely due to LED lighting projects as well as "administrative tidying up of our portfolio".

However, he says "the business now wants to undertake a number of other capex projects, which will squeeze the energy efficiency projects for faster paybacks".

While the competing projects – such as marketing or sales promotions – may have estimated paybacks and varying degrees of success, the business views them as core because they will ultimately drive sales.

With energy efficiency projects "our ROI is pretty much guaranteed, as long as the calculations are done correctly and the business case I submit allows for fluctuations in power price and hours of operation either way", he says.

> ***If I make a request for £1m in funding, it goes into a hopper with other projects, all of which are judged on how quickly they pay back***

if firms are presented with solid business cases built upon robust data. And therein lies the rub. Many businesses simply do not have the data.

Esos and bad data

Mervyn Bowden performed a number of Esos lead assessments. He estimates that 90% of the buildings he helped to audit had insufficient metering. "You physically could not do a meaningful energy profile without that metering," he says.

There were two main types of missing meters, says Bowden: those between landlords and tenants; and half hourly gas metering.

"There is an urgent need for meters between all landlord and tenant arrangements, otherwise you cannot know who is using what." Lack of it, he says, blew "a gaping hole in Esos". Meanwhile, beyond the top tier of I&C companies, "the majority of companies do not have half hourly equivalent gas metering, so you have no chance whatsoever of working out how efficient they are".

John Mulholland agrees that is a critical issue. "I didn't see any half hourly data on gas for any of the 36 Esos audits that I did," he says. This means if there are multiple gas users and no sub-metering then estimates of gas breakdown have to be made. This lack of data then adds a risk factor into recommendations". te

Just as you can't throw anything but a double six here, there can be no losers if every Esos audit is deemed acceptable

Esos: a frank assessment from a lead assessor

Consultant John Mulholland was at the coal face of the government's flagship energy efficiency scheme as a lead assessor. He shares his thoughts on the scheme's shortcomings and how it could be improved ahead of the next phase

This is a perspective on Esos from the front line. In 2015/16 I acted as a lead assessor for four organisations and I conducted 36 Esos energy audits – all with a site visit and a report. Sectors covered manufacturing, chemical processing, distribution centres, retail, offices, a housing association and transport.

I began my career 42 years ago as a chemical engineer conducting energy audits in process plants. So I assumed my experience in energy management would be best used in the lead assessor role. While I did so for four organisations, most of my time was spent doing Esos energy audits. I do not regret this experience as it has given me new insights into how some companies manage, or do not manage, energy as well as being in a better position to assess the audits of others as a lead assessor.

> ***To put it in plain English, 65% failed at the first attempt. Who signed off all these non-compliant assessments/audits? The answer is lead assessors. So they were clearly not up to the job***

It also put me in an informed place to comment on the whole Esos process with its strengths and weaknesses and lessons to learn for 2019.

Not all are equal

In the run up to Esos, the Environment Agency published the registers approved to have lead assessors. The registers definitely vary in standards on who qualifies as a lead assessor. Not all lead assessors' registers are the same.

Because of the different entry/qualification requirements for each register there is a difference in quality of lead assessors. In Esos Newsletter No 3, it gave the results of 51 compliance audits selected at random by EA. Of the 51, not a single audit failed – 35% passed and 65% passed with "remedial action".

Or to put it in plain English, 65% failed at the first attempt.

Who signed off all these non-compliant assessments/audits? The answer is lead assessors. So they were

clearly not up to the job. It should be right first time as this is what they are paid to do. Clients should accept nothing less. Theoretically their lead assessor had put them at risk of prosecution.

No experience needed

In the EA Esos guidance notes, it was implied that lead assessors would personally conduct most of the energy audits. However, it did not matter to EA who did the actual audits as they all had to be reviewed and signed off by a registered lead assessor.

In reality, an army of unqualified and inexperienced people were used as energy auditors. A number were new or unemployed graduates or non-graduates and told to go and do energy audits.

The logic of the EA was that everything had to be supervised, reviewed and signed off by the lead assessor.

However, if the lead assessor was not competent, how could they supervise the work of others – particularly if they, in turn, were not competent? Also a number of lead assessors conducted no energy audits themselves, so how could they assess the work of others?

Everything hinged on quality, experienced lead assessors, who had personally conducted Esos-compliant energy audits and therefore were in a position to assess the audits of others.

There was an additional problem of Esos sales people under-selling Esos as they had no idea of the time it takes to visit sites, collect data, analyse it and write a compliant report.

Perhaps Esos sales people should do an Esos audit before trying to sell one. The salesmen slept well at night while the auditors lost sleep to put in many extra unpaid hours.

I think there should be a rigorous registration scheme for anyone conducting an Esos energy audit, with minimum standards of entry and having to show examples of energy audits they have personally conducted. In healthcare, a hospital porter would not stand in to do the job of a specialist nurse so why should it be different in the world of energy auditing?

It could be argued the government was so slow to get Esos operating that there was barely time to get lead assessors registered, let alone a registration scheme for energy auditors. But there is no excuse in the run up to 2019. The auditors should individually pay an annual registration fee like lead assessors. This would be self-funding via existing lead assessor registers.

Assessing auditor compliance

The EA appointed contractors to check a sample of Esos assessments to make sure they were complaint. Who would be the best qualified to do this sort of checking of work? I would suggest qualified and experienced Esos lead assessors who were active in 2015 and who have direct experience of personally conducting and writing at least.

But how many of these contractors meet these suggested criteria? The answer is I don't know. But the reason I am asking the question is that I have seen 'compliant' Esos audits in 2016 that have been passed as satisfactory by those contractors but are actually non-compliant with Esos requirements.

Why would a contractor pass an Esos audit as satisfactory when it is non-compliant? Either they did not know the audits were non-complaint (in which case the contractor is lacking experience or incompetent) or they did know (in which case the contractor was somehow corrupt). If we are charitable then we have to say the former. So there needs to be rigorous selection of very experienced lead assessors for this vital role of assessing Esos compliance.

> *In healthcare, a hospital porter would not stand in to do the job of a specialist nurse so why should it be different in the world of energy auditing?*

There are some lessons to be learned from the world of international standards such as ISO 50001. For a company to get certification to ISO 50001 it has to meet key levels of conformity in its energy management system to the requirements of ISO 50001. Who decides this? An auditor from the certification body who is accredited to assess and recommend for certification to ISO 50001.

The recommendation is then reviewed by the certification body, which itself has to be accredited by the national accreditation body in the country. In the UK this is the United Kingdom Accreditation Service (Ukas). In addition, the individual auditor from the certification body sent in to conduct the external audit and assessment has to be qualified with sufficient experience in ISO 50001.

So quality is built in at every level. Sadly this is missing in the Esos process, with the inevitable results that the majority of Esos audits appear to be non-compliant or compliant with remedial action.

Because of the use of unqualified and inexperienced energy auditors, there was a race to the bottom on price. So I found myself working at day rates lower than I worked for 25 years ago. The clients were partly to blame. A number of my Esos proposals were rejected on price but I do wonder if the cheaper option selected by the client resulted in a compliant Esos energy assessment/audits. I doubt it. The result of poor auditing is poor quality recommendations which cannot be acted on.

For example, in a number of so-called compliant audits, I noticed there was no estimated or actual »

breakdown of electricity or gas by end use. This means significant energy use is not identified (a key requirement) but more importantly, it is impossible to make a specific recommendation unless you know the 'before' and 'after' kWh quantities are known. This is needed to calculate savings in kWh/cost and payback (a minimum key requirement) for each opportunity.

So one reason some recommendations will not be implemented is that the recommendations themselves are so poor. This is the fault of the auditor, the fault of the client for paying for a poor audit and the fault of the lead assessor for signing it off. And having paid for a poor audit they cannot implement the recommendations, even if they wanted to do so.

Much has been said about companies not having the will or allowing the capital to implement recommendations. But this assumes all the recommendations are sound and of good quality. It appears that many were not. The companies need to take some blame for buying cheap audits, which they assumed would be compliant but were not.

I am reminded of the words of John Ruskin: "It's unwise to pay too much... but it's worse to pay too little."

When you pay too much, you lose a little money – that is all. When you pay too little, you sometimes lose everything because the thing you bought was incapable of doing the thing it was bought to do. The common law of business balance prohibits paying a little and getting a lot – it can't be done. If you deal with the lowest bidder, it is well to add something for the risk you run. And If you do that, you will have enough to pay for something better.

Exercising proper authority

I am surprised at the number of companies that have totally ignored Esos and not a single company has yet been fined. The EA said it was initially taking a "light touch" approach. Many companies and consultants worked extremely hard in the run up to the 5 December 2015 deadline. I was working a 20 hour day in the last two weeks to meet deadlines and I personally know of consultants who had nervous breakdowns or worse as a result of the pressure. Some of this pain could have been avoided if the extension of deadlines were announced earlier or companies availed themselves of the opportunity.

> *I personally know of consultants who had nervous breakdowns or worse as a result of the pressure. Some of this pain could have been avoided if the extension of deadlines was announced earlier or companies availed themselves of the opportunity*

Routes to compliance

In 2015/16 most companies selected Esos energy audits as a route to compliance. Only 6% selected ISO 50001. As an experienced practitioner in ISO 50001, I think this is a good route to compliance. There was a myth surrounding ISO 50001 in 2015: that there were not sufficient certification bodies to cope with demand. In fact there were more than sufficient and some certification bodies reported to me that they were kicking their heels awaiting the predicted demand which never materialised. I conclude this was a self-fulfilling prophecy.

I suggest the real reason companies did not select the 50001 route is that they had left it too late. No doubt more companies will use ISO 50001 as a route to compliance in 2019 but only if they start the process in 2017/18.

I think it was right of the EA and Decc to exclude other schemes and standards, such as ISO 14001, as routes to Esos compliance. They simply are not focused enough.

The idea that DECs and

John Mulholland's key recommendations

1) Lead assessor registers

By mid 2017 all lead assessor registers should weed out lead assessors who have no experience as both lead assessors and Esos auditors. Those on the register should show evidence of competence and experience in 2015/16. All seriously non-compliant Esos audits should be publicly named by the Environment Agency along with the name of the lead assessor and the register and the company involved. If a register has lead assessors who consistently underperform, EA should remove their approval. Individual lead assessors should be struck off if they perform badly.

2. Esos energy auditor registration

By mid 2017 anyone wanting to be an Esos energy auditor should be registered unless they are already registered as a lead assessor. They need to have the correct minimum qualifications/experience and provide evidence of competent by supplying evidence of audit reports they have conducted. Their name and signature should be on each audit report along with that of the Esos lead assessor. Auditors will be stuck off if they perform badly.

3. Compliance assessment auditors

There should be a stricter criteria for those working on behalf of the EA to assess compliance to Esos. These should be competent and experienced lead assessors with practical experience in both lead assessor role and doing Esos audits and writing reports to demonstrate competence in the very things they are assessing. Also companies should not be contracted to this task. It should be left to individual lead assessors.

4. EA using authority to fine non-compliance

Having taken a 'softly-softly' approach in phase one, this should be abandoned in phase two. The EA should publish compliance dates with an escalating tariff of fines for non-compliance and ensure non-compliant companies are fined and publically named. On our road we have a residents' parking scheme. The only reason it works is that the council issues fine notices on cars that are non-compliant. The fines raised from Esos could partly be used to

Green Deal Assessments should be used as a route to compliance was clearly wrong and I hope they are excluded in 2019. Display Energy Certificates (DEC)s are used mainly in the public sector who are not in Esos – perhaps the civil servant specifying this did not realise this fact – or was badly advised. A DEC is not the equivalent of an Esos energy audit.

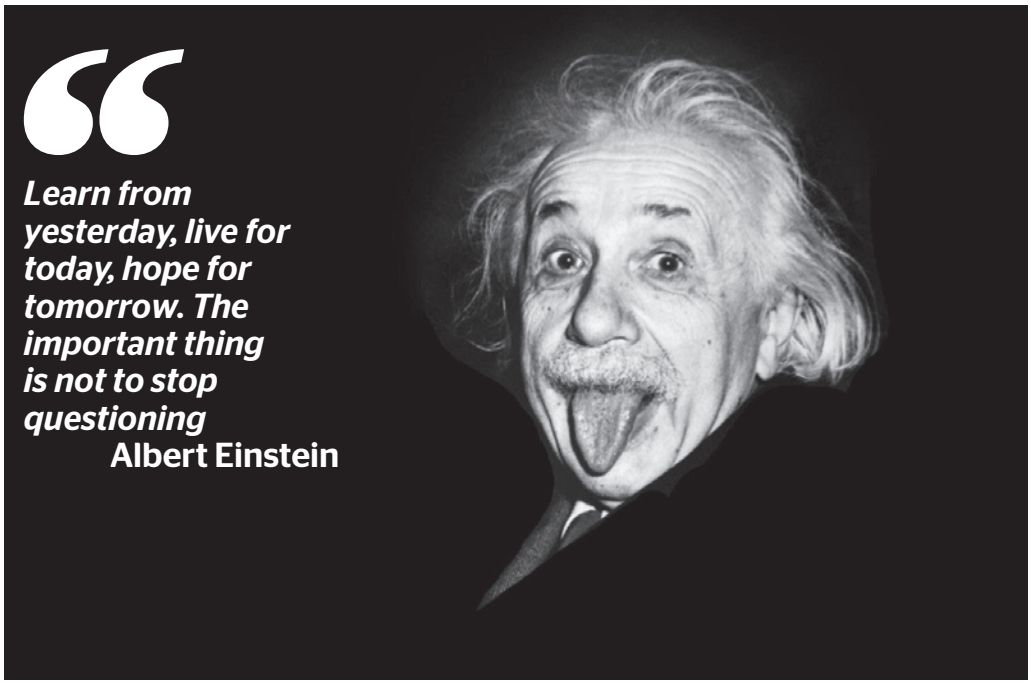
Qualification for Esos

The criteria of qualification for Esos was number of employees and turnover. This led to some very odd situations. I think an additional criteria should be that only those with an annual energy expenditure in excess of £300,000 (including transport) in the qualifying year should be in Esos. This would overcome these anomalies.

A final question: "What is the purpose of Esos?" Apart from the obvious answer that it was the UK response to Article 8 of the Energy Efficiency Directive, the answer is to significantly reduce energy consumption by the identification and implementation of opportunities. The initial target by Decc was 0.7% reduction in energy consumption. I thought this was an error and that it meant 7% – but no, it was 0.7%. A reduction of 0.7% is an unambitious target. This figure has now been removed from V5 of the EA's Guidance on Esos (2016) but that was the original intention.

A consultant friend said that the problem with Esos was that it focuses on the process rather than the desired outcomes. It assumes that if a report with opportunities are put in front of a director then they will implement them. By and large, we know this is not the case. He said the end result of directors implementing measures should be the starting point with fiscal incentives and removal of barriers. Then work backwards and build a scheme that will lead to this outcome. He has a point. The Germans do this successfully with ISO 50001 and as a result Germany holds more than 50% of global certifications.

I accept everyone was going up a learning curve in 2015 on Esos with inevitable shortcomings. But now the lessons are learned there is no excuse to repeat it all again in 2019. With that in mind I will end with a quote from Albert Einstein: "Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning." te



reduce or waive Esos registration fees to companies that comply early before the deadline to stop a last-minute rush like in 2015. It is said this won't be repeated in phase two because companies have four years notice. I wonder. Actually it is three years, as one year has passed.

5. Criteria for qualification

Add an additional qualification to Esos participation of an annual energy expenditure of more than £300,000 (including transport). This will reduce the burden on the smaller of SMEs and small companies that fall under Esos due to anomalies in turnover. No doubt a lawyer will tell me why this logical step is not possible.

6. Route to compliance

Remove DEC and Green Deal Assessments as routes to Esos compliance.

You might ask how these recommendations will be funded? Some cost nothing. Anything to do with registration should be paid for by the Esos registers who charge large amounts from individual lead assessors in terms of annual subscriptions. The rest could be funded by the fines, which should be imposed on the 1,200 organisations that were in Esos and did nothing. In my view, the EA has already made millions in savings to the taxpayer by getting Esos participants to pay for the role of their lead assessor instead of getting its own staff to do this work of checking compliance.

Through the management practice of coppicing, which harnesses the regenerative capacity of the trees to regrow from the stump when felled, and management of commercial forests and woodland, a sustainable supply of locally sourced wood fuel can be achieved. Of the 790,000 acres of woodland in the South East and London area, currently only 46% is managed, leaving 430,000 acres for which there is no long-term management or economic use.

The CHP plant will provide owners of woodland with the certainty required to manage their woodland efficiently and to realise their full and economic potential.

The plant will prevent fossil fuel carbon emissions that would have come from the burning of gas for heat, and from the burning of (primarily) gas or coal for electricity. The plant will prevent more carbon emissions, tonne for tonne, than a heat-only biomass boiler by replacing carbon-intensive electricity from the grid.

Directors 'right not to spend cash on energy efficiency'

Energy efficiency isn't a priority for many board directors, who would rather spend company cash on revenue-generating activities. They are the smart ones, Capitas Finance energy efficiency specialist Jason Hunter tells The Energyst

Finance remains the biggest perceived barrier to energy efficiency investment among small and medium-sized enterprises and the public sector, according to a survey of company managers and directors conducted by *The Energyst* (see p12).

Apathy at board level and distrust of claimed savings are also significant hurdles for those trying to implement energy efficiency improvements.

While anecdotal evidence suggests continued reluctance to fund energy efficiency measures via third party finance, Jason Hunter, associate director of the energy efficiency division at Capitas Finance, reckons spending cash reserves on non-core business is foolhardy.

Guaranteed savings

Hunter thinks presenting finance directors with guaranteed energy savings that are cash positive from the outset enables businesses to go further in cutting energy and carbon consumption. Naturally, the financier believes the UK's 5.2 million SMEs, not to mention the 9,000 corporates with an Esos audit "gathering dust", should reevaluate their options.

Many companies are reluctant to fund energy efficiency measures using third party finance

> ***They simply don't believe what they are being told by the vendors and the suppliers and solutions providers***

"We are firm believers that if a company has capital available, then they should be deploying that on their core functions," he says.

Keeping cash to enable the business to capitalise on opportunities makes sense, he adds. However, if finance can be used to produce guaranteed energy bill savings, why do so many organisations appear reluctant to use it?

Hunter, a former head of commercial planning for Mittal Steel's European operation, says boards are also distrustful of promised savings. "They simply don't believe what they are being told by the vendors and the suppliers and solutions providers," he says.

Another barrier is "complexity," Hunter acknowledges. "Energy efficiency is at a very nascent stage for finance – rather like the IT industry was 25 years ago. Many people don't realise the different types of finance that are out there, because the larger banks tend to focus on larger transactions where they will bespoke the terms of the finance on each individual project."

But Hunter says smaller financiers are now trying to tap into the SME market, working with vendors to provide finance for projects as small as £10,000.

Impact from SMEs

"We believe the biggest impact on energy efficiency and carbon reduction in the UK is going to come from SMEs rather than large scale businesses."

That may be true. But if SMEs don't trust the savings promised by technology vendors and don't appear enthusiastic about taking on finance, how is the situation going to change?

On the first point, Hunter is confident. "We guarantee the savings. If your project predicts a 25% saving on energy and you only see 10%, we work with a global insurer which will make up the difference."

Hunter claims vendors incorporate the "very small" premium for that insurance into their margins, so that for end users "there is very little extra charge, if any".

If something sounds too good to be true, it usually is. Hunter admits overcoming disbelief is "the biggest problem we have" in getting finance deals away.

But he thinks the tide is starting to turn in the SME market and points to the £7m Green Business Fund, administrated by the Carbon Trust and funded by a fine levied on E.ON for failing to meet advanced metering targets, by way of example.

"[The fund] offers SMEs a high level energy audit. If they decide to implement recommendations, they receive 15% of the cost of the capital equipment as a grant," he says. Combined with proper use of Enhanced Capital Allowances, businesses can find ways to turn energy efficiency investments into a "cash boost", says Hunter.

"So there is progress and [compared to corporates] it is much simpler for SMEs to move forward and eliminate a large part of what is often a significant overhead."

For the corporate market, Hunter accepts that not all Esos audits are made equal. He understands the calls for Esos to be 'given teeth', but says he is "not a fan of forcing people to do things". Instead, he hopes the shift to half-hourly metering will equip businesses with the tools to make themselves more profitable.

"If you have half-hourly metering, you have better data, and if you have better data, you can make better business decisions that will end up saving you money," he says. "If you can make payments [for equipment] out of the savings delivered, it is also costing you nothing upfront. To my mind, that is a far better way to lead the conversation." te

Capitas has produced a free guide to third party energy efficiency finance, available at http://bit.ly/2hsJUwc

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Grid mulls rolling all frequency response services into one

National Grid may consolidate its fast balancing programmes, a move that aggregators say makes sense. Brendan Coyne reports

National Grid has mooted rolling together its fastest system balancing programmes into a single pre-fault service. The system operator shared its thinking on simplification of balancing services at the Storage Working Group meeting in December.

End-users and demand-response providers have urged National Grid to simplify the market in order to make it easier for them to participate. For its part, National Grid requires a greater volume of system balancing from demand-side parties as renewable generation pushes thermal plant off the system, reducing inertia.

The Firm Frequency Response (FFR) and Enhanced Frequency Response (EFR) mechanisms pay generators and demand-side providers, usually but not exclusively via aggregators, to quickly adjust load or provide power to help balance the system when it deviates from set trigger points around 50Hz. This usually happens when a generator or interconnector drops out. They pay the highest rates of all National Grid's balancing services available to the demand-side.

FFR providers have to respond to a frequency event within 10 seconds. There are two forms of FFR – static and dynamic. The former requires providers to reduce consumption while the latter requires flexibility in both directions.

Enhanced Frequency Response is the fastest dynamic frequency response service. Most EFR comes from batteries and providers have to deliver in under a second.

One frequency response service to rule them all?

Logical approach...

While National Grid has stressed that it has not yet decided when or if it will combine all frequency response mechanisms into a single service, market participants believe that represents a sensible approach.

Alastair Martin, co-founder and head of strategy at aggregator Flexitricity, said it was a "perfectly logical thing to do". However, he adced: "It's not the end of the story. EFR is basically fast FFR that contains some concessions for batteries. National Grid needs fast response, so it makes sense to roll the bulk of that into the FFR tender."

... but not end game

However, said Martin, neither of those services address the growing inertia problem in the system. "So you will see services which respond not just to frequency, but to the rate of change of frequency, which is the signal that shows you that inertia is failing to keep up with events.

> ***National Grid needs fast response, so it makes sense to roll the bulk of that into the FFR tender***

"Basically, frequency moves fast and the lighter the system, the faster it moves. EFR is a partial response to that – it responds more quickly than FFR. But the end game is to respond directly to the speed of movement of frequency rather than waiting for it to get to a particular level [the 50Hz deviation trigger point]."

Get your RoCoF

Martin believes this will ultimately require a RoCoF-based frequency response service. That is, Rate of Change of Frequency – and the firm is involved in a project with National Grid, called Enhanced Frequency Control Capability, to work out how to get there.

Also involved in the project are Centrica, which brings a large-scale CCGT into the trial; GE Grid Solutions, contributing control systems; and the universities of Manchester and Strathclyde, which are involved in "technical puzzle solving", according to Martin. Solar and battery developer Belectric is also on the team, as is a wind farm operator.

Much of the trial revolves around understanding regional variances in system inertia, and how a loss of input (a power station or interconnector) in one location affects other locations.

"When the France interconnector goes down, it gives the system a kick, the disturbance propagates through the GB system and the [required] response varies by location," explains Martin. "If Torness [EDF's 1.3GW nuclear station in East Lothian] tripped, that would give the system a kick in a different location [and create different knock-on effects in other regions]."

The team is trying to work out how these disturbances affect each other and develop systems that can determine which resources to deploy based on a better understanding of the effect on regional inertia.

Get involved

While some industrial companies have signed up to the trial "and hopefully a water company, some cold storage and CHP as well", Martin says more participants are welcome, particularly those already providing frequency response, as this service, while similar in terms of speed of response, is based on the speed of the change in frequency, rather than the magnitude of that change.

"We are trialling different options for industrial and commercial customers to provide RoCoF. We are looking for diversity of geographic location and diversity in the type of response they can provide," he said. te

Entering the prosumer age

John Langley-Davis, product marketing manager – energy at Schneider Electric, argues that smart technology is the key to turning consumers into prosumers

With the emergence of smarter technology, consumers can now make more informed choices about energy usage and become energy producers and storers themselves – known as 'prosumers' – resulting in a two-way directional flow of power.

Across Europe, there are three million of these prosumers, with room for many more.

City districts, educational campuses, military bases, hospitals, commercial buildings, factories and residential homes alike are becoming proactive energy prosumers.

In the UK, community projects based in towns across the country are co-operatively harnessing owned renewable energy. The Brixton Energy community in south London is one such not-for-profit co-operative. It owns its own solar power stations in Brixton. While Wolverton Community Energy society in the Wolverton and Milton Keynes area is taking a long-term view towards being self-sufficient off-grid, by working with individuals and businesses in the area to help them become more energy efficient.

Infrastructure fit for purpose

While the demands of informed, proactive energy users may appear daunting at first, there are many opportunities for providers. Where once utility companies were forced to build an increasingly expensive infrastructure and fire up more generators to keep pace with customer demand, prosumers are leading them down a less costly path, looking for new ways to save energy Key to this is greater investment into demand management and energy efficiency. In the UK, the government is currently consulting on how to implement smarter energy systems, through which our ageing infrastructure may finally be overhauled in order to enable greater efficiency. Moving to a new model potentially including distribution system operators (DSOs), the network will be better served by the willingness of prosumers to limit and alter their energy consumption for periods at a time.

If the government decides to adopt a DSO model, as long as prosumers are a key consideration – catered for and kept engaged – there is an opportunity to balance local grids, increase the reliability of power, improve customer retention and cut costs more easily. These factors are crucial for both growing business and satisfying environmental obligations.

However, consumers must first be encouraged and empowered with the right information and tools, including the provision of advanced metering infrastructure (AMI), namely smart metering technology, and the implementation of automated demand response (DR) services.

In most countries smart meters serve as the point of engagement for consumers and the utility, providing them with more information on their energy consumption across various interconnected devices, and lets them participate in DR programmes. DR then occurs when a grid operator identifies a consumer who is using a large amount of energy and asks them to limit their consumption – often through an automated process and often in exchange for an incentive such as discounted prices.

The much-maligned UK smart meter rollout is further complicated when you consider that the useful data and control ability currently resides primarily with the energy supplier rather than the DNO or DSO. Deploying DR services at a large-scale residential level will require the ability to send control messages to individual household appliances such as water heaters or car chargers, requiring the infrastructure to be fit for purpose for balancing the grid and administering the commercial element of the energy tariffs.

Have your cake: Wolverton Community Energy society is helping local individuals and businesses become more energy efficient

A competitive edge

Implemented together, these tools and services allow utilities to help their customers identify and implement energy-efficient projects to reduce their energy consumption and bills. This can provide utilities with a competitive edge, increasing customer satisfaction, loyalty and retention, reducing delayed repayments and creating new markets for potential services.

Yet, they also enable providers to orchestrate and manage energy consumption, increasing or decreasing demand where needed through commercial mechanisms and automated DR and shifting loads to mitigate peak power. Ultimately, they allow utilities to provide more reliable power where and when it is most needed, as well as make better use of their existing assets and add new low-cost systems to their portfolios as opposed to the expensive construction of new energy sources.

For prosumers, the promise of new, interconnected technology has the potential to satisfy the desire for greater control over their energy usage and turn them from passive into active participants, embedded within the energy infrastructure.

For utilities, the prosumer revolution represents an exciting opportunity to offer new services, manage assets and bring another layer of stability to modern grid constraints. te

Red zone alert: How DCP228 could affect energy bills

Ofgem is making key changes to distribution charges via its 'DCP228' directive. This will affect most businesses and potentially increase costs for many, says Inprova Energy director of account management Paul Garratt

Ofgem is changing the Common Distribution Charging Methodology (CDCM), which determines how distribution charges are calculated. Dubbed 'DCP228', these regulatory changes are scheduled to be implemented no earlier than April 2018.

Distribution charges currently account for as much as 19% of a customer's bill. The major distribution charge is the Distribution Use of System (DUoS) levy, which relates to usage. This is calculated using a banded tariff and there is currently a much higher tariff for usage during the peak 'red' band period, which predominantly relates to evening consumption.

The current system generates a large portion of revenue from premium pricing on the peak 'red' time band. Under DCP228, charges are to be scaled more accurately so that the costs are distributed across all three time bands – green, amber and red. It is argued that this will more accurately reflect the incremental costs of reinforcing the network.

Who will it affect?

The CDCM governs how domestic and business customers connected at low and high voltages are charged, so this change will affect these users. However, the modification will not change the UK's larger electricity connections whose charges are scaled under the Extra High Voltage Distribution Charging Methodology.

There is currently a much higher tariff for usage during the peak 'red' band period

It will be the Distribution Network Operators (DNOs), which own and operate the distribution network that brings electricity to homes and businesses, that will determine the charges in their area. For most DNO areas, red band unit rates will fall but the amber and green rates will rise, likely leading to a net rise for half hourly electricity customers with a spread of consumption across the day and night. Those with HV (excepting extra high voltage) connections will be affected the most.

Despite these changes, red periods will still accrue higher charges than amber and green periods, meaning the incentive to manage consumption at peak periods will remain, although the cost benefit will decrease.

According to Ofgem, the change may "have large impacts on customers". Its working group estimates that some customers could face significant increases in distribution costs. This will vary by location and DNO area but Ofgem states that "the general pattern is that distribution charges for domestic customers will fall, but those for non-domestic customers will increase".

It is certain there will be winners and losers. Businesses that have invested in demand management measures to shift load away from peak times may be particularly disadvantaged. These organisations may have invested in onsite generation or energy storage to avoid premium costs; or made operational changes to reduce the actual demand at these times. As such, Ofgem's changes may cause disruption and dent anticipated returns on this investment.

19%
The amount distribution charges can account for of a customer's energy bill

When, what, how?

As a result of the requirement for a 15-month notice period prior to any new charges, the earliest possible implementation date is April 2018. The latest DNO rates were issued in December 2016 and these will provide a clearer idea of the potential cost implications..

This is the time to re-examine the economic case of existing strategies to reduce peak time consumption and create new power consumption strategies.

Third-party non-energy charges, such as distribution tariffs, make up as much as half of today's business energy bills and are set to rise from a number of other quarters, including capacity market costs. This is making business energy more expensive.

While there is limited room for manoeuvre in reducing these non-commodity costs, businesses do have more freedom to control their wholesale energy costs. Moving from fixed to flexible contracts might provide the best protection against future market fluctuations by allowing energy to be contracted over a period of time rather than fixing at one point.

Businesses should also put energy demand reduction at the top of their agenda and employ efficiency strategies that can generally reduce bills by 5 to 20%. te

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Energy 'black hole looms with costs set to spiral'

Companies risk "sleepwalking into an energy black hole" as a result of rising oil prices, increasing non-energy costs, the low pound and the onset of winter, according to energy procurement firm Businesswise Solutions

Most companies do not realise they face increases of up to 30% per year in energy costs from next year, warns Businesswise Solutions managing director Frazer Durris.

He says: "We hear a lot about the pension black hole but I'm concerned about the energy black hole. The combination of the low pound; uncertainty over Brexit; rising wholesale energy costs, some fundamental changes in non-energy costs and the onset of winter have created the perfect storm and the potential for an energy black hole to appear on company balance sheets.

"We buy and manage energy for companies that typically spend between £100,000 and £20m per annum. If the customer is spending £5m on energy it wouldn't be uncommon to see an increase to £6.5m a year from 2017. It puts pressure on the bottom line for both large corporations and smaller owner-managed organisations and it is vital, now more than ever, that future energy strategies for these operations are discussed at board level."

EXAMPLE: CUSTOMER SPENDING £1.8M ON POWER

	2016	2017	2018
RO (Renewable Obligation) £	354420.5	406059.5	427670.5
% increase		15	21
FIT (Feed in Tariff) £	118291.8	126253.8	127391.2
% increase		7	8
CM (Capacity market) £	3412.264	193361.6	85306.61
% increase		5567	2400
CfD (contract for difference) £	11374.21	68245.29	121704.1
% increase		500	970
Total £	487498.8	793920.2	762072.4
% increase		63	56

Source: Businesswise

Durris says wholesale prices have risen significantly in the past few months, with oil prices also on an upward trend.

Furthermore, National Grid's procurement of standby power to manage dwindling winter capacity margins will also pile on the pressure.

"All these costs have to be paid for," says Durris. "The other big factor is the low value of the pound, which is having a big impact on the wholesale energy price. We import a lot of our energy from Europe and the low pound means it's costing us more."

Durris: act now to mitigate the risk of rising costs

The firm advises companies to act now to mitigate the risk of rising costs. "They need to look at how they buy their energy and ensure they have a robust management strategy to offset the impact," says Durris.

"Basically they need to lower the premiums they're paying to suppliers, look at how they manage it and make a concerted effort to reduce consumption." te

Bergen and UX rolled into global mega brand

US fuel giant World Fuel Supplies has brought together energy management and procurement firms Bergen Energi and The Utilities Exchange under a new global brand, called Kinect Energy.

The firm acquired Bergen last year and fellow third party intermediary The Utilities Exchange in July. US consultancies US Energy, KTM and Beachfront Energy have also been rolled into the Kinect brand.

Announcing the move, Kinect touted access to a worldwide energy network, as well as comprehensive procurement and risk management services to reduce energy spend and increase predictability as core customer propositions. It also promoted end-to-end sustainability services to meet carbon footprint goals.

"Kinect Energy Group reflects our commitment to sustainable energy solutions," said Michael Crosby, EVP of the Global Land segment at World Fuel Services Corporation. "We are proud to provide energy management expertise to diverse organisations and assist in managing complex energy challenges on a local and global scale.

"We are committed to solving energy challenges," said Todd Overgard, SVP of Kinect Energy Group. "Kinect Energy Group allows us to deliver on our customers' energy vision for their operations." te

British Gas: £4bn energy efficiency opportunity...

UK businesses could cut billions of pounds from their energy bills by investing in energy efficiency, reckons British Gas Business boss Gab Barbaro. But he says they must think longer term to realise the prize. Brendan Coyne reports

UK businesses spend £20bn on energy, according to British Gas Business boss Gab Barbaro.

"There is a 10-20% energy efficiency opportunity they can realise. That is a £2bn-£4bn profit opportunity for businesses," he believes.

Procurement departments have excelled in extracting value from supply contracts, "but if we focus [purely] on commodity cost, then we miss that opportunity".

20%
Potential energy efficiency opportunity businesses can realise

Speaking at the Energy Live conference in London, Barbaro pointed to earlier predictions by Frontier Economics that power prices will rise by 5-10% during the next 12 months due to Sterling's fall.

"If prices are going up, the best way to manage that is to take control of their usage. It is a lot more rewarding and a better investment than trying to predict the commodity cycle, which will go up and down," said Barbaro.

"Business users have done a great job through procurement teams of managing down pricing. But in reality the huge value is taking control of your assets," he added.

"The amount of incentives that are beginning to develop now, through distribution networks, National Grid, government – a lot is unaddressed."

Barbaro said energy efficiency and broader services was a "no regret" opportunity both for business and for British Gas, which is spending heavily to scale its energy services business. Parent firm Centrica has stated that it intends to invest £1.2bn of additional resources in distributed energy and power and connected homes up to 2020.

Barbaro said customers win by investing in energy because, as well as "10-20%" bill savings through energy efficiency, they can generate revenue by exporting excess power. Meanwhile, he admitted, providers make higher profits.

> ***Business users have done a great job through procurement teams of managing down pricing. But in reality the huge value is taking control of your assets***
>
> **Gab Barbaro**

"The margins energy suppliers make on industrial and commercial customers are very thin, sometimes negative," said Barbaro. "But the margins that can be made on energy services [are better] and another benefit is that you end up with a more engaged customer."

SSE chief executive Alistair Phillips-Davies was speaking alongside Barbaro at the conference. He confirmed the view that prices would rise.

"On prices, people in this room are going to be facing some issues. Short-term electricity prices for balancing this winter are up 40-70%; gas prices are up 15-20%; coal prices are up strongly, driven by mixture of currency and some scarcity issues," said Phillips-Davis.

"That is something people must consider carefully when managing their hedging costs." te

... as power prices 'set to rise 5-10% in next 12 months'

Power prices could rise by 5-10% during the next 12 months due to the impact of Brexit on Sterling, according to one of Europe's largest economic consultancies.

Mike Huggins, a director at Frontier Economics, told the Energy Live conference that the fall in Sterling would translate to price increases in core energy commodities that would inevitably result in significant hikes in power prices.

"All energy commodities are traded in dollars or euros. We had seen increases of 5-10% increases pre [Sterling] flash crash, now we are seeing 15-20% increases on things like gas, oil and coal," said Huggins. "That will have a quite major effect" on power prices, he added, though it might take a year or so to fully materialise.

While Huggins predicted a dip in UK energy consumption of 1-2% in the next 12-24 months, it would not fully mitigate an increase in prices, he said.

‘More low hanging energy efficiency fruit than ever’

M&S energy efficiency supremo Munish Datta says there is an abundance of opportunities for firms with a genuine will to cut energy consumption, carbon and cost. Brendan Coyne reports

Marks & Spencer head of Plan A and facilities management Munish Datta believes the opportunities for energy efficiency are greater than ever, rejecting the old adage “that the low hanging fruit has been picked”.

Speaking at the The Curve’s XEnergy event in London, Datta argued that “the tree is actually getting heavier, with new fruit growing all the time”.

In 2006, the firm set a target to reduce its energy consumption per square foot by 25% and met it in 2012. M&S has now achieved a 39% reduction, setting its sights on a 50% reduction by 2020.

Since 2012, it has sourced power from 100% renewable sources for UK and Ireland operations, increasingly from on-site generation, and aims to apply similar targets to international operations.

The energy efficiency tree is “getting heavier, with new fruit growing all the time”

Early gains were made from easy wins such as lighting replacement, said Datta, which offered “instant returns”. However, he said retailers now have the opportunity to turn lighting into a potential revenue stream as well as bottom line savings.

“To limit the purpose of lighting to providing purely light is perhaps blinkered thinking,” said Datta. “There is now a technology called LiFi that can transmit data one hundred times faster, locally, through LED lighting to smart devices.”

Datta believes retailers could leverage that technology to enhance customer experience and potentially, increase sales.

“Suddenly, an energy efficient light, which is already costing you less to run, offers the ability to interact with customers, influencing the journey the customer is taking through the store. Suddenly you have a revenue generation case alongside the cost-efficiency business case.”

Datta suggested energy managers look at “hidden” business cases around increased occupant comfort and revenue generation as well as efficiency business cases in order to access further low hanging fruit. Doing so, he said, means that “a simple light has a whole new perspective.”

Datta was speaking as part of a panel session that discussed the impact of technology, data and artificial intelligence on energy management. However, he underlined that people remain crucial to deliver the savings promised by smart technology.

“It is very easy to be seduced by technology and to think it will solve all of our problems. But it is people that make technology happen,” said Datta.

“I would say that 25-30% of the benefits gained from our technology deployment are from training people to use them properly. That is easy to forget in the AI world we are looking ahead to, but it is key.”

Meanwhile, Datta warned that technology could potentially also create problems for businesses that fail to prioritise energy efficiency.

“You cannot underestimate how much more knowledgeable the general public has become about energy and energy efficiency,” Datta suggested.

“With the devices [mobile phones] that everyone walks around with, we are on the cusp of being able to know much more about the building that you are in, its energy use, air pollution levels and so on.” te

> ***It is very easy to be seduced by technology but I would say 25-30% of the benefits gained from our technology deployment are from training people properly***
>
> **Munish Datta**

39%
Reduction in M&S’ energy consumption per square foot since 2006

From Atari games to climate change via 40% cooling savings at Google datacentres

DeepMind co-founder Mustafa Suleyman outlines how the firm slashed cooling costs at Google's datacentres and its plans for Artificial Intelligence as a service en route to tackling climate change and global poverty. Brendan Coyne reports

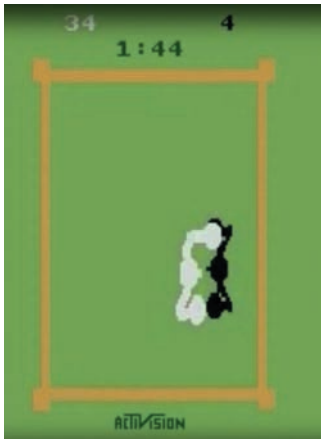
Google's datacentre engineers were deeply skeptical that an AI that learned to 'think' by playing Atari games could cut data centre cooling costs. But they were wrong. It slashed them by 40% and improved overall PUE by 15%.

Datacenters consume about 3% of the world's power and the firm aims to sell its AI learning as a service to more of them – and into other power intensive business sectors. But DeepMind co-founder Mustafa Suleyman is ultimately training the mind he helped to build on bigger problems.

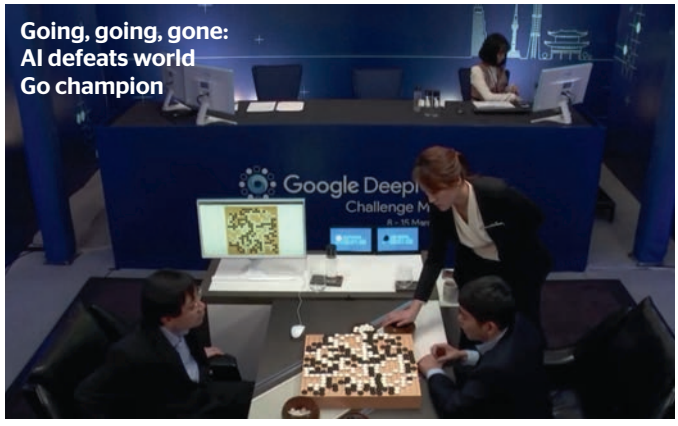
"What is the state of the global environment? Eight hundred million people have no access to clean water – and that is set to double over the next decade. Eight hundred million people are malnourished – and yet a third of the food we produce is wasted," he told The Curve's XEnergy conference.

"We would need 3.1 planet Earths to sustain the global population at UK consumption levels," he said. "So there is a lot at stake."

> ***You can learn really interesting linear versus exponential power efficiency curves that were very surprising and unintuitive to the human operators that had been running the system for some time***



AI contender: algorithm learns to box clever



Going, going, gone: AI defeats world Go champion

All you can eat data

Since DeepMind was acquired by Google three years ago, it has all the data it can eat. But the feast was preceded by a famine, said Suleyman.

"Pre-Google, getting access to data was difficult, so we trained [the mind] with Atari games," he said. "We created a small world. All we passed to the algorithm was raw pixels that describe what is happening in any moment in any frame in the games."

They built everything from scratch, said Suleyman, with the goal simply to maximise the score. "We trained the algorithm to play games, but to learn new knowledge, not our knowledge, limited as it is."

The algorithm, said Suleyman, got pretty good. In the Activision 1980 classic Boxing, "it worked out a clever trick where it could pin the opponent in a corner – and from that position there is no way out."

Post-Google, feeding on data, the algorithms became more powerful and took on increasingly complex games. Earlier this year, the DeepMind AlphaGo programme beat Lee Sedol, 18 times world champion of the ancient Chinese game of Go, four games to one in a televised event watched by 250 million people.

The game, in which the aim is to surround opponent's territory, has more possible configurations than the estimated number of atoms in the known universe, according to Suleyman.

Now DeepMind wants to apply its artificial intelligence to bigger challenges. Climate change, with carbon emissions driven largely by energy consumption, is pretty big.

Datacentres: the heat is on

Power demand from datacentres is expected to triple in the next decade and within the Google fleet, that

consumption is "non-trivial", Suleyman noted. "So we were able to create a model that reduces the energy – and cost – required to cool Google's datacentres by 40%."

The engineers, he said, "were very cynical about whether we could do that." But DeepMind did, improving overall PUE by around 15%. Now the firm aims to launch its optimisation engine as a service platform to other data centre operators and to power intensive sectors more broadly.

The overall objective was to maximise PUE by removing the heat from incoming compute load as efficiently as possible while respecting known temperature and safety constraints.

Key to enabling new insight was "data, data, data", said Suleyman, in two key areas: state data, such as sensor and meter data that describes the physical behaviour of the utility; and action data, such as "how many cooling towers are turned on, how many chillers are active at any given moment, what are the set points of various pressure and temperature valves, flowrates and so forth".

That threw up about 1,200 different state variables, and for each of those variables were about 20 actions, said Suleyman. Those were aggregated into about 120 state representations combined with a series of actions, both continuous and discreet, that would throw up suggested actions to optimise PUE within safe operating constraints.

"Essentially [it is] a very general framework to solve datacentre prediction," said Suleyman. "There's a bunch of state inputs, a bunch of actions, and just like we did with Atari and AlphaGo, we are learning to correlate state with rewarding behaviour."

The aim was also to maximise long-term reward over short-term gains and for the system to predict the degree of confidence in the suggested actions delivering those rewards.

> *The ability to shift loads to different parts of the system, given the type of incoming compute demand and the temperature, actually allowed a much more flexible and fast adaptive response to the kind of conditions that the datacentre team were seeing at any given moment*

Suleyman: Next phase for DeepMind is AI as a service

Machine learnings

Insights gleaned from that approach defied conventional wisdom in three key areas, according to Suleyman:

"The first is that more cooling equipment, not less, brought to bear to run the system turns out to be much more valuable. So if you spread out load really thinly over lots of bits of kit and run them all at a lower level of capacity ... you can learn really interesting linear versus exponential power efficiency curves that were very surprising and unintuitive to the human operators that had been running the system for some time.

"Second: higher flow isn't always better. A lot of the engineers believed that they should be concentrating flow through the chiller a great deal, but if we put less flow through the chiller it turns out that ... the global energy consumed across the system was actually much more efficient.

"Finally, the ability to shift loads to different parts of the system, given the type of incoming compute demand and the temperature, actually allowed a much more flexible and fast adaptive response to the kind of conditions that the data centre team were seeing at any given moment," said Suleyman. "And that turns out to be very valuable."

The methods DeepMind used for Google's data centres are "inherently general, large-scale optimisation systems" that will work "reasonably effectively in a wide range of environments" subject to enough appropriate data, said Suleymen.

"So we are really starting to look at what this might look like as a service we can bring to the market outside of Google." te

Driving energy efficiency

Data centre infrastructure management can improve energy and capacity efficiency. Florence Burnoud, head of global service assurance for Atos, Managed Services and Philippe Heim, Siemens Global DCIM portfolio manager tell The Energyst about the benefits of working in strategic partnerships

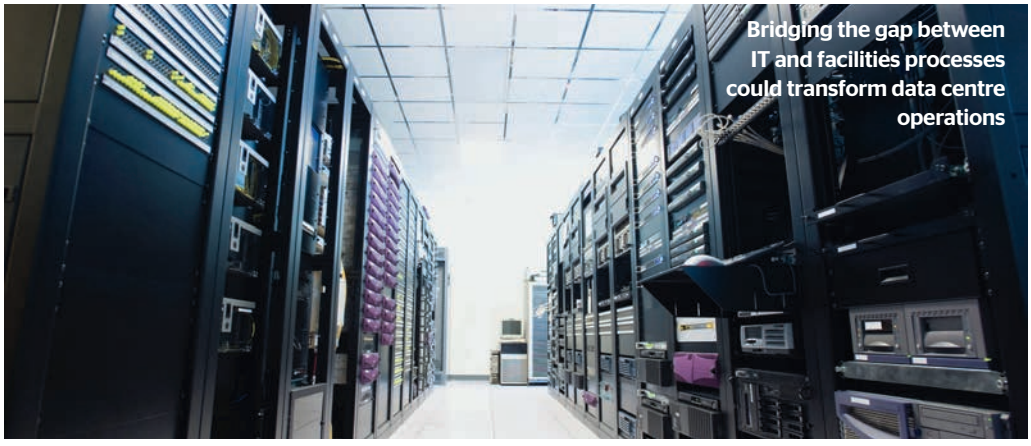
Industry, commercial and public sector organisations rely heavily on instant access to online information to support working processes, productivity and the security of data.

Research shows that in 2014, 60% of organisations suffered downtime with consequences including loss of revenue cited by 34% and loss of customer confidence cited by 29%. In fact, data losses and downtime cost of enterprises around the world amount to £1.36 trillion in 2014, with an estimated cost of £4,500 per minute. It has been predicted that by 2024, business servers worldwide will process each year, the digital data equivalent of a stack of books extending more than 4.37 light-years to Alpha Centauri, the closest star system to our Solar System. With this amount of data running through servers, it is essential that organisations are prepared for all eventualities.

£4.5K
Cost each minute of data losses and downtime

The challenge facing many of today's energy, facilities and building service managers and directors is to ensure the successful implementation of a mission-critical Data Centre Infrastructure Management (DCIM) solution and also to deliver real-time cost and energy savings.

As a leading global IT services provider, Atos manages more than 100 data centres worldwide, taking the responsibility for ensuring the security, reliability and continuity of its customers' critical business information and resources and providing fully managed services to clients across a wide range of industries.



Bridging the gap between IT and facilities processes could transform data centre operations

Atos, based on its competences and knowledge in running these data centres, has contributed to the development of a state-of-the-art DCIM solution, in collaboration with its strategic partner Siemens, to deliver a single, consolidated view of both IT and facilities operations from a single workstation.

Divided data centre operations

Florence Burnoud, head of global service assurance for Atos, Managed Services, and Siemens Global DCIM portfolio manager Philippe Heim agree that data centres are challenged by multiple complex drivers: the need to ensure maximum uptime, reduce carbon footprint and improve energy efficiency; as well as increase process efficiency, accommodate rapid change and also the demand to increase IT service revenue.

Sitting at the core is the natural division between IT services and facilities as each tends to function in a silo, with limited sharing of information. Yet bridging the gap between IT and facilities processes will transform data centre operations, enabling both parties to improve the management of assets and workflows, they believe.

The business case for Atos

Burnoud outlines the scope of Atos' own data centre infrastructure requirements: "We wanted to improve operational performance with software that offered deep integration, with the capacity to manage IT operations and implementation skills, as well as manage energy and capacity efficiencies and incorporate the building and the critical systems to drive down power utilisation and to deliver a safe, secure and efficient data centre."

"Atos had a variety of different asset management tools, products and spreadsheets and we needed a tool that could pull them together in the right place to help make timely, accurate decisions. We also wanted to improve our asset management capabilities with better reporting of capacity and the ability to 'model' infrastructure, to enable better utilisation of data and reduced risk of downtime. To increase overall energy efficiency and reduce utility costs for our customers, the need for detailed, rack-specific power consumption data with real time temperature monitoring and heat map visualisation was vital.

"We monitor success by asking ourselves what our DCIM offers to daily operations in terms of risk mitigation, cost improvements, data Centre performance and agility," she concludes.

A smart decision

To deliver integration and efficiencies across their data centres Atos co-invested in the Siemens DCIM solution. This solution, Siemens DataCentre Clarity LC, delivers

a single, consolidated view of all of a data centre's IT and facilities operations from one workstation. The core benefits of the technology include:

- A single dashboard for Key Performance Indicators such as PUE and floor / used space utilisation
- Real-time monitoring and historical reporting of alarms and notifications, particularly with regard to power, cooling, smart PDUs and IT equipment
- Infrastructure lifecycle management via pre-defined and ad hoc reports, benchmarks and dashboards and monitoring data in an integrated manner
- High-definition asset visualisation to support capacity planning
- Workflow and work order management that delivers information sharing across departments, the ability to audit access or changes, support for cross-team KPIs and cross-functional analysis
- Computational Fluid Dynamics (CFD) create 'what if' scenarios, predict airflows and temperatures for both existing and new data centres
- Power management enables the planning and resourcing of assets and cables, as well as the analysis of future-dated changes
- DataCentre Clarity LC is based on Siemens' tried and tested Product Lifecycle Management software, which has a proven 20-year pedigree
- A data centre manager can access DataCentre Clarity LC from any workstation around the world, giving the management team the agility and flexibility they need to ensure uptime and address upcoming issues

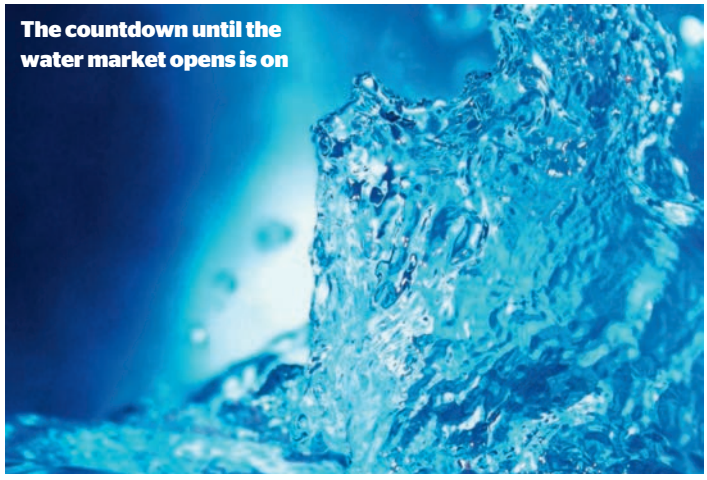
Results so far

Discussing the current outcomes of the implementation of DataCentre Clarity LC in the Atos data centres, Burnoud says: "Most pilot benefits have been realised in the three key areas of cost and risk, performance and agility. A key advantage has been usage-based reporting and invoicing, as well as better understanding of resource, duration and the cost of data cleansing. Overall performance has improved as we can now identify and eliminate Single Point of Failures (SPOFs), which has led to increased availability and reduced downtime; in so doing we provide a better and more fluid service to our customers which has resulted in increased customer confidence.

Furthermore, we have more accurate information on IT asset and M&E power infrastructure and the single view of the data centre has meant improvements to our internal data Centre processes."

"We anticipate future returns will be include further benefits in energy efficiency and a higher utilisation which will mean we are able to pass on reduced costs to our customers, as well as better deployment of data centre capacity through 3D modelling and 'what if' installation planning."

Heim concludes: "The operational challenges facing Atos have been alleviated by the adoption of robust, user-based, modular integrated technology to ensure maximum uptime, resilience and sustainability. DataCentre Clarity LC combines information from vital sub-systems that traditionally operate in isolation into a single, powerful solution that monitors energy and building management, physical security, fire safety, power and communications, zones and raised floors, racks, servers and data storage systems, as well as switches and routers. Importantly, it prevents silos forming between IT and facilities processes, enabling both parties to share greater efficiencies. IT and facility management integration is an essential component for business success in the mission critical data Centre environment and we look forward to working with Atos to further their business requirements." te



Open Water 17 and market awareness

Ofwat and the Consumer Council for Water hosted an event on Wednesday 7 December to explain and raise awareness of 'Open Water 17'. This is the programme for allowing non-household customers to switch their water supplies and wastewater services to one of the 19 or so water retailers that will have licences to operate across England in April 2017.

The water companies are raising awareness on bills and websites and funding a national campaign, which is due to run from January 2017 until the market opens. They are particularly concerned that there is a lack of awareness particularly in the SME sector and are targeting membership organisations and local chambers of commerce etc. to try and raise awareness.

However, research conducted by Ofwat and the Consumer Council for Water back in 2014 suggested that the levels of saving that a company would need to make to prompt a switch of supplier was 19%.

With the margin between retailers and wholesalers expected to be only around 10% it will be difficult for suppliers to generate sufficient saving to prompt the switching that the Open Water 17 programme is planned to deliver.

There have been a number of recent developments in the market. On 29 November 2016 Pennon and South Staffs Water joined forces to operate as Pennon Water Services. The trading name for the group outside their own supply areas will be 'Source for Business'.

Kelda Water / Yorkshire Water's retail arm rebranded to Three Sixty Water in December.

The Water Retail Company, which applied for a licence to supply water and sewerage services on 28 November2016, is a new start-up company headed by Lord Rupert Redesdale, who is the CEO of the Energy Manager's Association. It is planning a limited entry aiming to sign up no more than 20 businesss in its first year. But with an ambition to secure a turnover in its first year of £30m, it is clearly targeting large water users.

Our team of industry experts is on hand to answer any questions or enquiries you may have about water or energy. Contact BIU at:
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Powering health

Public private partnerships are providing increased impetus in driving down carbon emissions and energy costs in public infrastructure projects and taking the pressure off straining public sector budgets. One such example was the subject of a UKAEE event held at Bart's Hospital, London to see an innovative tri-generation project. UKAEE committee members Gonzalo Jimenez and Funsho Alo provide an overview

UKAEE committee members next to a model of the pink trigen system at Barts Hospital

£546K
Barts' annual energy saving using Jenbacher's pink tri-generation (CCHP) system

The UKAEE, in collaboration with Clarke Energy, organised a site visit to Barts Hospital in London in November to see its Energy Centre housing an impressive tri-generation plant.

One of GE's 1.4MW Jenbacher pink tri-generation (CCHP) systems with a 250kW absorption chiller provides a significant proportion of heating, cooling and electricity to the hospital, driving down carbon emissions and the associated energy spend.

The system is expected to save 2,500 tonnes of CO_2 emission and £546K per year.

The CCHP is also supported by 3 x 5.5MW gas boilers.

The hospital is one of Europe's oldest still located in its original place, demonstrating how large-scale low carbon infrastructure projects can work successfully within older buildings.

Bart's Hospital's Energy Centre holds some remarkable statistics. It is the first of its kind, being a collaboration between Sustainable Development Capital (SDCL), GE, Clarke Energy and the NHS Confederation. The onsite tri-generation unit was funded by SDCL as part of its 'Powering Health' collaboration to deliver lower-carbon, fully funded CCHP solutions to NHS Trusts.

The project was delivered through Skanska, which commissioned Clarke Energy to install the system.

It is also the first project that has been procured and delivered through

40th World Energy Engineering Congress 2017: Regional Awards

Regional Awards will be presented on Tuesday 26 September 2017 at the Georgia World Congress Center in Atlanta, Georgia in conjunction with the 40th Anniversary World Energy Engineering Congress (WEEC).

If you know individuals, organisations, agencies, corporationsvor institutions in your region that are doing outstanding work in energy, you will want to make sure they are nominated for this year's awards.

To learn more about the Regional Awards Programme and to see award categories, visit aeecenter.org/regionalawards

To submit your international award nomination, go to the online nomination form at: https://aeeawards.wufoo.com/forms/2017-aee-regional-award-nomination/

WEEE call for papers

The WEEC Advisory Board and the Association of Energy Engineers cordially invite you to submit an abstract for consideration to speak at the 40th World Energy Engineering Congress, being held September 27-29, 2017 at the Georgia World Congress Center, Atlanta, GA. To submit an abstract, visit aeecenter.org/weecabstract.

a variation of a private finance initiative (PFI).

The visit to the centre commenced with an introduction by Paul O'Neill from Clarke Energy into the technical specifications of GE's Jenbacher gas engine and CCHP system along with providing an overview of the project development to the service and maintenance arrangements.

From receiving the initial enquiry, a design and proposals team was assigned. A feasibility study was then conducted to fully appreciate the scheme and assess all loads to realise maximum benefit (operation, availability and reliability) which was used to inform the pre-design and tender development.

Post-tender queries, post-tender interviews and submittal stage were then carried out followed by contract negotiations, project award and internal handover to a design and projects team.

A detailed engineering design was then conducted to include 'Application Design Review' and 'Design Freeze'. The site works stage included pre-construction stages, health and safety considerations, installation, snagging, followed by final commissioning and handover (projects to client, projects to service).

Design consideration

All implementation issues such as layout, balance of plant, mechanical interfaces, electrical interfaces and thermal interfaces were considered as well as a full understanding of the integration with existing services and system resilience. Other aspects such as planning requirements, grid connection application, dispersion modelling and implications to overall programme were also carefully considered.

Engine selection

The generating set installed at the hospital is a JMS420GS-NL Jenbacher gas engine manufactured by GE Power. This engine is characterised by its high power density and efficiency – with total efficiency of the engine of 88.6% (thermal efficiency 47.1%, electrical efficiency 41.4%). The electrical output is 1,426kW and the energy input 3,443kW. The engine also features GE's LEANOX lean-burn combustion control system, which is designed to minimise NOx emissions and maximise engine performance.

Operation and maintenance

Clarke Energy is also providing a 15-year fully comprehensive maintenance contract to the tri-generation system, which helps ensure that the Bart's Health NHS Trust benefits from the increased energy efficiency, reliability, durability and financial savings that the system brings to the hospital.

However, before agreeing on a formal maintenance contract, an essential due diligence process was undertaken by Bart's Health NHS Trust assessing financial stability, ability to guarantee parts availability and price, investment for the future, track record, in-territory support, skilled and equipped service engineers.

Triple bottom line savings

Being a PFI project, where private capital is used to fund public infrastructure projects, there were bound to be challenges in the implementation of this project. Fiona Daly, head of sustainability and patient transport at Bart's Health NHS Trust, took the delegates through the PFI process including financing, risk of the overall project and other options considered. The visit concluded with a walk-around the Energy Centre where Bryan O'Regan gave the attendees further information about the impressive pink trigeneration system and the support boilers.

Ultimately, this has proven that large-scale public private partnerships can be successful through open strategic partnerships such as that between the NHS Confederation, Skanska, SDCL, Clarke Energy and GE, delivering a triple bottom line of cost savings, carbon savings and improved resilience. te

This article was authored by Gonzalo Jimenez, UKAEE committee member and Funsho Alo, webmaster for the UK Association of Energy Engineers (UKAEE).

The UK Association of Energy Engineers (UKAEE) covers a range of expertise in the energy management and energy efficiency sectors. It delivers a range of technical focused seminars and offers excellent networking opportunities for energy and sustainability professionals.

It offers continued professional development opportunities for AEE certifications such as certified energy manager, certified measurement and verification professional and certified energy auditor.

Membership to the UKAEE is currently free. For more information on UKAEE or how to join, or if you like to attend the year's AGM on 31 January 2017 at 5pm in London – venue tbc – please visit ukaee.org.uk

The Jenbacher pink trigen system at Barts provides a significant proportion of the hospital's heating, cooling and electricity

ukaee.org.uk

Water competition and EDI billing will reap rewards

EDI billing is likely to be the main attraction for multisite organisations following reform of the water market, believes Team's managing director Paul Martin

> ***The lessons from electricity and gas competition are that water suppliers need to break away from any complacency engendered from a monopoly position, listen to their customers, embrace change and be quick to implement best practice***

If, as we are led to believe, the price reduction and therefore cost savings following water reform in April 2017 may be as little as 1% to 2%, Electronic Data Interchange (EDI) billing is likely to be the number one priority and the key driver in selecting a water supplier. During electricity and gas competition in the 1990s, cost savings were much larger.

Multi-site organisations are already including EDI in their water tenders as a prerequisite and it is likely that government procurement bodies such as Crown Commercial Services will too This may come as a shock to any water supplier that isn't listening to their business customers as they could miss the opportunity to tender for a water supply contract which may not be tendered again for two or three years.

Just like we had in the 1990s with electricity and gas deregulation, competition is a wonderful opportunity for organisations to get what they have been asking from the water suppliers for many years, ie 'Best Practice' in water billing. EDI, invoicing to the UK utility industry common open standard, TRADACOMS file format 26v3 (UTLBIL), is common place now. Almost all electricity and gas companies can provide this capability (see Table 1) but only one water company can, Yorkshire Water. To their credit it has been providing this since 2003.

Currently, multi-site customers such as retailers, banks, local authorities, health authorities, emergency services and even housing associations and local authority housing obtain their electricity and gas invoices through EDI.

For water, most have to toil through processing paper invoices or occasionally receive CSV files. Each supplier has a differing format that can change without notice and therefore break the process.

It is important to know that EDI billing, contrary to what some utility salesmen think, isn't a spreadsheet, CSV file, posting a PDF on a website, or even XML files despatched electronically. It is also a myth to think that this is only something for large companies. EDI billing is also common place for organisations with only a few sites. EDI is the computer to computer transfer of invoices between two organisations using an agreed industry standard. HM Revenue and Customs accepts EDI as a 'bill' but other forms are merely 'billing information' and hard copies are required to satisfy tax requirements. I know of a few utility companies that got a nasty shock when an over enthusiastic salesman signed them up to 'EDI billing' and after despatching their first consolidated bill in some CSV format, were informed by the customer they were in breach of contract.

So where did it all start and what lessons can be learnt from electricity and gas competition?
We have British

Telecommunications (now BT) to thank for leading the way in bringing best practice into utility billing. Back in the early 1990s, electricity and gas companies were privatised and by the mid-1990s competition arrived. Competition resulted in consumer power and the ability to stipulate to a utility what they wanted. The power was shifting from the state-owned monopoly to the customer, keen to enjoy the process efficiencies they already enjoyed partnering with suppliers in other business sectors. With an eye to the future competitive market, in 1993 BT invited the electricity companies to produce electronic bills.

The problem for BT was it had more than 20 people in Reading processing hundreds of thousands of paper electricity, gas and water invoices for its 7,500 sites from all the regional utility companies. The information within the invoices (which is also a rich source of information for energy management) was entered into BT's M&T software system for validation, checking and forwarding for payment. It was also its energy management database from which it was able to carry out benchmarking, exception reporting, waste detection, financial reporting, budgeting and accruals.

Then, leading up to the competitive market in 1995, BT invited all electricity companies to a meeting. It was explained what requirements would be in its forthcoming tender, why it was asking for them, and said that it would work with electricity companies to provide it. This was to remove all paper billing and replace it with one consolidated bill for all its sites. It should be HM Customs and Excise compliant, to an industry standard format, containing sufficient detail such that all elements of the bill could be checked through its M&T software system. Basically this was the paperless, electronic 'end to end' processing that was then the 'norm' from suppliers in other business sectors. Four electricity companies were successful. Manual bill entry that took two days to input was now processed in 20 minutes. The data processing team in Reading reduced from 22 people to 10, then halved again when gas companies provided EDI billing in 1999.

The lessons from electricity and gas competition are that water suppliers need to break away from any complacency engendered from a monopoly position, listen to their customers, embrace change and be quick to implement best practice.

So how does the EDI billing process work?

The utility company tags the individual invoices that belong to a customer. If the paper invoices are sent to a single address, this is likely to be already done. There are then typically two choices to generate EDI bills:

1) The utility company builds the capability into the core billing system. This was typically the route the utilities took in the late 1990s and early 2000s.

2) The utility company uses a third party, virtually 'off-the-shelf' software. This is located on a server that is sent the billing file, maps this into TRADACOMS format, reconstructs the bills, checks the integrity of the bill, encrypts the file if required and despatches it to the customer by email or other agreed means.

The latter route tends to be favoured by the utilities now as it is non-intrusive, inexpensive and quick to deploy.

The customer will usually receive the email message into their M&T software, which will automatically process it. »

TABLE 1: COMPANIES PROVIDING EDI BILLING

Utility company	Electricity	Gas	Water
Business Stream			✔
Centrica	✔	✔	
Corona Energy		✔	
Dong Energy	✔	✔	
E.ON	✔	✔	
Haven Power	✔		
Laser	✔	✔	
Mobile Gas		✔	
npower	✔	✔	
Opus Energy	✔		
Seven Trent			✔
Scottish and Southern	✔	✔	
Scottish Power	✔		
Smartest Energy	✔		
Three Sixty			✔
Total	✔	✔	
Yorkshire Water			✔

Correct as of 30 November 2016. Source: Team

M&T systems are commonly used by most multi-site organisations to check bills, detect energy waste and to build a database in support of many compliance activities, such as; Carbon Reduction Commitment, Greenhouse Gas Reporting and Display Energy Certificates etc. After validating and checking the bills the software usually sends a file with reduced, but specifically defined information, to finance where it is loaded directly into the accounts payable system for payment – usually by BACS or Direct Debit.

It is customary that the full EDI 'parent' bill amount is paid and any incorrect 'child' bills that the customer identifies are cancelled and rebilled in the next billing cycle. Very occasionally a customer may stipulate that they only want to pay bills that are 100% correct. However, this leads to complications from an HM Revenue and Customs point of view. The customer can protect themselves in their terms and conditions by rejecting the whole consolidated bill if x% are found to be incorrect and ask for a correct consolidated bill to be sent.

Although it is somewhat counter intuitive to pay a bill where some individual bills are known to be incorrect, the alternative is fraught with problems. This procedure has been followed by companies for years.

So what are multi-suite organisations likely to be stipulating in their tenders?

The Energy Services and Technology Association (Esta) represents more than 120 energy services companies including more than 80% of the M&T software suppliers in the UK. The specialist aM&T group within Esta, in conjunction with customers, has produced a 'Best Practice Guide, EDI Billing – The use of the TRADACOMS 26v3 Open Standard by Utility Companies'. This summarises the benefits to both the customer and utility company, indicates which utilities provide EDI and includes wording that can be 'cut and pasted' into electricity, gas and water tenders to invite 'best practice' from their supplier.

The four main elements, which are important to include in tender documentation so both parties understand and agree their obligations, are as follows;

- EDI message, operating procedures and protocols
- Visibility of charges
- Full cancel, reinvoice
- Change control procedures

So how are water companies faring?

The problem with water billing is that it has not moved forward in the past 20 years. When there is a monopoly supplier, isn't it supposed to be the regulator who protects the interests of the consumer?

Currently, as previously mentioned, Yorkshire Water can provide an EDI billing capability. Seven water companies provide CSV files and the rest paper billing. Of the seven, all are in a different format derived by the water company themselves, only one has any change control procedure's, only half have a full cancel and rebill capability and the visibility of charges is mixed.

It seems likely that the new Kelda Retail (Yorkshire Water) will provide EDI billing, Business Stream and Severn Trent had a capability in Q3 2016 as did Thames Water before it withdrew from the market. Water Plus, we believe, is committed, and others we know are likely to follow suit.

> *The problem with water billing is that it hasn't moved forward in the past 20 years*

Interestingly, Welsh Water, which will not be part of the competitive market in 2017, may consider EDI billing due to the pressure from the Welsh public sector and particularly the local authorities in South Wales, which have in turn been asked by the Welsh government to increase electronic payments and processing.

The energy manager of one local authority told me: "Ninety per cent of our water is supplied by one water company. It takes us ages to go through their CSV files, check it, sort out their columns and formats before we can use it. It will cost us £50K to go out to tender through OJEU and if we can only save 1% that's £30K. If we can get them to provide EDI billing like we get for electricity and gas we may not need to go out to tender."

An EDI billing capability is not only an acquisition tool to attract new customers in 2017, it is a retention one too, to keep existing customers in their own area. Also, if water suppliers that have 'opted out' of the non-household market to concentrate on forthcoming household market, do not provide EDI billing for housing associations, local authority housing, university halls of residence etc that want it, and engage with them now to build relationships, they may look elsewhere. These could be plum targets for predatory competitors that can provide it now.

The way ahead seems pretty simple. Listen and hear what customers want. An EDI capability and compliant 'best practice' billing systems could be the number one attraction for many multi-site organisations. The decisions made now by water utilities on billing may determine their success and destiny after April 2017. te

Landlords caught cold?

Heating and hot water within buildings is responsible for 40% of the UK's energy consumption and 20% of its greenhouse gas emissions. The Heat Network Regulations 2014 aim to tackle this but many landlords are either unaware they need to comply or bewildered as to how to do so, writes Carbon Smart director Louise Quarrell

The Heat Network Regulations 2014 affect all organisations that supply and charge for heat, cooling or hot water through a communal or district network, regardless of whether this is billed for directly or through a service charge. This includes landlords with multi-tenanted offices, housing providers, universities, local authorities, and residential care homes.

The regulations have laudable aims – to drive carbon savings by motivating energy efficient behaviour through charging end-users for the heating and cooling they actually consume. While this is an admirable goal, has it been implemented and monitored effectively to achieve results?

Commercial landlords could be forgiven for being confused by the regulations, but ignorance is no defence, says Quarrell

Notification deadline

The requirement to bill end users based on actual supply came into effect on 19 December 2014. Notifications by suppliers of heat and hot water through communal or district networks were due by 31 December 2015.

The next step is to install heat meters for each end user in the building.

However, haphazard rollout has left qualifying landlords either unaware or baffled by the requirements.

The regulations have been poorly publicised. The Department for Business, Energy & Industrial Strategy (BEIS) states that it has, and continues to, exploit a range of awareness-raising activities. Yet even now, almost a year after the notification deadline, we regularly come across organisations that are not aware they need to comply.

Deadlines have been altered multiple times. The original notification deadline was April 2015; this was pushed back to December 2015.

The deadline for installing meters has been moved from December 2016 yet the new date is unknown, although it is likely to be in 2018 to allow organisations sufficient time to budget and plan the required work.

While BEIS is adamant that the deadline moves are aimed at making compliance easier, it does make it difficult for organisations caught by the regulations to keep track and plan their response accordingly.

Need to comply?

Compliance documents have been released and then revoked. The regulations require suppliers to install meters where technically and economically viable to do so. This requires a viability assessment to be carried out.

However, the viability tool designed for this purpose was withdrawn many months ago and remains unavailable. This has left organisations unable to ascertain whether they need to comply with the meter installation requirement.

Complying with the regulations is not a straightforward exercise. The information required within the compliance documents is often not readily available and needs to be sourced from technical specifications, O&M manuals, site visits or online research.

> ***Breaches of the regulations could be subject to compliance notices, penalties (£5,000 per offence) or even criminal prosecution***

Retro-fitting meters can be expensive and disruptive to tenants, and needs to be carefully managed. For larger organisations with multiple systems in scope, the compliance exercise can be a significant undertaking. All the more reason to want to get it right first time.

Mounting concerns have forced BEIS to rethink the regulations and a consultation on the requirements is due early 2017. However, the requirement to notify BEIS about the network and provide key information on the system remains.

BEIS is starting to contact organisations and to chase up non-compliance. Therefore, if you are yet to comply with this element your time is running out!

Although BEIS has stressed it will work with companies to help them comply with the regulations, breaches could be subject to compliance notices, penalties (£5,000 per offence) or even criminal prosecution.

It is a shame the regulations have suffered these setbacks, but from our conversations with the team at BEIS, it seems determined to build a smoother, more straightforward it gets get the revised legislation right – focusing on the efficiency and carbon savings that were its principle aim. te

Free guide to Heat Network regs

The Department for Business, Energy & Industrial Strategy (BEIS) has recently updated the Heat Network (Metering and Billing) Regulations – and community heating firm Switch2 Energy has produced a new free guide detailing what those changes mean for heat suppliers such as landlords and developers.

The legislation covers every community and district heating system across the country and forms a cornerstone of a 10-year international initiative to reduce energy consumption and carbon emissions and increase efficiency.

The major regulatory change is that the duty to fit final customer meters to existing unmetered buildings has been delayed. The feasibility tool, that is intended to indicate the viability of retrofitting meters to existing district heating schemes, is expected to be launched in 2017, with the deadline for retrofitting final customer meters being extended to the end of 2017, or 2018.

However, it remains compulsory for new build projects and most buildings undergoing major refurbishment to fit final customer meters. It is also mandatory for all heat networks to install point of entry meters, which record the amount of heat delivered into the building.

The legislation also rules that heat customers must be billed using actual meter readings, rather than estimates, at least one a year, and that billing information must be transparent and informative. There are also recurring duties for heat suppliers to update the registration of the heat network every four years.

Switch2 head of R&D Ian Allan said: "The only parts of the regulation that are on hold are the feasibility tool and the retrofit of final meters. It is, however, expected that all heat networks will need to be fully metered over time. All other deadlines and requirements still stand and BEIS has indicated that it will strongly enforce the regulation."

He continued: "Smart metering strategies are key to improving energy efficiency, as well as fair and transparent billing."

Download the free guide at bit.ly/2hmtANS

New R-32 heat pump cassette system

Accommodating cooling capacities from 6.8kW to 13.4kW, Daikin says its new Sky Air Bluevolution Cassette is an affordable, energy-efficient, environment-friendly heat pump solution that uses R-32 as a refrigerant.

With a 15% lower refrigerant charge, the system has no need for an annual refrigerant containment check. The firm claims that the new heat pump cassette system, which works off a single phase, 220-240V power supply voltage, provides some of the highest seasonal energy ratings on the market, with a Seasonal Energy Efficiency Ratio (SEER) up to 7.35.

The result, claims Daikin, is a significant improvement in energy efficiency and a 68% reduction in environmental impact compared with the R-410A equivalent products. In addition, the new cassette system has been expanded to support applications with longer piping requirements up to 85m in length.

Seetha Sasikala, Daikin Europe sky air and packaged products SBU manager said: "We are proud to launch Europe's very first light commercial cassette system using a next-generation low GWP refrigerant, which supports Daikin's ongoing global aim to lower the impact of its product portfolio.

"The Sky Air Bluevolution cassette system uses as much as 15% lower refrigerant volume in operation compared to its R-410A equivalent – delivering immediate benefits in installation use and maintenance."

More limescale prevention, less waste

Sentinel Commercial says its new 'Triple Power' water treatment chemicals help deliver lifetime protection from corrosion and limescale in commercial heating and cooling systems.

The new Triple Power Range protects systems up to three times larger than its previous formulations, according to the company, meaning less product now goes further.

In its simple best practice system, cleaning removes contaminants, protection prevents corrosion and limescale in clean systems, and maintenance ensures ongoing protection. According to the firm, a contractor would use a Triple Power Sentinel Commercial X300 Cleaner to remove installation debris, flux residue and greases from a new system or Sentinel Commercial X400 Cleaner to remove black oxide magnetite and other corrosion debris in older systems, and Sentinel Commercial X100 Inhibitor to protect the system. Maintenance involves the regular use of Sentinel SystemCheck, a water treatment analysis kit and service that provides a prompt and independent report of water condition, including confirmation that a system has been correctly cleaned and protected with Sentinel X100 Inhibitor. It also includes the implementation of corrective action, if required.

The new products will be detailed on the firm's website from early 2017.

Gas grid future: Committee on Climate Change chief calls for 'proper' hydrogen trials

The independent Committee on Climate Change (CCC) has called for "proper and effective low carbon hydrogen trials" so that the UK can make informed technology decisions in the mid 2020s to hit 2050 decarbonisation targets.

CEO Matthew Bell also suggested energy efficiency must be central to decision-making to maximise outcomes and that funding for heat pumps must be more effectively targeted.

Bell said that while the blend of low carbon heat technologies – as well as gas – required to decarbonise the economy by 80% on 1990 levels was currently unknown, technology decisions would have to be made within the next decade to stand a chance of hitting 2050 targets.

"There will be an important decision in the mid 2020s about the importance of low carbon hydrogen, because it will potentially create a different role for other technologies such as heat pumps," said Bell. "If we know we have to make that decision in mid 2020s, the question is what needs to be done between now and then both to reduce emissions over next decade, but also prepare ourselves for the decision that needs to be made."

Implementing "proper and effective trials for low carbon hydrogen [and] ramping up at a reasonable rate will allow us to put in place the framework, skills, training, consumer understanding and to join up energy efficiency and low carbon heat so that we will be in a place to know how to push forward in a concrete way in the mid 2020s", Bell told the ADE's heat conference.

He suggested that new build homes and those off the gas grid would be prime candidates for rolling out hydrogen trials in the shorter term, as well as installing more proven technology such as heat pumps. The CCC's scenario modelling suggests about 200,000 heat pumps will be installed a year by 2020. That compares to about 20,000 annual installs today.

CCC scenarios suggest that one in seven homes and "half of public and commercial buildings will be heated by some form of low carbon heat by the time we get into the 2030s", said Bell.

Flexibility and grid services will drive future revenue for combined heat and power

Providing flexibility and grid services will become increasingly valuable to firms with combined heat and power (CHP) systems, according to Chris Marsland, technical director of ENER-G Combined Power.

Marsland said the business, acquired earlier this year by Centrica, expected significant growth during the next 12 months, which would result in a doubling of the "eight billion datapoints" it currently handles.

Speaking at the ADE's heat conference, Marsland said the firm was concentrating on turning that data into insight. ENER-G is building an integrated system that automatically links together all customer generation and storage assets – such as CHP, battery storage and solar – to improve their overall efficiency, "balance out the energy flows" and make the total more effective than the sum of the parts, according to Marsland.

Optimising aggregated customer assets will also enable firms to "access the new value streams for CHP, such as grid support and demand-side response", said Marsland. However, customer trust and engagement represent a barrier to scaling an aggregator-type business model, Marsland acknowledged.

"You are dealing with the energy manager, the maintenance manager and buildings team, with the finance team – it crosses so many different areas within the business. It is really hard to drill down and get the right person who can both make a decision – and bring along the other people involved [in the process]," he said.

Marsland did express optimism that digitisation of the energy industry would help remove market barriers. "Having visibility of energy prices in real-time available to everybody through the internet will help and I think the introduction of smart contracts maybe linked to the blockchains, the bitcoins, will enable peer-to-peer transactions for a single customer with a big utility," he said. "I think that will be a big enabler."

BEIS remains keen to incentivise larger biomass

Government tilts biomass subsidy in larger plants' favour, retains solar thermal support

The government has published changes to support rates for renewable and low carbon heat via the Renewable Heat Incentive (RHI).

The Department for Business, Energy & Industrial Strategy (BEIS) remains keen to incentivise larger biomass, which it believes is a more efficient use of available funds, and has merged existing tariffs into one rate.

The tiered biomass support structure will now favour larger developers.

BEIS has also retained support for non-domestic solar thermal, which was potentially due to be cut when the department consulted on proposed RHI changes earlier this year.

However, 92% of responses to that consultation argued against scrapping support.

Subsidy for commercial air and ground source heat pumps remains unchanged but support for biogas and biomethane will increase, subject to a stricter feedstock requirements.

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Lambeth walks the walk, saves £500,000 per year

An eye on savings: Bouygues is helping Lambeth reduce its expenditure and minimise its carbon footprint

Bouygues Energies & Services has developed an Invest to Save Plan to replace 13,000 existing standard street lights with LED lighting, working in partnership with the London Borough of Lambeth.

The plan will help the local authority reduce expenditure and minimise its carbon footprint while maintaining service delivery.

The project is being delivered on a fast track programme to achieve energy savings of £500,000 per year once completed.

Bouygues operates a private finance initiative (PFI) contract to maintain the street lighting assets for Lambeth Council, so was well placed to undertake the upgrade.

The highlights of the initiative are:

- 2,700 tonnes of carbon saved per year
- 60% energy saving
- eight year payback period
- 13,000 lanterns replaced
- 15 month replacement programme

John Francis, operations manager at Bouygues Energies & Services, said: "With the significant improvements in street lighting technology we can now reduce energy consumption and maintenance costs while maintaining a good standard of lighting. This means the authority's standards regarding lighting, safety and security for residents can continue to be upheld. To date Bouygues has installed over 7,000 lanterns and is significantly ahead of programme."

Lambeth's cabinet member for environment and sustainability, Jennifer Brathwaite, added: "This is an important step in making our borough as environmentally friendly as possible.

"These new LED lights will save the council money, be kind to the environment and even provide a better quality of light on our streets at night.

"When there's an opportunity to improve our service, help the environment and save money, we have to be proactive and take it."

LED Eco Lights shows its softer side with sleek panels for offices, retail and healthcare

LED Eco Lights has added a range of 'sleek' office panels to its Goodlight product line.

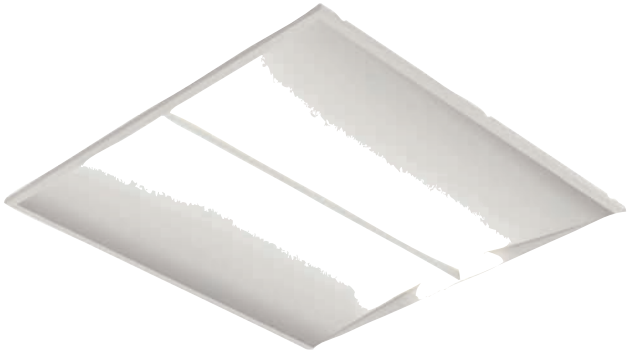
The firm says the Goodlight Luxe panels deliver softer, more natural light, improving the work environment in offices and meeting rooms, and enhancing the ambiance in reception areas and corridors.

The panels also suit high-grade office environments as well as retail, healthcare or educational applications, according to the firm.

The new panel has chamfered twin opal diffusers, providing a uniform 90° light spread. It delivers low glare illumination and, says the company, is well suited for use in Cat A/B fit-outs as well as any areas requiring an LED upgrade for a standard Cat 2 modular fitting.

The Luxe panel draws 32W, is 600mm square and has a colour temperature of 4000K (natural white). LED Eco Lights also offers the Goodlight Avant LED Panel, with a range of mounting options, and includes a microprismatic diffuser for glare-free lighting performance achieving UGR <19.

Businesses can pay upfront or use the company's BrightPlan leasing scheme to pay for the lights directly from energy savings.



Thorn Lighting gets a pizza of the LED action

Thorn Lighting has provided an energy efficient LED lighting upgrade for pizza firm Papa John's new headquarters in Milton Keynes.

The Thorn team worked closely with Halligan Associates, Birmingham, to deliver a design that included 600 x 600 Omega PRO LED recessed luminaires and Chalice LED recessed downlights to provide 450 lux throughout the office areas.

The Omega PRO LED 600x600mm fitting has a slim 12mm profile and a UV-stabilised opal acrylic diffuser so it will retain its clean look. The IP44 rated Omega provides glare control (UGR<19/22) and is easily retrofitted, says Thorn, while maintenance is significantly reduced by the 50,000 hours' life of the 4000K LED lamps supplied with the fitting.

Thorn's Chalice LED is a high-performance LED downlight that Thorn claims delivers efficacy of up to 110 Llm/W. The high performance optic and light mixing chamber provide a uniform appearance which, combined with a unified glare ratio <19, CRI 80 and CRI 90, makes Chalice well suited to high quality lighting applications.

Other Thorn products used in Papa John's upgrade include Glacier LED, modern and efficient decorative LED pendant luminaire with high lumen packages, in the reception area and Surface Aquaforce IP65 rated LED luminaires in the dough room to provide the required 500 lux via low-energy lighting in this damp, dusty environment.

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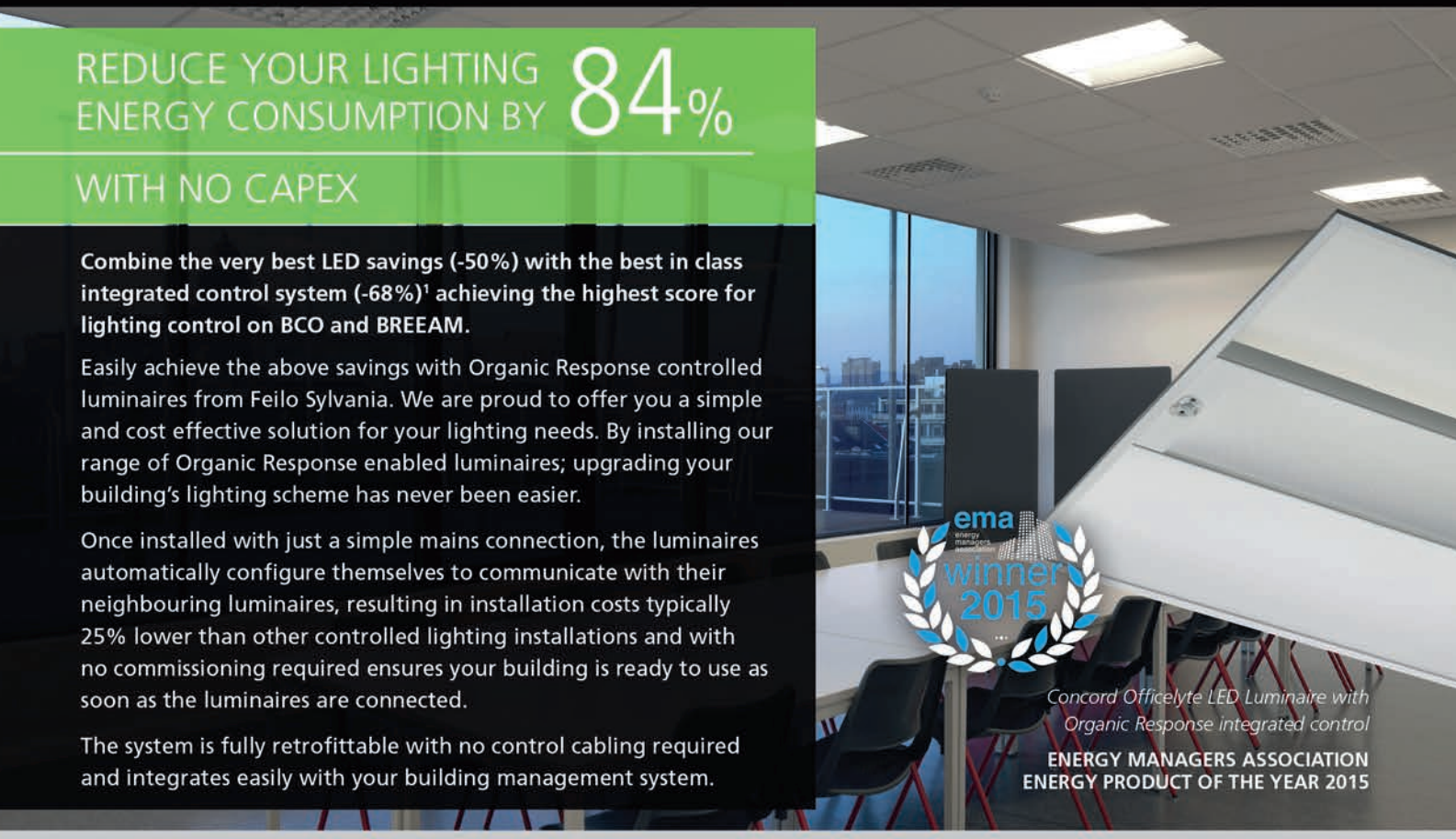

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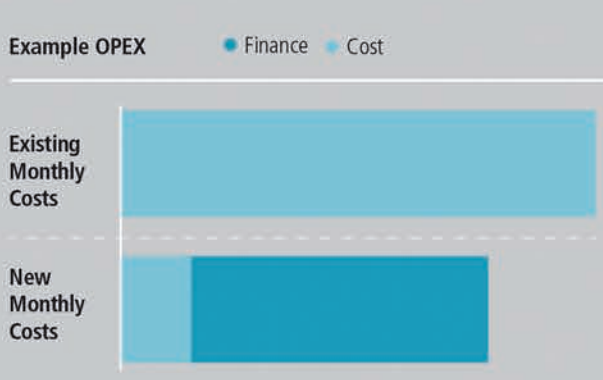

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1 Team Catalyst, Lighting Art + Science, William Street project, 2014. Copies available on request

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2. Behavioural Change/ Employee Engagement
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3. Energy Buying Team of the Year – Six and Under
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4. Energy Buying Team of the Year – Over 6
The Energy Consortium

5. Supplier of the Year
Haven Power

6. Energy Data Collection and Analysis
BG Energy Solutions

7. Energy Efficient Product of the Year HVAC&R
FridgeWize

8

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8. Lighting Energy Impact Award
New York Bakery Company and R3MC (Biffa)

9. Retail Energy Project of the Year
Honeywell

10. Innovation of the Year – Processes and Projects
National Trust / Ashden

11. Public Building Energy Project of the Year
UK Energy Partners

12. Innovation of the Year – Technology: Physical Product
Waterscan

13. Residential Building Energy Project of the Year
Moixa Technology, Bioregional, Oxford Brookes University and Oxford City Council

14. Innovation of the Year – Technology: Internet and Controls
Pulse Business Energy

15. Smart Product of the Year
Honeywell Controls

16. Commercial Building Energy Project of the Year
The Crown Estate

17. Energy Efficient Partnership of the Year
British Gas and the partners in BGreen Oldham

18. Third Party Intermediary of the Year (Broker) – Under 50 Employees
Beond Group

19. Third Party Intermediary of the Year (Broker) – Over 50 Employees
Kinect Energy Group

Cost-effective carbon reduction

From low-energy lighting and building controls to waste-to-energy plants, reducing your carbon footprint doesn't have to break the bank. Nicola Meadow explains

The behaviour of individuals is more important than ever in shaping the future of the green energy sector. This is because while some renewable technologies are very large in scale, such as industrial wind and solar farms, many other initiatives are well-suited to smaller businesses, like low-energy lighting.

This scalability fundamentally sets the renewable sector apart from non-renewables such as coal and oil, which are limited to large-scale industrial generation. But flexibility and lower emissions won't pay the bills, and cost-effective carbon reduction measures are central to maintaining the momentum of the green energy sector.

On an individual level, facilities managers can achieve reductions in energy costs by making a few simple changes. Behavioural adjustments such as using appliances, lighting, heating and water more efficiently are the most cost-effective of all because there is no capital outlay.

Property management companies and housing associations should also consider initiatives like cavity wall and roof insulation, double glazing, draught proofing and boiler replacement.

Introducing low-energy lighting is another option – replacing inefficient halogen bulbs with LEDs can offer a return on investment in energy bill savings about five months after installation, according to YouGen. At the same time, adding occupancy sensors can reduce electricity use by a further 30% by dimming or switching off lighting when a room is vacant, according to the Carbon Trust.

Building controls

Businesses can intelligently regulate an entire building's heating, ventilation, cooling and lighting to reduce excess energy consumption. While more costly to install, depending on their sophistication, these systems offer attractive returns on investment in terms of savings on energy bills.

For those with more funds, low-carbon energy measures including grid-connected solar panels are another option. While a higher capital outlay is required, if a grid-connected system is producing more power than is consumed, then what is left over can be fed into the mains grid, with some electricity companies offering credit on your bill in return.

Installing ground-source heating is another option, but again the price tag is higher thanks to the ground work required, and there are other considerations – a poorly insulated building will struggle to see the benefits of this technology, for example. But if the technology is applied effectively, using an efficient wet system heat distribution like underfloor heating, ground-source heating can be an effective way of reducing energy bills and carbon emissions over the long-term.

Electricity saving by dimming or switching off lighting when a room is vacant

Replacing inefficient halogen bulbs can offer a return on investment in about five months

Large-scale renewables

Moving away from individual initiatives, large-scale renewable energy is a sector traditionally considered more expensive to build and operate than many of the fossil-fuel powered competition.

However, reduced load factors and shorter lifetimes for coal and gas plants are impacting their cost efficiency, while at the same time more of the cost of renewable energy projects relate to their construction, with technology costs dropping in recent years

The Department for Business, Energy & Industrial Strategy estimates the levelised cost of various power generating technologies – essentially the lifetime cost of a power plant per MWh of electricity generated, including construction, operating and decommissioning costs. Its latest figures for November found renewables were more competitive.

Lifetime costs are falling for low-carbon technologies such as large-scale solar, onshore and offshore wind greater than 5MW, and biomass, according to BEIS. For instance, the report outlined potential levelised cost estimates for projects commissioning in 2025, which saw offshore wind drop to £100 per MWh, large-scale solar PV drop to £63, and onshore wind greater than 5MW drop to £61.

This compares with a 2025 levelised cost estimate of £136 to £148 per MWh for coal-fired plants in 2025, between £82 and £189 for various types of gas-fired plant, and £95 per MWh for nuclear.

BEIS also said its estimates of lifetime cost reductions for renewables may be conservative, noting there have previously been large reductions in its projected costs for renewable generation facilities. It explained this reflected cost reductions and technological improvements for these technologies, as well as faster progress in their deployment.

This is just a snapshot of some of the renewable energy options available to individuals and industry. Regardless of whether or not government decides to scrap the carbon price support mechanism, renewables such as solar, wind, biomass and waste-to-energy are becoming far more cost-effective.

These key topics and many others will be featured at The Energy Event 2017 (12-13 September, co-located with RWM at the NEC in Birmingham, rwmexhibition.com), as part of the workshop programme where government, businesses and regulators will come together in high-level discussion. Exhibits from major solution providers, equipment manufacturers and operators will be on show at what promises to be a powerful platform for shaping the future of the low-carbon energy debate. te

Nicola Meadow is RWM Event director at Ascential

Cleantech Hub opens doors in the North East

Green Energy Consulting is set to open a new experiential space in January to demonstrate new energy efficient and renewable technologies.

Based in Gateshead, the Energy Hub concept aims to bring cleantech to life so that clients and potential clients gain a deeper understanding of how technologies work in practice – and how they can be applied across their organisation.

"We want to bring renewables and energy efficiency to life, and show businesses across every sector what can be achieved," said Green Energy Consulting director and co-founder Kilian Coyne.

"We think that demonstrating how the latest technologies can reduce energy consumption and how easy it is to benefit from renewable energy will prove more powerful than reading technical specifications on a page."

The firm says its auditors and energy efficiency experts will also be on hand to provide bespoke demonstrations and advice.

"We look forward to welcoming everybody with an interest in making their organisation more robust and less carbon intensive from January 2017," Coyne added.

Renewable technologies on show at the Hub include ground source heat pumps, solar PV systems and wind turbines while energy efficient technologies showcased include LED lighting, energy monitoring and intelligent heating controls.

As well as welcoming businesses and public sector organisations to the Energy Hub, Coyne says it will also help to educate schools and colleges in the North East on the benefits of a smarter, cleaner and more efficient approach to energy.

Free hydraulic power efficiency download

Eaton has published a new white paper that provides background and approaches for reducing energy consumption in applications where flow rates need to be controlled.

Using hydraulic power units as an example, the power management company's new white paper, Planning and operating hydraulic power units to provide greater energy efficiency, explains how and why the choice of drive concept for hydraulic pumps can have a significant impact on energy and life cycle costs.

Machine and system builders can achieve energy savings of more than 50% if they use variable speed drives. At the same time they benefit from lower heat generation, and therefore reduce cooling requirements.

Other important benefits include achieving a more compact design and reducing pump noise level. The paper also discusses and explains the role of power management and the contribution that an intelligent wiring and communication system can make in preparing machines for the Internet of Things, ie in making machines IoT-ready.

The white paper is available for free download at eaton.eu/moem-ee

Control occupancy switches from your phone

Danlers has launched its EasyZAPP range of PIR occupancy switches. Designed for the automatic control of lighting or other connected loads, these controls are remotely set up or adjusted using a free app on an Android phone or tablet.

EasyZAPP products work as presence detector switches and can be adjusted for settings such as photocell override, time lag and maintained lux levels (dimmable versions only).

The phone or tablet can be used as a remote control on/off override or to configure a number of EasyZAPP controls at the same time. Danlers says the products are straightforward to install and generally make use of existing wiring, making them suitable for either retrofit or new installations.

The EasyZAPP range includes switching only controls as well as controls for dimming available for either DALI, 1-10VDC or DSI dimmable ballasts. Mounting options include: ceiling flush, ceiling surface, high bay and batten mount variants.

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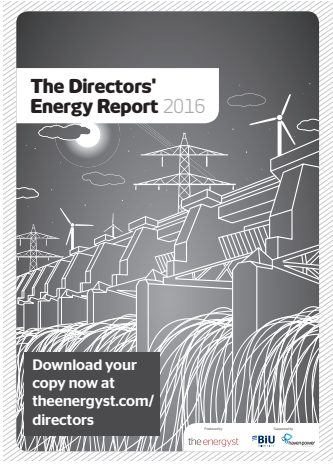

Julie Allen

The principal at JA Allen Consultancy Services talks about Daleks, her Kindle and being the next Joni Mitchell

Who would you least like to share a lift with? Why?
A Dalek. I have an irrational fear of them going back to my childhood. And before anyone says this is highly unlikely, I came across a horde of them in Excel one year. I swear that day I could have given Usain Bolt a run for his money!

You're God for the day. What's the first thing that you do?
Make fossil fuel non-combustible. Then we'd have to work on renewable energy.

If you could travel back in time to a period in history, what would it be and why?
The Victorian era. I'd persuade everyone that decentralising energy production was the way to go.

Who or what are you enjoying listening to?
Jazz and swing, with a bit of soul thrown in. I love Bette Midler and Beth Hart. And Radio 4 Extra, I do love a good drama, especially science fiction.

What unsolved mystery would you like the answers to?
Atlantis! Did it exist?

What would you take to a desert island and why?
My Kindle and a solar charger. I can exist without most things. I've left my phone at home and coped, but I'll always go back for my Kindle!

> *I came across a horde of them [Daleks] in Excel one year. I swear that day I could have given Usain Bolt a run for his money!*

What's your favourite film or book and why?
Tough one this. I love any Terry Pratchett book, and I can always make time to watch *Stardust*. Oh, and *Small Soldiers*. And *Batteries Not Included*.

If you could perpetuate a myth about yourself, what would it be?
That I'm a traveller from the future, come back to save the planet.

What would your super power be and why?
The gift of the gab. I envy marketeers and sales people who can persuade others to do things, even when it sounds daft.

What would you do with a million pounds?
Buy a smallholding and raise chickens and goats. The goats would keep me in wool for my knitting! Oh, and I'd have a recording studio as well. And be self-sufficient.

What's your greatest extravagance?
Yarn. I have far too much, but not enough, all at the same time. I make clothes for my grandson, and dragons and hippos for friends. I also make a mean pair of shark socks.

If you were blessed with any talent, what would your dream job be and why?

A singer. I love singing and I can see myself as the next Joni Mitchell.

What is the best piece of advice you've ever been given?
Don't sweat the small stuff

What irritates you the most in life?
How those with the loudest voices get heard, to the exclusion of common sense. How there always must be the 'Next best thing', even when tried and tested works.

What should energy managers be doing to help themselves in the current climate?
Stop looking at solutions with a marketing bent. Sometimes the most practical solutions are invisible.

What's the best thing – work wise – that you did recently?
Start my own consultancy. I've got over 20 years' experience in the energy industry, from end user to supplier and I realised I could help more people branching out on my own. te

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