the energyst

"If you rip off your customers, you cannot work with us" p42

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> ***If a company genuinely has an off balance sheet structure that complies with IFRS 16 and ESA 10 they are sitting on gold dust***
>
> **– Kathryn Dapré**

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Power, and gas, to the people?

By the time you read this, the snow should have cleared and gas and power prices should have eased down. But the cold snap underlines the fine balance of our energy system and the interrelation of its component parts.

While prompt gas prices soared at the end of February, some power generators made a killing by 'NIV chasing' in the balancing mechanism. Bids of around £1,000/MWh were accepted.

> ***That requires whole systems thinking – and not just across energy, heat and transport – but the entire economy***

Interconnectors imported at full power as generators on the continent took advantage of higher yields in the UK. Gas storage, or lack of it, made national headlines for the first time in years.

Yet, while there may have been a few sweaty palms in Whitehall, the market and its mechanisms did their job.

The UK is incredibly reliant on gas, but will struggle to meet carbon targets if that does not change in the medium term. Getting off natural gas is no mean feat. Gas networks are looking at hydrogen – which could cut carbon emissions, but only if carbon capture and storage can be delivered and that is far from certain.

Electrification could work – and does not rely on unproven technology – but at what cost, given the huge amount of energy and heat delivered by gas?

Difficult and potentially expensive choices must be made which will affect pretty much every aspect of life.

That requires whole systems thinking – and not just across energy, heat and transport – but the entire economy.

The need to think beyond siloes is the driver behind The Energyst Event, a conference and exhibition taking place 17-18 April in Birmingham at the National Motorcycle Museum.

While there are difficult choices facing policymakers and regulators, the conference will discuss some of the easier ways businesses can take advantage of the convergence of energy procurement, efficiency and flexibility.

We'll be talking about heat, storage, flexibility, efficiency, finance, procurement and how these elements can be brought together to deliver greater outcomes than the sum of individual parts.

If you value the insight you receive from experts that share their views with *The Energyst* magazine, The Energyst Event should be on your radar.

It brings people face-to-face to share ideas and find solutions to the challenges we face.

Because while our lives are increasingly shaped by technology, it is ultimately people who must deliver the changes we need to make.

Brendan Coyne
Contributing editor

the energyst

Editor
Tim McManan-Smith
tim@energystmedia.com
t: 020 3714 4450
m: 07818 574308

Contributing editor
Brendan Coyne
brendan@energystmedia.com
t: 020 3771 1267
m: 07557 109724

Design and production
Paul Lindsell
production@energystmedia.com
m: 07790 434813

Sales director
Steve Swaine
steve@energystmedia.com
t: 020 3714 4451
m: 07818 574300

Commercial manager
Daniel Coyne
daniel@energystmedia.com
t: 020 3751 7863
m: 07557 109476

Circulation enquiries
circulation@energystmedia.com

energyst media

Energyst Media Ltd, PO BOX 420, Reigate, Surrey RH2 2DU

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Triad cuts injunction refused as Ofgem prepares for main hearing in April

Firms challenging Ofgem's decision to make deep cuts to Triad export rates were refused a temporary injunction to stop the decision from coming into effect from 1 April.

The companies had sought to delay cuts being implemented ahead of the T-1 Capacity Market auction, which ended in February (see p14).

Lower Triad export payments would have affected small generators' CM bidding strategies. If they knew they would earn a lot for exporting power during times of transmission system stress (Triad payments), they could have bid lower in the auction.

Following the ruling, they no longer had that advantage, and the auction outturn was in any case a record low.

But the cuts to Triad benefit, outlined last year by Ofgem, may spur owners of gas and diesel farms with contracts for delivery next winter and winter 2019/20 to offload them. Consultant Aurora has suggested up to half of small generators with those agreements may give them up, which could materially affect future T-1 auctions.

Ofgem plans to cut Triad export rates by roughly a third this year, a further third in 2019 and again in 2020 to leave them between £3/kW and £7/kW, versus their current value, £45/kW.

Ofgem said refusing to grant an injunction was in the interest of consumers

The regulator says it is fixing a market distortion which it suggests could save consumers up to £7bn by 2034. Decentralised generators have questioned its analysis and approach.

Ofgem said the High Court's refusal to grant an injunction was "in the interest of consumers" and enables it to focus on defending its position in the main judicial review, which is scheduled for three days in late April 2018.

Consultant Franck Latrémolière predicted last issue that Ofgem will lose the case. Having attended part of the hearing, read what he now thinks on p64

Centrica wields axe amid domestic and business supply headwinds

Centrica will commence further cost-cutting, planning to take £500m out of the business each year from now to 2020. The firm targets savings of £1.25bn in total and said like-for-like headcount will decrease by 4,000.

Preliminary results for the year ended 31 December show Centrica lost 10% of its UK customer base, or 1.4 million accounts.

Operating profit collapsed 92% to £4m for Centrica's UK business energy supply unit. It lost 23% of its I&C customer base and 5% of SME customers.

Centrica reiterated it is "focusing retention and acquisition activities on the higher value SME segments, continuing to build relationships with energy brokers and improving our

customer portal facilities to allow them to manage their whole portfolio online".

The company said that approach has "led to an increase in broker-led acquisitions, which should aid our commercial performance" with some recovery in gross margin anticipated in 2018.

While the SME business is less challenged, the company has stated previously that it is not retrenching from the I&C market.

Centrica posted an adjusted operating profit of £1.25bn for the year, down 17%.

Ørsted plans solar, storage and energy services push

Ørsted, the Danish energy company formerly known as Dong, has outlined plans to push into energy storage, services and solar power.

Posting strong profits for 2017, CEO and president Henrik Poulsen said Ørsted has "established a new unit focusing on energy storage and solar PV projects, and we also look into onshore wind".

Meanwhile, the company seeks to mature and scale its 'energy-as-a-service' concept for industrial and commercial customers.

While it is "early days" for its new business initiatives, Poulsen said the company is nevertheless open to strategic acquisitions in those areas.

"When it comes to storage, solar PV and onshore wind, we first and foremost see value creation where we can take over projects from developers who do not have the scale, capabilities, and balance sheet to extract the full value from their projects," he said.

Poulsen said the firm was not "under pressure" to move into areas such as storage, but noted that the global market is expected to grow 15 times to 121GWh by 2025.

Meanwhile, for its core offshore wind business, Poulsen said there remained "considerably potential for further cost reductions".

Earnings before interest, taxes, deductions and amortisation (Ebitda), or operating profit, increased 18% to £2.64bn.

Ørsted outlines its new energy as a service product, via which it may embed staff at client sites, on p26

‘Beast’ drives gas and power price spikes

Freezing temperatures at the end of February and early March led to price surges for both gas and power and renewed calls for investment in gas storage.

National Grid issued a Gas Deficit Warning early on 1 March, which is an indication that demand is likely to outstrip supply and a signal to suppliers to make more gas available.

It also serves as a warning to large firms on interruptible contracts that they may face supply restrictions.

The shortage was exacerbated because Rough, the UK’s largest gas storage facility, stopped withdrawals at midnight on 28 February due to offshore maintenance.

National Grid moved to reassure householders that their supplies would not be affected and that the deficit warning was “part of its toolkit in extreme weather”.

Within-day gas prices on 1 March spiked to 250 pence per them, around five times normal levels.

Meanwhile, as imbalance prices soared, the UK’s older power stations joined flexible generators in the Balancing Mechanism in effectively naming their price to crank into action, some having bids accepted in the region of £1,000/MWh.

By 3pm on 1 March (as *The Energyst* went to press), National Grid was forecasting that supply would meet demand. But by then the incident had made national news, putting pressure on the government to rethink gas storage plans, with Rough now closed to new injections.

WPD to launch flexibility tenders in all areas in 2019

Western Power Distribution will launch flexibility across all of its network areas next year.

The distribution network operator (DNO) has updated its distribution system operator (DSO) transition. A DSO is effectively a smart grid that dispatches distributed generation resource and demand-side response, and more closely manages the network through technology rather than increased copper.

Within its plan, WPD outlined a timetable for key elements of its DSO transition, with flexibility tenders to launch across all networks in 2019 through to new, time-of-use-based network charges for customers in 2023.

Looking further ahead, the company said it expects 8GW of energy storage to be connected to its networks by 2030.

In the meantime, to manage its networks and help National Grid manage the national system, WPD said it will use a mixture of tenders and market based arrangements.

The company noted concerns from stakeholders around DNOs becoming commercial aggregators and said it will not invest in smart grid flexibility services where the market can do so more economically.

Utility plans to build data centres as disruption hits sector

Norway’s state-owned utility Statkraft is eyeing new energy retail and distributed energy models in the UK and has plans to develop data centres, as well as new business models for electric vehicle charging, initially in its home territory.

In its annual report, the firm outlined a number of initiatives.

Divesting from UK offshore wind, Statkraft noted innovation initiatives it is undertaking around automated dispatch of hydro resources to displace fossil fuel at times of low renewable generation.

Statkraft, which last year invested in UK flexibility provider and licensed energy supplier Limejump through its Statkraft Ventures arm, flagged “major changes” affecting the European power market with “new specialised companies” bringing disruption to traditional utilities.

“In the future, Statkraft expects to see changes in the value chain with increasing requirements to remain competitive. Statkraft does not have large end-customer activities but in the UK and Germany it is testing business models within electricity retail and distributed energy. Statkraft intends to increase the company’s energy trading activities and explore new business opportunities in a changing European market. The utility also aims to develop market operations in selected international markets where it owns assets,” the firm stated.

One such new activity is around data centres, which account for an increasingly significant proportion of global power consumption.

Statkraft said it is looking at developing data centre sites and selling them on to global data centre operators.

The firm, which owns Norwegian EV charging infrastructure company Grønn Kontakt, is also looking at developing new business models in that area.

Meanwhile, the report highlighted the growing cyber security threat faced by utilities.

Statkraft said 198 security incidents were reported over the year. Of these, 156 were IT security incidents “whereof nine were high potential incidents that were detected and blocked at an early stage”.

The firm posted operating profit of £1.56bn, versus £282m the prior year.

Flexitricity and Ameresco strike DSR deal

Ameresco has partnered with Flexitricity to provide demand-side response (DSR) services to its industrial and commercial customers in the UK and Europe.

It will enter firms’ load flexibility and generation assets into National Grid balancing services including Short Term Operating Reserve (Stor), Capacity Market, Frequency Response, Demand Turn-Up and Enhanced Frequency Control services, plus Triad.

Flexitricity CEO Ron Ramage said a combined approach would deliver stronger outcomes for customers.

Ameresco vice-president Derek Dixon claimed that the partnership enables the firms to “deploy the UK’s widest and most sophisticated DSR solutions”.

One in 10 commercial buildings drop into danger zone as energy efficiency laws loom

More than one in 10 commercial buildings previously deemed to be above the minimum energy efficiency standards to avoid falling foul of new legislation may actually now be F or G rated.

That should worry landlords given that the new laws come into force on 1 April.

The new Minimum Energy Efficiency Standards (MEES) mean public and private sector non-domestic landlords may not grant a tenancy to new or existing tenants if their property has an EPC rating of band F or G.

From 2023, landlords will not be able to lease buildings with an energy efficiency rating lower than E.

Energy data firm Arbnco has run a number of simulations using EPC data from around 3,500 'well managed' commercial buildings. It has previously warned that the data suggests a third more buildings than thought could prove unlettable.

Commercial property owners are 'failing to heed warnings'

Of those buildings, its latest modelling finds 18% have now dropped down at least one EPC rating band, with 11% of properties on its platform falling to an F or G rating.

Overall, Arbnco said 15% of properties on its platform are now rated F or G, deeming them 'sub-standard' and non-compliant with MEES.

Extrapolating that figure nationally, the firm estimates that up to £130bn of UK commercial property could be at risk of falling foul of MEES.

Overall, some 60% of properties on the platform are now rated D, E, F or G, which the company said illustrates highly rated properties have become more difficult to achieve.

Arbnco director Simon West said the data suggests that property owners are "failing to heed warnings" with time running out to mitigate potential impact on the value of their buildings.

He said the findings should serve "as a stark warning" and advised landlords to centralise and manage EPC buildings data to enable targeted improvements.

The government published MEES guidance for landlords last year. While there are some stiff penalties for non-compliant buildings, improvement works must be deemed viable and landlords can self-certify exemptions.

Transport now biggest pollutor as energy sector cleans up

Transport has overtaken the energy supply sector as the largest contributor of UK greenhouse gas and carbon dioxide emissions.

Statistics released by Beis show falling coal generation in the power sector is driving the broader energy sector's decarbonisation.

Worsening economics for coal generators due to carbon pricing and growth in renewables capacity led the power sector to reduce overall emissions by 17% in 2016 compared with 2015 levels. That follows a fall of 12% in 2015.

Overall transport emissions increased by 2% in 2016 and now represent 26% of UK emissions compared with 25% from the power sector.

Against 1990 baseline levels, the UK has decarbonised by 36% and reduced total greenhouse gas emissions by 41%. The energy sector has reduced emissions since 1990 by 57%, despite a 9% rise in final energy demand over that period.

The transport sector has decreased emissions 2% in 26 years.

Emissions from business, responsible for 17% of overall emissions in 2016, declined by 5% year-on-year and have dropped 29% since 1990. Some of that reduction is attributable to energy efficiency, much of it to the decline of British heavy industry.

Housing emissions increased 4%, the same rise recorded in 2015.

Beis said the UK is on track to meet the second Carbon Budget.

Carillion carve up after outsourcer goes under

Property and facilities management giant CBRE is set to take on Carillion's FM contract with Centrica.

Carillion was awarded the five-year framework in 2016, with an option to extend for a further two years.

Meanwhile, J Murphy & Sons has acquired Carillion's UK power framework business for an undisclosed sum. Murphy will take over Carillion's position on National Grid's electricity overhead lines, substation and underground cable framework contracts.

The deals cover works on National Grid's 33kV to 400kV transmission network in England and Wales.

TPI Energy & Carbon Management acquired

Inprova Group has acquired fellow third party intermediary Energy & Carbon Management for an undisclosed sum.

The Horsham-based firm will continue to operate under the E&CM brand under managing director Gary Worby, with its 20 staff remaining with the business.

The deal is Inprova's second acquisition in West Sussex in recent years.

The firm bought Energyteam almost three years ago in a double swoop that included the acquisition of Warwickshire-based Ener-G Procurement.

Inprova CEO Paul Kennedy welcomed E&CM's staff and clients to the group and said the firm remained on the hunt for "opportunities that will add scale, capacity and capability into our business over the coming months and years".

Energi Mine raises millions

Energy consultancy Energi Mine has raised $15m (£10.6m), with $4m coming in an hour and 21 minutes.

The firm, which plans to use the money to develop an energy token and trading platform, used an initial coin offering (ICO) approach, a fund raising method popular with cryptocurrency developers.

The company raised $11m in a pre-ICO sale and reached its $15m cap in minutes of opening a public sale.

Under Energi Mine's plans, people who bought its EnergiTokens (ETKs) will be able to trade them for goods and services or cash.

"The hard work begins now, as we buckle down and build a platform," said CEO Omar Rahim. "We're in this for the long haul, not for the hype. We are creating a platform that will revolutionise the energy industry from top to bottom."

Rahim added that the firm will state which exchanges its currency can be traded on "as soon as we can".

Rahim, formerly an energy trader at large utilities including SSE, Vattenfall and third party intermediary Inenco, was also a co-founder of TPI LG Energy Group.

He founded Energi Mine a year ago with the concept of coupling artificial intelligence and blockchain to make energy buying more efficient and transparent.

Upside Energy scores £5.5m

Upside Energy, a firm specialising in aggregating smaller loads and bringing them into demand-side response has raised £5.5m from Legal & General and investment and advisory company Systemiq. The company will use the cash to hire technical and commercial staff and scale operations.

Smartest and Origami do deal

Smartest Energy will use Origami Energy's technology platform to manage its customers' distributed energy assets and consumption and boost DSR revenues.

Smartest Energy can now offer real-time, flexible energy management services to help its customers unlock the value of their flexibility.

Mini nuclear reactors 'could decarbonise heat and transport and balance renewables'

Mini nuclear power stations located closer to heat demand could help decarbonise energy, not just electricity, argues a recent report from think tank Policy Exchange.

The report suggests small modular reactors (SMRs) could be based upon proven third generation pressurised water reactor (PWR) designs at a smaller scale. SMRs are typically defined as up to 300MWe.

While critics of nuclear power say it is insufficiently flexible to help balance a power system with high renewables penetration, Policy Exchange believes that SMRs would have a degree of flexibility, based on ramp rates of later PWRs and targeted design improvements.

If so, mini nuclear plants could help enable a greater penetration of renewables while providing baseload to manage period of low wind and sun.

Rolls-Royce's view of how a small modular reactor might look

System stress events have historically taken place during evening winter peaks but National Grid is now also challenged with high levels of solar during summer when demand is low.

At those times, Policy Exchange says SMRs could help to ease system stress by diverting electricity to charge batteries to create hydrogen. That could be pumped into the existing gas grid to deliver lower carbon heat, the report suggests.

Meanwhile, if small reactors could be sited closer to heat demand, i.e. towns and cities, waste heat could be used in heat networks.

Policy Exchange accepts that small modular reactors may be initially more expensive than large nuclear power stations, no small admission, given the furore around the cost of Hinkley C. However, the report argues that with an efficient design and sufficient demand, cost curves for SMRs might follow the same trajectory as offshore wind.

As such, it recommends government funds design studies for SMRs but puts the onus on designers to show how their reactors would deliver flexibility and wider system benefits.

The report also makes broader recommendations about low carbon energy policy post-Brexit.

It suggests scrapping renewables specific energy targets and focusing on decarbonisation at lowest cost; assessing the cost of intermittency, which would deliver a true cost comparator between low carbon technologies; and bringing carbon capture and storage back onto the political agenda – but to decarbonise industry and more carbon-intensive hydrogen production, rather than power generation.

Policy Exchange also suggests government researches potential for long-term storage, such as pumped hydro, compressed air and heat storage.

Supplier pushes back on aggregator claim

A letter from Mark Meyrick, head of Smart Grids, Ecotricity, to The Energyst

Looking at Enernoc's comments around the regulator's role in easing access to the Balancing Mechanism and wholesale markets (*The Energyst* Dec/Jan issue, p47), I was struck by Paul Troughton's comments on 'erecting barriers to deter customers from dealing with aggregators'.

This seems a bit of a cheek to be honest – why wouldn't a supplier try and protect its competitive position, through fair and legal contracting practices? I don't really see why the aggregation community should see it as their right to cherry pick the flexibility off our business customers, leaving the supplier to have to deal with all the load deviation on the rest of their inflexible business portfolio without any tools to manage it, supplying against a tariff that could well have been set 12 months ago.

Flexibility tools are vital for suppliers in dealing with imbalance risk – which isn't a risk aggregators have to manage at all. Therefore, we need to lock in all aspects of a customer's supply, including any flexibility, in the supply contract. That's not 'erecting barriers' – it's sensible business practice.

£185m available for SME energy efficiency projects

The new call for Horizon 2020 Energy Efficiency project proposals has opened, with £185m available to fund small and medium-sized enterprise (SME) energy efficiency schemes in 2018 and 2019.

Funding is also available to local authorities.

The European Commission invites SMEs to apply for funds in areas including: buildings renovation; integrated home renovation services; next-generation of energy performance assessment and certification; heat/cold recovery of industrial waste; capacity building for energy audits; mainstreaming of energy efficiency financing and its further innovation; project development assistance; new energy labelling, modelling energy efficiency and energy demand; supporting public authorities to implement the Energy Union; mitigating household energy poverty; role of consumers in changing the market; and enabling the next-generation of smart services integrating energy efficiency.

Funds are available to individual firms and consortia.

See details on how to apply at http://bit.ly/2FdHo8X

Ofgem reorganises, heavyweights leave

Energy regulator Ofgem is to streamline its structure into three divisions. Meanwhile, two stalwarts are heading for the exit.

Andrew Wright, senior partner for Energy Systems, and Chris Poulton, managing director for E-Serve will leave within the next few months.

The three divisions are:

- Consumers and Markets, which will look after the interests of consumers in the energy market. Its remit will include both wholesale and retail markets as well as enforcement.
- System Operation and Networks will focus resources on the next round of network price controls due to start in 2021 and ensuring maximum benefits for consumers from the rapid changes in the energy system.
- Corporate & Scheme Services will provide business support services to Ofgem and run environmental schemes for government.

CEO Dermot Nolan said the regulator would announce more details in March, ahead of Ofgem's move into the government hub building in April.

He added: "I would like to thank Andrew Wright and Chris Poulton for their enormous contribution to Ofgem. I have appreciated their support during my time at Ofgem and wish them well in their future careers."

Broker lands £3m, aims to make buying transparent

Energy buying platform Open Energy Market has secured £3m in funding from Calculus Capital to scale its operations and take the power away from brokers.

The company will use the money to make platform improvements and expand into the US market.

The firm's ambition is to bring transparency to the energy buying market.

Most UK corporates use a broker. Using a middleman can add unnecessary cost and while some TPIs and buyers offer value for their cut, it can be an opaque market.

Open Energy Market says its platform streamlines the procurement process, using automation to help medium to large firms manage energy contracts. It does this by showing prices offered by suppliers and captures and stores the data that simplifies reporting, forecasting and portfolio management.

The firm claims more than 200 organisations have already benefitted from buying their energy via the platform, including Dairy Crest, EasyJet, Southampton FC and London Business School.

"In an age of technology, it still amazes us how antiquated and manual our industry is," said CEO and founder Chris Maclean.

"Our platform uses technical automation to cut through the complex market processes, alleviating many of the pain points that energy buyers face and ensuring their route to market is as efficient as possible."

More on procurement and transparency on p42

'A year of hanging in the (im)balance'

Louis Burford (pictured), VP Sourcing & Sales, REstore UK outlines 12 months of learnings from FlexTreo™, its day ahead optimisation and imbalance capture tool

FlexTreo™ empowers consumers to take intelligent decisions 'from their desk'

As the grid transforms into a smarter, decentralised grid, traditional methods to procure power are also evolving. The 'old grid' came with incentives for electricity consumers to coerce them into certain consumption patterns like consuming outside peak periods. Consumers were rewarded if they followed a grid-imposed consumption pattern, such as avoiding Triad and Duos charges. But the market is changing, and the new, smarter grid does not need to rely on coercion. Instead, real-time automated flexibility allows for more efficient and cheaper balancing solutions driven by real time grid requirements. Flexible resources can now be deployed to help manage grid stress and rewarded via other channels such as the day-ahead and intraday markets, imbalance market and frequency response and capacity markets.

Energy managers also increasingly understand the potential of flexibility hidden within industrial processes but struggle to identify the optimum way to stack revenue opportunities to maximise value. FlexTreo™, for the first time ever, provides a 360° solution and a holistic, real-time overview of all energy market opportunities, which empowers consumers to take intelligent decisions 'from their desk'. By maximising the capture of energy cost savings through real-time demand-side management and day-ahead planning, FlexTreo™ truly bridges the gap between energy procurement and plant managers, using real-time energy market data to capture real-time opportunities.

No matter where you are in this transition FlexTreo™ will always allow you to harness the power of your flexibilty either via Triads/Duos/peak-shaving in the old grid model, or capturing in day price spikes (imbalance events) and day ahead optimisation for consumers updating their strategy with wholesale exposure, managing exposure in a totally automated way.

Since launching 12 months ago, FlexTreo™ has operated seamlessly alongside participation in all grid reserve programmes. For example, a large industrial manufacturing site, on top of the participation in reserve and capacity markets, has captured £114,000 of imbalance opportunities using FlexTreo™ during the past three months alone by 'stacking' revenue streams.

FlexTreo™ uses the latest technology developments such as deep learning and big data analytics. The more data it has, the more (artificially) intelligent it gets. In a Deep Blue vs Kasparov moment, FlexTreo™ beat one of the most advanced procurement teams in Europe, with cost savings of almost 20%, and all within the industrial boundaries meaning production wasn't impacted.

So, what have we learnt? Energy is becoming more complex. It is no longer about how many kWh do I need and which supplier has the best price. It is about making real time decisions, quickly and automatically using thousands (millions?) of data points and inputs. **So we need help. FlexTreo™ is the future but to take advantage now, please visit www.restore.energy**

REstore

2018... a challenging year for the energy market

The market is not getting any easier, writes Tony West, energy trading consultant, Pulse Business Energy

For many years prior to the summer of 2016, wholesale energy prices fell and forward curves for annual prices were generally in contango. Consequently, it was reasonably easy to meet or beat energy purchase budgets year on year; making it straightforward to get purchasing approvals.

While it is true that fully made up retail prices may not have been dropping significantly, and were eventually increasing as time went on, this was primarily because of a general increase in taxes and levies required to promote and support renewable energy sources. This was largely perceived as out of anyone's control and could not be influenced, although in reality this may not have been true for all buyers.

Throughout this time, many energy brokers, who were looking to aggressively increase customer numbers, also misinterpreted the contango forward-curves and often described them to consumers as forecasts, which appeared to support the argument to purchase earlier than necessary in order to close a deal. With prices moving down these purchases nevertheless looked good compared with previous years, even though in most cases delaying purchasing decisions would have been more beneficial – many of Pulse's customers did take advantage of such contract flexibility and so achieved even better prices than the fixed prices being peddled by others.

At the same time, Ofgem were encouraging new entrant suppliers, which, together with the active TPI sector, helped to create increased competitivity, further pushing prices down.

As mid-2016 approached the market bottomed, coinciding with a structural shift as the forward curve for annual prices flipped to backwardation, enabling consumers to cover forward years at lower prices – consumers also began to better understand the market structure and learnt that backwardation was actually a sign of an underlying stronger (bullish) market sentiment and so buying forward sooner rather than later was likely to be a good strategy.

As time progressed markets became more difficult; prices rose and volatility increased. Whereas backwardation meant consumers could still buy forward years cheaper, overall price levels were higher and so beating budgets, aimed at achieving previous year's levels, became ever more difficult.

As we move through 2018, all these challenges have increased. These difficult market conditions are also affecting suppliers, as evidenced by recent announcements by Centrica and the consolidation of many of the newer entrants, some of which have experienced business threatening risk management and financial performance issues.

Several factors are at play, which will ensure the energy market in UK, and EU for that matter, will remain challenging in 2018 and maybe beyond:

- Thermal generation capacity mix has changed over recent years and will continue to do so going forward. Historically during the winter, when demand for gas is high for heating, coal-fired power generation helped to lessen the demand on gas for power generation. However, over recent years, emission regulations, including SOx, NOX and CO_2, have all resulted in the gradual closure of coal-fired power generation plants particularly in UK but also now impacting on countries like Germany, Spain and Poland, who have traditionally been large users of coal. This means in cold periods and at times when French Nuclear power generation or intermitted renewable power is curtailed, gas fired power generation is relied upon; often coinciding with high heating demand, resulting in high price volatility.
- Following the recent closure of the Rough storage facility and the reduction in production capacity from the large Groningen gas field, the

> ***As spring turns to summer the possibility of contango returning becomes more likely and then flexible strategies with delayed purchasing will become the order of the day again***

market is now increasingly reliant non conventional gas supply, i.e. Russian and Norwegian gas flows, and LNG deliveries, which are all very price sensitive.

- The increasing proportion of wind and solar power generation capacity, which is primarily driven by subsidy rather than the wholesale market, has not only added to production volatility, but has also changed market drivers. Prices have become much more correlated to weather (temperature, wind and sun) and far less correlated to supply/demand – peak demand no longer necessarily coincides with peak price – the market is not broken but really does need updating to reflect the modern generation mix.
- Oil prices have risen recently as the oil market supply/demand balanced and OPEC curtailed production levels, though whether this will be maintained as 2018 progresses is not obvious.

All these factors support the likelihood of greater volatility. However, as regulations come in to 'fix the market', suppliers consolidate and subsidy incentives for new generation change, the impact reduces.

Furthermore, the recent capacity auctions demonstrate National Grid is increasingly confident it has sufficient 'reserve' capacity to manage imbalances. While current conditions might suggest fixing forward energy prices could be the lower risk strategy, as spring turns to summer the possibility of contango returning becomes more likely and then flexible strategies with delayed purchasing will become the order of the day again, though today deciding which way to go is not obvious.

A word about Brexit. It might surprise some, though in isolation Brexit is unlikely to have a major impact on the UK energy market. If we assume the energy market is indeed just that, it will ultimately be driven by fundamental factors, primarily supply and demand; remembering it is essentially a global market anyway, with the largest energy suppliers to Europe being Russia and Norway (neither part of the current EU 28), with renewables increasingly significant too. Yes, there could be macro-economic impacts of Brexit, perhaps causing large-scale demand reduction and changes to FX rates, though many of the consequences will have opposing impacts on price. Furthermore, Europe is set up on a very integrated basis to allow multidirectional energy flows; technical issues may need to be finalised but it is in nobody's interest to impose cross border tariffs. Even the European Parliament's recent study 'The Impact of Brexit on the EU Energy System' recognises that the energy-system impact of Brexit will be limited.

Pulse wins Energy Buying Team of the Year accolade

Pulse Business Energy has been named winner in the Energy Buying Team of the Year category in the Energy Awards 2017, the benchmark for quality in the Energy business, celebrating innovation and best practice across the industry.

The Energy Buying Team of the Year Award has been introduced to emphasise the importance of teamwork in the procurement of energy and recognises a company's ability to devise and implement a purchasing strategy that manages energy prices in a controllable manner while achieving below budget costs for gas and electricity procurement.

It is fast becoming one of the most hotly contested categories in the awards. The field is so strong it is no longer enough simply for teams to demonstrate successful performance – judges now look for additional factors to separate out the winners from the chasing pack.

This year's award has been won in partnership with the Nottingham Express Transit (NET), which consists of a 32km-long tram network servicing the city of Nottingham.

Prior to involving Pulse Business Energy, NET fixed the price of electricity for three years at a time. Pulse devised a three-year procurement strategy that could be modified to reflect changes in the market and NET's requirements. The strategy was so successful that it saved NET £1,198,340 between 2015-2018 against the price available to fix in November 2013.

The lower tram costs made NET more attractive to commuters and increased tram usage provided several environmental benefits like improving the city air quality and reducing congestion and traffic in the city centre. "True teamwork and impressive results," raved judges

This award is a substantial milestone in Pulse's business strategy following the acquisition in early 2017 by the Arrow Group.

Ben Dhesi, managing director of Pulse, comments: "We are especially pleased to accept this award as an acknowledgment of our commitment to the Pulse customers and our desire to offer market-leading energy and water solutions."

Pulse Business Energy is leading the innovation and practices in the Energy sector, previously winning the Energy Buying Team of the Year in 2015 and the Innovation of the Year Award in 2016 with its revolutionary Pulse Online Database business platform (POD).

Cut price capacity 'not a disaster' for flexibility

Capacity market auction prices cleared much lower than most analysts predicted. Some believe it makes battery storage economics even more difficult. Other flexibility providers remain convinced it provides a foundation to greater prizes. Brendan Coyne reports

A capacity market price of £8.40/kW in the T-4 auction was not seen as particularly good news for UK battery storage developers.

Nevertheless, 153MW of de-rated capacity took an agreement at that rate.

Last winter, about 520MW of batteries secured agreements in the T-4 auction, which cleared at £22.50. Yet that figure is not directly comparable with the latest auction due to de-rating factors announced in December.

Last year, battery asset owners were awarded agreements with a 98% de-rating factor. This year, batteries were de-rated according to duration of output. A 30-minute battery would therefore receive about a fifth of the clearing price, whereas assets that can discharge at full rating for four hours would receive the same 98% de-rating factor.

This winter, some 391MW of batteries secured agreements, so the gross capacity of batteries with contracts is only 25% lower than the previous auction.

While the price was low, capacity market agreements are an important income stream for storage developers because they can provide a 15-year bankable income on which to stack other, far less certain revenues. Given the challenges in financing batteries, that may be why some bidders took such a low rate.

> ***We don't believe the auction results are a 'good thing' for DSR but they certainly aren't the end of the world***

Mixed views

Other bidders opted not to progress projects at £8.40/kW.

UK Power Reserve preferred to promote the 200MW (190MW derated) of agreements it secured for new-build gas recip engines, taking its total portfolio above 1GW.

But asked about battery storage, UKPR business development manager, Marlon Dey, said the results suggest "the market is clearly still attracting batteries, and investors must be feeling confident about the need for them and the revenues they can achieve".

Dey said this was a good result for bill payers.

Mark Meyrick, head of smart grids at Ecotricity, was less enthused. "It's a huge slap in the face for batteries, which are already struggling to get financing, as financiers try to get their head around revenue streams and where they are coming from," he said. "This just made it that bit harder."

Demand-side response

Aggregators took most of the 1.2GW of agreements secured for demand-side response, a volume broadly similar to last winter's T-4 auction (which procured 1.4GW of DSR).

While the clearing price was lower than anticipated, it was not a disaster for providers with multiple revenue sources, said Enernoc, which secured 287MW. "We don't believe the auction results are a 'good thing' for DSR but they certainly aren't the end of the world," said Enernoc EMEA managing director Dirk Idstein.

He said that while the capacity market would "ideally be less volatile", it offered price certainty over a longer timeframe than any other GB programme, providing a base on which to stack other opportunities, both contracted and market-based.

He added that Enernoc continued to push for further market reform to provide access to the balancing mechanism, which represents potential revenue opportunities of some £350m to flexibility providers.

Idstein welcomed proposals to unbundle flexibility services from supply contracts, which the firm believes limits choice for businesses by forcing them to work with a licensed supplier to access flexibility markets such as the balancing mechanism.

"After years of work, this unbundling should happen in Great Britain next year," said Idstein. "We think this is a big win for customers, and believe this despite now being part of a major supplier in many countries."

Michael Phelan, chief executive of Gridbeyond (formerly Endeco), said the auction's low clearing price "suggests that the market is increasingly valuing flexibility, rather than capacity".

He said the proliferation of renewables means National Grid's challenge "revolves around how firm the generation is and how to counter that with flexibility, rather than the amount of available power". te

Gas king as coal declines, interconnectors rise

Of 50.4GW of agreements awarded in the T-4 auction, gas took the lion's share (58%) with 29.6GW. Nuclear took 7.9GW, while interconnectors, included in the auction for the first time, secured 4.6GW.

Coal secured just 2.6GW, compared with 6.1GW of coal and biomass in the previous T-4 auction.

Pumped storage took 2.5GW, DSR 1.2GW, hydro 654MW and energy from waste 547MW. Diesel agreements totalled 361MW, roughly half versus last winter's T-4 auction.

Meanwhile, the T-1 auction for deliver next winter cleared 5.8GW of agreements at £6/kW, which equates to about £35m added to bills next winter, on top of the cost of capacity market agreements awarded four years prior.

Gas took the lion's share of contracts awarded, diesel took very little. Some 673MW of CHP and autogeneration won contracts; 632MW of coal and biomass; 443MW of DSR and 89MW of battery storage was successful.

Shell signs PPA with England's largest solar farm

Oil giants are increasing investment in renewables, driving competition for deals. Meanwhile, developers are seriously considering battery storage and co-location. Brendan Coyne reports

Shell has signed a deal to buy all of the power from England's largest solar park, the 69.8MW Bradenstoke development, once RAF Lyneham, near Swindon.

The deal follows Shell's entrance into both business and domestic energy retail and represents another small but strategic step by big oil into clean energy.

In December, BP bought a 43% share of solar firm Lightsource. Meanwhile Denmark Oil and Natural Gas (Dong) has divested fossil assets and rebranded as Ørsted.

Shell used to manufacture and market PV cells and made a foray into solar 17 years ago with a Siemens joint venture, before buying out its partner, and then, five years later, scrapping the idea.

However, it has recently acquired an electric vehicle charging firm and is mulling the long-term future of its petrol stations. In January, the firm paid £158m for a 44% in US solar company Silicon Ranch Corporation.

Compared with the likes of Ørsted, Shell remains hugely invested in oil and gas but stated in November it will double annual investment in clean energy development to $2bn (£1.45bn), which suggests the fossil giant will announce further renewables deals in the coming months.

Growth and consolidation

The Bradenstoke power purchase agreement was negotiated with O&M contractor British Solar Renewables (BSR), which is majority owned by Norway-based holding company, Siem Europe SARL, which also owns the solar farm.

While policy changes last year curbed the subsidy-fuelled growth of previous years, the secondary market is increasingly competitive, as funds fight to secure generous, long-term, index linked revenue streams: about a fifth of UK solar farms are expected to change hands in the next year, according to renewables investment firm, The Foresight Group.

Graham Harding, BSR managing director and chief financial officer, told *The Energyst* that consolidation »

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in the ownership of big solar would likely lead to consolidation in the operations and maintenance (O&M) market as owners seek efficiencies to maximise profit.

"Owners are looking to rationalise their O&M providers to avoid having to deal with a large number of companies to look after long-term assets. These assets need to be looked after as efficiently as possible," said Harding. "So O&M consolidation is almost inevitable over time."

He says despite subsidy cuts, "there is still very much a [solar] marketplace going forward," although "not on the scale of the last few years".

Shell will double annual investment in clean energy development to $2bn (£1.45bn)

Solar, storage, money

As well as efficiencies and continued component cost reductions, Harding says co-location of storage will also influence market growth.

Investors are trying understand storage and co-location economics. However, "the challenge is that every site has its idiosyncrasies, you have to take a case-by-case basis, there is no magic bullet" or standardised approach, says Harding.

BSR now manages over half a gigawatt of solar and has significant battery storage ambition.

"It is a fascinating area. It comes down to finding investors and funders that are comfortable with a level of return that is relatively consistent with solar, but that is not underpinned by a subsidised revenue stream. Everybody is looking at the returns that can be achieved."

Capacity market contracts provide a small but bankable revenue stream, one which is now smaller for short duration assets following derating factors published in December. Most battery assets that were successful in the T-4 Capacity Auction will only receive a fraction of the £8.40/kW/year clearing price.

The bigger prize is firm frequency response (FFR) contracts from National Grid. However, FFR prices are falling as firms pile in, with risk of "acute revenue compression", according to economic consultants, Baringa Partners.

Shift happens

That compounds the challenge facing investors. But Harding believes more revenues streams will emerge. "There will be a demand for these assets," he says, "so [investors] almost have to take a leap of faith."

Moreover, while political risk can never be discounted, Harding suggests the current climate and recent government announcements clearly signpost the direction of travel.

That may suggest further big deals are in the offing.

"We are in an environment now where things like the Clean Growth Strategy, the Industrial Strategy and the environment plan are all pointing in the same direction. That is, a shift away from coal and oil to, ideally, a world in which renewable energy is a key feature," says Harding.

"Therefore, big organisations like BP and Shell will be looking at how they can do that. The direction of travel feels fairly clear both domestically and internationally, and I don't think that is going to change." te

PPAs boom as corporates eye economic benefits

The world's biggest companies are driving a boom in power purchase agreements with renewable generators.

A new report from the RE100 group, which encompasses 122 large corporates committed to buying 100% renewable power, shows PPA deals increased four-fold across the group in 2016. Most of the PPA growth in Europe came from deals struck between members and off-site generators in the UK.

The report breaks down the procurement practices and progress of members towards their renewables ambition.

Collectively, RE100 members' electricity demand stands at 159TWh per year, more than enough to power Poland.

On average, members sourced 32% of their power from renewable sources in 2016. That was down from 50% in 2015 but is attributed to new members joining RE100 over the year that currently procure less renewable power as a percentage of their overall consumption.

Some 25 firms have already achieved 100% renewable power procurement, with Marks & Spencer and Sky joining the club last year.

RE100 members include tech giants Ebay, Facebook, Google and Microsoft as well as telcos, media companies, data centres, consumer goods companies, manufacturers, banks, insurers, carmakers, pharmaceutical companies and retailers .

Surveyed for the report, 88% of member companies said economics of buying renewable power were an important part of the rationale to commit to doing so.

The group plans to increase membership to 200 this year and is specifically targeting large energy users from the metals, cement and other heavy industrial sectors.

It believes that by bringing the buying power of the group to bear, RE100 can also help deliver significant progress within renewables supply chains, further driving down costs.

As well as PPA growth, the report suggests member companies are also massively increasing the amount of power they generate and consume from onsite renewables. te

See the report at: http://bit.ly/2E04RLa

Self-generation: the answer to rising energy costs?

Ian Farr, sales manager at CHP and power generation firm Edina, outlines why firms should consider onsite generation, plus potential risks on the horizon

In a recent energy resilience report published by Centrica, 80% of businesses surveyed either had a concern or serious concern about the rise in energy prices.

Wholesale power (the actual cost of the electricity) prices declined in 2015, 2016 and early 2017 yet the annual power bill for a site continues to rise. If the wholesale price of gas and electricity is getting cheaper, then why is the power bill getting more expensive?

While the wholesale electricity price has reduced, the non-commodity costs on the overall power bill have increased significantly. These non-commodity costs are principally the additional charges for Green energy, and the costs for transmission and distribution of power. In 2017 the non–commodity charges accounted for over 50% of the total power bill.

Typically, if the purchase power price was 8p/kWh in 2017 it is likely to be 11p/kWh or greater by 2020 – representing a 37.5% increase. If oil and gas prices rise, then the wholesale power price will also rise, increasing this figure further.

Understanding the power bill

The power bill is made up of a number of components: the wholesale price of power including transmission losses, which currently accounts for just under 50% of the total power bill; grid charges such as distribution use of system (DUoS), transmission use of system (TNUoS, aka Triad), balancing services use of system (BSUoS) and the capacity market (CM), which collectively make up 15-20% of the total power bill; and green charges including Climate Change Levy (CCL), renewable energy obligation (RO), Feed-in Tariff (FIT) and Contract for Difference (CfD), which account for an eye-watering 30-35% of the total power bill. The remaining 2-4% is costed for supplier and margin charges.

By 2020 the grid, supplier and green charges could account for more than 60% of the annual power bill, representing an increase of almost 20% on the power bill overall cost when compared with prices in 2017.

For businesses and high energy users where energy is a substantial overhead, this is undoubtedly a growing concern and strategies to offset these cost rises is imperative.

Self-generation

The conventional way of

Onsite generation: the power to control costs

procuring energy is often perceived as a commodity delivered at a fixed cost, with little control. Medium and large users usually obtain a one or two-year contract at the lowest price offered. Historically in some years new contracts have shown large savings over the previous as the global wholesale price of energy has changed. Currently, with the increasing cost of the non-commodity element of the power price, the opportunity for obtaining a significantly competitive power price contract is slim, with overall costs increasing year-on-year. However, a decentralised energy solution through reciprocating gas engine technology can reduce the annual power bill, offset the non-commodity costs, and potentially make money via the capacity market.

Self-generation also provides insulation against impending cost rises.

Quantifying savings

New gas-fuelled generation has a high electrical conversion efficiency with low maintenance requirements. A typical fuel and maintenance operating cost would be around 6-7p/kWh. Hence with rising power costs the potential annual bill savings could be in the range of 20%-40% less than imported grid power going forward.

For example, if a site had a 1000kWe average electrical import it would use circa 700MWh a month, totalling £65,000 in energy costs per month. If a gas generator was installed at site, which supplied 80% of the site's electrical load, it could conceivably save £200,000 on a 2018 annual power bill. This would increase to £250,000 in 2019 and £300,000 in 2020 as power bills increase.

In real terms, a hospital with a continuous electrical and heat demand of around 1MWe, could easily save more than £200,000 per year on its energy costs – enough to employ up to eight nurses on an entry level salary band earning £23,137* per annum, allowing hospitals to divert cost savings to support front line resources.

> *A hospital with a continuous electrical and heat demand of around 1MWe, could easily save more than £200,000 per year on its energy costs – enough to employ up to eight nurses on an entry level salary*

Combined heat and power

Further additional savings can be made if heat is utilised from combined heat and power (CHP) application. This can be high grade heat or low grade depending on the process or need. Even if the heat required is small, it can be used for space heating for the office or factory. The heat can also be used for supplying cooling and chilling through what's known as tri-generation. On sites where CHP would be a good application, but there is no mains gas supply, alternative fuels such as liquefied natural gas (LNG) are now also potentially economic.

Additionally, any heat recovery as CHP will reduce the facility's carbon footprint, and where the majority of the heat is used there are further potential cost benefits in reduction of CCL costs.

Opportunity and risk

Purchasing power from the grid is a simple supply contract and an operating cost for a facility. Installing a CHP is a capital spend and additional complexities and operation on site. It does not produce more "product" for the site, but does reduce operational costs and can future proof against ongoing power cost rises. The capital aspects of the purchase can be offset by lease purchase or even separate onsite power agreements.

It can make economic sense to self-generate, often providing a favourable return on investment of two to four years (sooner if CHP is applied).

The largest operational cost for onsite generation is the fuel gas. Gas prices are relatively low at the moment but future trends cannot be predicted as it is a global commodity. However, there is a direct correlation in the UK between the fuel commodity price and the wholesale price of electricity. If the gas price increased such that the cost of onsite generation increased by 1p/kWh, then it would be expected that the wholesale price of electricity would also increase by around 1p/kWh.

Charging regime change

There are ongoing reviews and changes in charging to how the grid, national and regional is paid for. At the regional level the DCP 161 (a set import capacity a business has agreed with the DNO) and DCP 228 (time of use DUoS tariffs) network charging changes come into force on 1 April 2018.

The DUoS tariff change is supposedly to proportion, distribution and DNO maintenance costs evenly across user power bills. Previously the majority of the charge was paid during peak (4-7pm) but now the peak charge is reduced and the day and night rates increased. Sites that use power continuously rather than just during the day, and those that undertake reduced load at peak times are likely to lose out and pay a higher charge. Also, if a site exceeds its agreed import capacity, the costs for this are expected to increase significantly.

However, it remains unclear how businesses with onsite generation will be charged for national grid access, flexibility and capacity, details of which are part of a major review conducted by Ofgem which is scheduled to publish in 2020.

MCPD concerns

The Medium Combustion Plant Directive comes into force in December 2018 to regulate emissions of pollutants from industrial plant including generation with a 1MW-50MW thermal input and has raised a few concerns. However, at the moment this directive should have limited direct effect on onsite gas generation. te

For further detail on MCPD implications for onsite generation see p22

**Median salary calculated at payscale.com*

MCPD: taking back-up generators out of Triad avoidance

Legislation passed to transpose the Medium Combustion Plar Directive now rules out using back-up generators for Triad avoidance as well as demand-side response. Brendan Coyne reports

Legislation passed to comply with the Medium Combustion Plant Directive appears to rule out using back-up generators for Triad avoidance as well as demand-side response.

Last issue, *The Energyst* reported on implications of new emissions legislation that effectively takes unabated back-up generators out of demand-side response. But it has since emerged that Triad avoidance is also out of scope.

The Medium Combustion Plant Directive is EU legislation intended to improve air quality.

The government has actually gone beyond MCPD requirements and in January passed The Environmental Permitting (England and Wales) (Amendment) Regulations 2018. However, the regulations contained crucial changes that were not included in the original consultation.

Clean up or drop out

The regulations cover new emissions limits, principally around NOx and require all thermal plant between 1MW and 50MW to meet those limits by 2025 or 2030, largely depending on size. However, thermal plant entered into new capacity market or balancing services agreements must clean up sooner, by the end of this year.

While newer gas plant can meet the 190mg/Nm^3 for NOx (nitrogen oxides) without abatement, diesel generators cannot without fitting selective catalytic reduction (SCR) technology.

Back-up generators are excluded from the legislation – but only if they are used for emergency purposes for up to 50 hours a year. They cannot be used for any balancing services, nor testing regimes aligned to revenue opportunities.

Triad as balancing service?

The legislation describes a balancing service as any service procured for that purpose by National Grid. But it appears Triad – which is a billing methodology applied retrospectively and in no way a service procured by National Grid – will be treated in the same manner.

The Energyst asked The Environment Agency if back-up generators could do Triad avoidance and remain out of scope of the MCPD. The answer was: "The Triad service is considered to be a balancing service. Any participation in a Triad event by a backup generator would make them a specified generator."

Specified generators are subject to the regulations, and as such, have to meet the emissions requirements.

According to the regulations, specified generators are categorised as 'Tranche A' if they do not take on new balancing services agreements. That gives them until 2025 or 2030 to comply with the new emissions limits. But if they do take on new capacity market or balancing services agreements, they become 'Tranche B' generators, and must clean up before 1 January 2019.

Some aggregators argued that, as Triad is not a balancing service, back-up generators used for Triad could become specified generators but remain in Tranche A and be free to do Triad avoidance unabated for at least another six years.

The Energyst asked the Environment Agency if that interpretation was correct. The eventual answer, via Defra, was: "If a Tranche A generator participates in Triad in 2019, it will be classed as a Tranche B generator."

That means compliance with emissions limits and permitting will be required by 1 January 2019 for firms planning to use back-up generators for Triad next year.

The agency continued: "The rational is that Triads are considered to be a balancing service – unabated operations, which this would be if it is a diesel engine without SCR, will increase emission to air and potentially displace cleaner generators."

The agency said it will issue guidance on the subject for businesses, but aggregators have criticised the policy development, ambiguous regulations and the subsequent information void for causing confusion.

Businesses now have less than a year to decide whether to fit SCR and continue to provide balancing services as well as perform Triad avoidance. te

Next issue we will examine MCPD implications for gas generators

Life after Triad

Triad, the methodology on which National Grid recoups sunk costs of the transmission network, will probably be phased out following Ofgem's big review of all network charging methodologies.

"We expect Triads to change after Ofgem's Targeted Charging Review," says Louis Burford, VP Restore UK.

"No longer will companies be able to avoid transmission costs (that are increasing) as it just puts up the costs for everyone else. Ofgem won't provide additional insight until later this year, but I would expect an unavoidable charge, so in this instance being flexible might not be beneficial," he said.

"What is clear is that those companies who think holistically about energy will be more resilient to whatever changes come, and flexibility should be a central part of that strategy."

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IFRS 16: Opportunity or threat to energy performance contracts?

Incoming changes to accounting rules may materially affect energy performance contract structures and risk allocation. But there may be upsides, experts suggest. Brendan Coyne reports

IFRS16 is a new leases standard that comes into effect on 1 January 2019. It requires virtually all leases to be recognised as on balance sheet. That's a big change and will affect businesses across all sectors – from those that rent fleets of aircraft, to company cars, to computers.

But the world is not going to stop leasing. Experts suggest IFRS 16 compliance essentially requires a change of contract structure and, potentially, some operational adjustments.

While uncertainty tends to create inertia, IFRS 16 could lead to positive outcomes for energy efficiency service models, suggests Steven Fawkes, European lead on the Investor Confidence Project.

Fawkes says the nub of IFRS 16 means classifying deals as service contracts where suppliers have the right to make decisions on asset operation.

"That is the interpretation that needs to happen so it can be treated as off balance sheet," says Fawkes. "It is all around how you interpret who is in control of the asset."

While that may create friction between parties unwilling to cede control over key assets to third parties (see box), Fawkes believes it creates opportunity for innovation.

"The service aspect is key. But, ultimately, if people want to find a solution [to IFRS16 compliant models], they will. But it may move us away from pure financing models where risk is not really transferred to more interesting contract forms," says Fawkes, nodding to pay-for-performance models emerging in the US that revolve around "metering energy efficiency".

"In those kind of models [the provider] is taking a risk and that can take you into some really interesting areas," says Fawkes.

He uses the example of a portfolio of 10,000 home retrofits, where half use one contractor, and half use another, with performance analysed to see which performed best.

"Then, if you are paid on performance, you either get good at improving performance or you go out of business. If you are paid on delivering, you must deliver or else – and you are taking a risk. So there is a fit with changes to accounting rules and emerging models of energy efficiency."

> *It is all around how you interpret who is in control of the asset*
>
> **Steven Fawkes, Investor Confidence Project**

Public sector double whammy

While financiers and energy services companies think they can handle IFRS 16 rule changes, the public sector faces a double whammy in the form of European System of Accounts 2010, or ESA 10, says Kathryn Dapré, head of engineering, energy and sustainability, NHS National Services Scotland.

ESA 10, which is monitored in Europe by Eurostat, governs EU countries' net debt, how it is accounted and what can be classified as revenue versus

capital funding for public sector budgets. Updates from Eurostat have indicated that energy performance contracts (EPCs) now effectively hit capital budgets, unless the EPC contractor is bearing the majority of the risks and rewards associated with the use of an asset.

In Scotland, ESA 10 particularly affects the NHS because it does not have borrowing powers. Trying to find an EPC contract that satisfies both ESA 10 and IFRS 16 is somewhat challenging, says Dapré.

If a company genuinely has an off balance sheet structure that complies with IFRS 16 and ESA 10 they are sitting on gold dust

Kathryn Dapré, NHS National Services Scotland

Scottish Government supported by the Scottish Futures Trust (SFT) developed a Non Domestic Energy Efficiency Framework to help public sector bodies fund and deliver energy efficiency projects in line with current budgetary and accounting rules.

"While, to date, the Scottish Non Domestic Energy Efficiency Framework has not been used to deliver revenue funded projects, about half of Scottish local authorities and four colleges have either delivered capital funded projects through the framework or are in the process of identifying and developing projects," said SFT's Stephen Vere. "This approach has proven attractive as it provides a procurement route for delivering guaranteed energy savings, thus providing the authority with a level of confidence that the contractor will deliver on their commitment to reduce energy bills."

Under her watch, two NHS boards have EPCs in operation, signed off as operating leases before rules changed. The third, procured after ESA1 0 kicked in, is self-funded and about to enter operation.

Dapré is delighted with initial results. "The savings we are achieving and the quality of installations are brilliant. I would have loved to have done more."

But for now, she faces several tall hurdles.

"If a company genuinely has an off balance sheet structure that complies with IFRAS 16 and ESA 10 they are sitting on gold dust," says Dapré.

Even if those contracts exist, and companies are willing to share them, the level of contract scrutiny required from Scottish government, and a green light for each individual project under that structure, is not insignificant, says Dapré.

That paperwork must be undertaken before the equally challenging task of selling service contracts both to Boards and to O&M staff can commence.

Dapré thinks ceding control of key items of energy infrastructure could be a deal breaker.

For those reasons, Dapré is "doubtful we will find a model where we can borrow that satisfies both the accountants and the estates departments. Even if it can be proven as off balance sheet, it is a really difficult sell." te

IFRS 16: How will it affect EPC market?

Duncan Child, head of program management, UK energy and sustainability services at Schneider Electric, outlines the firm's view on IFRS 16 and how it will impact both energy services firms and their customers

The change to IFRS 16 will impact the EPC market, where the EPC is currently procured under an operating lease. Where the EPC is self-funded, then this is not an issue. The implication of this change is that the decision to allow an EPC provider to control the usage of the asset(s), once installed, now becomes critical to the customer's decision as to whether they want the EPC to be off balance sheet.

Assuming that companies would prefer to have the EPC off balance sheet because of the potential impact to their debt/equity ratio of an on balance sheet EPC, this then implies that for the development of the EPC market, companies/organisations must be willing to accept that if they want to benefit from the energy and cost savings from an EPC then they must permit greater control and operation of their asset to a third party EPC provider.

This could be challenging to some companies as they may not be willing to provide part/full control of their building operation to an EPC provider, especially where this could impact on maintenance operations and possible staffing requirements. On the other hand, this may not be so much of an issue for companies that are already using third-party FM provision.

What's the upshot?

For businesses, this change to the accounting rules is also creating some uncertainty and indecision as to whether to invest in an EPC. Private sector companies that have a more strategic and proactive mindset towards embracing energy efficiency and the wider sustainability benefits that an EPC project can bring, are generally more accepting of this change and therefore continuing to look at potential EPC projects, whether on or off balance sheet.

On the other hand, companies that have a more responsive and reactive mindset are now becoming hesitant in investing.

Green Investment Group targets I&C firms for finance

Finance must be integrated into energy projects alongside technology from the outset to deliver better outcomes for large firms, Green Investment Group's Richard Braakenburg tells The Energyst

One of the first steps taken by the Green Investment Group (GIG) following its acquisition by Macquarie is to increase its engagement with industrial and commercial companies on energy efficiency and distributed energy.

GIG believes embedding finance within distributed energy initiatives from the outset is essential to bring properly structured projects to fruition, according to Richard Braakenburg, senior vice president of Energy Solutions at the Green Investment Group.

The Green Investment Group has "healthy appetite" to invest in distributed energy and energy efficiency, "anything that is host-focused and behind-the-meter", says Braakenburg.

> ***We are not seeing appropriately structured projects coming forward***
>
> **Richard Braakenburg**

"But a key barrier is that we are not seeing appropriately structured projects coming forward."

That is partly because the concept of off-balance sheet, third party-funded solutions is not yet mainstream, says Braakenburg. "Where it is on businesses' radar, it has tended to be an afterthought; finance has been perceived as something you leave until the eleventh hour."

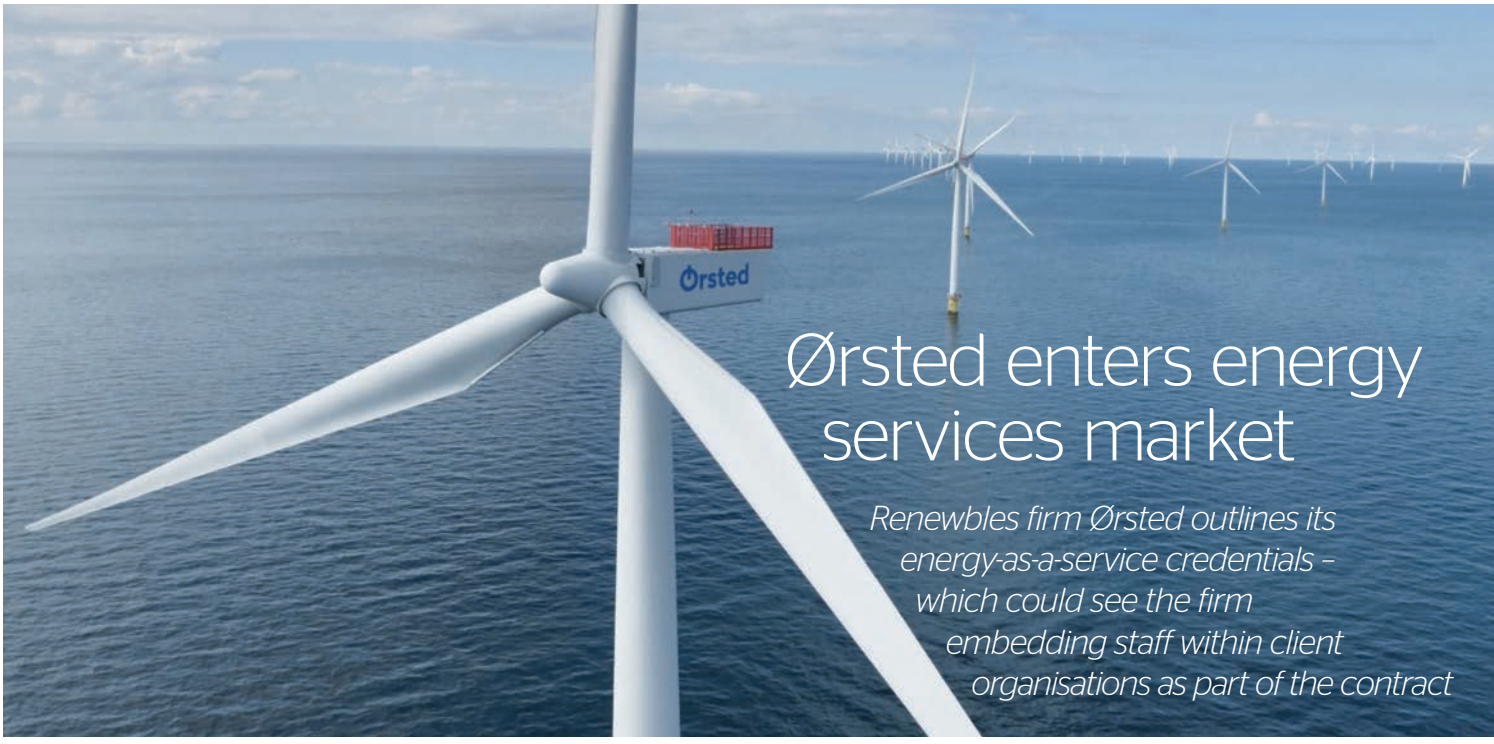
That approach leads to inappropriate risk allocation for third party capital and unsuitable energy services agreements, "which have to be ripped up and begun again", says Braakenburg.

GIG is attempting to address that by partnering more closely with industrial and commercial (I&C) businesses on energy efficiency and distributed energy

"We recognise the need to take a step up in the value chain to ensure that finance is at the table from the outset," Braakenburg explains.

GIG has developed its own form of energy services contract, or Energy Services Agreement (ESA) which launched late last year as part of its Energy Solutions package.

The ESA is a pay-as-you-save finance model. It is designed to fund energy solutions – from power generation, heating and



Ørsted enters energy services market

Renewbles firm Ørsted outlines its energy-as-a-service credentials – which could see the firm embedding staff within client organisations as part of the contract

cooling, controls and systems, batteries, transport fleets, and lighting – and deliver financial benefits from day one without sitting on balance sheets.

IFRS 16 compliance

It differs from traditional Esco arrangements in that it has been developed with new accounting rules, under IFRS 16, in mind.

IFRS 16 compliance is, to a degree, open to interpretation. But industry consensus is that it will require businesses to cede at least some degree of control over assets provided as a service.

Allowing a third party take some control of potentially core assets will require "a degree of education" for energy managers and corporates, Braakenburg accepts. But he draws parallels with IT equipment and services.

"Over the years, as requirements have become more complex and product updates more regular, corporates have become comfortable in regarding IT as a service proposition," he says. "There should be no reason why the provision of steam or electrons on site should be any different."

Cultural acceptance cannot be taken for granted, but Braakenburg points out that many firms already cede a degree of control.

"Unless a corporate has capability to do absolutely everything onsite, they are already dealing with third party service providers for elements of operations and maintenance," he says.

"The Energy Services Agreement takes that one step further. We own the underlying asset and derive a return from generating KWh savings compared to the host baseline," says Braakenburg.

"In our mind, that is not a huge step between the current reality [of Esco-type arrangements] and what would be required contractually under IFRS 16."

Commercial outcomes

While service providers and businesses are working out what IFRS 16 means for their arrangements, Braakenburg is confident that GIG's solution could work deliver commercial returns for both parties.

"The accounting aspect is important. But more important is that the overall solution works for clients and they understand the energy assets work for their production, and not the other way around," says Braakenburg.

"We think we are conveying that message: We are here to invest in your energy assets and will require a level of control and access. But, at end of day, we deliver a service to you: heat, steam, power or efficiency. We first and foremost need it to work for your production in order for it to work for us." te

The long and short of the Energy Service Agreement

Richard Braakenburg says a key benefit of the Energy Services Agreement is reducing development hurdles: The GIG will ascertain the scope of project savings and produce an investment grade audit, at its cost if the project does not deliver savings levels outlined at the outset.

Meanwhile, the ESA can be used to bundle together beneficial energy projects that may otherwise have been starved of budget.

"Speaking with energy managers, we have found that they are typically constrained by fairly strict payback hurdles. The energy manager knows there is a huge amount of potential improvement, but can be subject to a drip-feed of capital investment budgets over several years," says Braakenburg.

"Because we focus on internal rate of return (IRR), we are happy to take a longer-term infrastructure-type view and look at projects with 5-7 year payback. By taking that approach, we find that a third-party funded proposition can accelerate the scope of the investment opportunity from day one," he says.

"So the ESA is about reducing development hurdles and bringing forward investment."

Renewables firm Ørsted has worked with businesses to better understand the barriers to smarter energy management.

The issues most often cited are risk, time, expertise, headcount and access to Capex. We are also hearing that there is more pressure than ever for energy managers to extract maximum value from their strategies. As a result, our own role has changed; from being fully focused on commodity trading, to supporting and guiding in-house energy teams – or even embedding our own dedicated team.

To help our customers face the challenges ahead, we have created Energy as a Service – a business within Ørsted that helps organisations navigate the evolving energy sector. As well as reducing emissions and costs, the new service handles the key risks associated with energy; including operational, regulatory, and market and asset-based risks. Our internal consultants help businesses find innovative ways to achieve their energy objectives, without additional headcount or funding.

Energy as a Service takes account of individual business needs, ambitions and assets to design an approach that achieves financial savings, while reducing carbon footprint. It encompasses a range of techniques, including sustainable sourcing, on-site generation and storage, to optimise the customer's entire estate.

For many businesses, obtaining the necessary Capex funding to install new technologies or onsite generation is the real challenge. Ørsted can fund that upfront investment, providing finance so that the payments can come out of Opex spend over long periods of up to 20 years.

> *Handing over 100% control [of assets] means also handing over 100% of the headache*

We also shoulder the risk for our customers. The level of control we take over assets is always the customer's decision – but handing over 100% control means also handing over 100% of the headache.

Supporting more businesses to install renewable technologies and reduce energy consumption, without being commercially disadvantaged, is an important aspect of our vision to live and work in a world that runs entirely on green energy. te

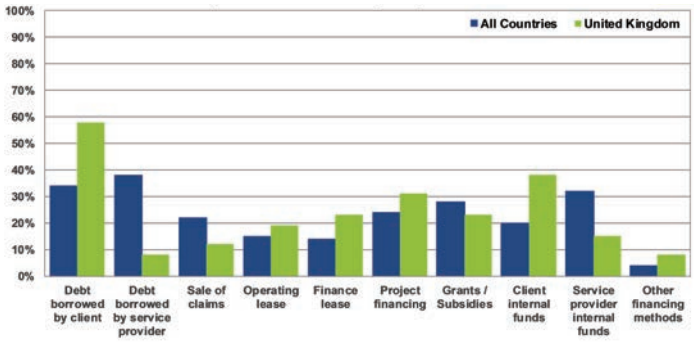
‘UK not at pay-as-you-save Nirvana just yet’

Nick Keegan, senior consultant at energy efficiency specialist EEVS, highlights that UK businesses are far less likely to use third party funding compared with their European counterparts

Results from a recent energy services survey conducted by the pan European QualitEE project showed that while a full range of financing options are in use for energy performance contracts in the UK, most projects focus squarely on the client’s internal funds or debt arrangements, in contrast to European counterparts.

This is backed up by EEVS’ quarterly Energy Efficiency Trends study with Bloomberg New Energy Finance, which has reported that – since 2012 – the overwhelming majority of UK energy efficiency investments have used ‘in-house’ funds.

Figure 1: How are the Energy Performance Contracting projects you are involverd with financed? ***(Source: QualitEE survey 2017)***



This suggests that the UK market is not yet achieving the nirvana of financed pay-as-you-save energy services models that many pin their hopes on to unlock the ‘high hanging fruit’.

Looking further, the QualitEE research pinpointed that finance affordability is the key issue rather than finance availability.

The affordability issue, in respect of finance for energy services, is thought to be linked to a lack of standardisation in the market, which leads to high due diligence costs for investors.

The QualitEE project is looking to drive standardisation – and tackle an identified lack of trust – by developing quality assurance schemes for energy services in the UK and several other European countries.

For further information visit qualitee.eu/gb

Need funding for heat networks or street lighting?

The Investor Confidence Project (ICP) wants local authorities and consultancies planning heat network and street lighting projects to partner with it in order to stand a better change of securing funding at lowest cost.

The ICP has developed protocols that enable standardisation of documents and processes for energy efficiency projects.

Standardisation of projects enables aggregation of ‘bankable’ projects for investors. Through standardisation and aggregation, ICP’s aim is to make energy efficiency a genuine investment asset class.

ICP protocols initially focused on buildings. Last year, ICP Europe was awarded further EU funding to focus on street lighting and district energy. Now it seeks early adopter projects.

Steven Fawkes is a senior advisor for ICP Europe. He says local authorities and developers that come forward will receive technical assistance that give the projects a better chance of progressing.

“Using ICP reduces project risk, which ultimately reduces the cost of money. We have worked closely with [insurer] HSB, part of Munich Re, which insures project performance. HSB has stated publicly that any project that is developed via ICP, automatically qualifies for its insurance,” Fawkes told *The Energyst*.

“That translates to a lower premium – any funder will be happier.”

In future ICP protocols may be developed to encompass wider infrastructure projects. For now, Fawkes says the group is keen to hear from local authorities and developers within district energy and street lighting sectors. te

Find out more about ICP Europe at: http://bit.ly/2EUJ9eA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Why you can't afford to miss The Energyst Event

The event in Birmingham, 17-18 April, highlights the impact of the convergence of energy procurement, efficiency and flexibility on your business

The decentralisation of energy is having a profound effect on all aspects of the system. The Energyst Event aims to discuss what this means for businesses – and how organisations across the public and private sector are turning challenges into bottom line benefits.

The two-day conference and exhibition covers all aspects of energy procurement, efficiency and flexibility, joining the dots between disciplines that are converging and highlighting what that means for energy strategies.

Within the conference streams, speakers and panelists will share their expertise, experiences and insights, arming delegates with knowledge that can be transferred directly to their organisations' bottom line.

These include: Energy Institute, National Grid, NHS Property Services, Marks & Spencer, Lineage Logistics, Nottingham City Council, The University of Bristol, Unite Group, BT, Gateshead Energy, Yorkshire Water, Anglian Water, Cornwall Consulting, Baringa Partners, Aurora Energy Research, Bloomberg, The Green Investment Group, Ingenious Infrastructure, Investor Confidence Project Europe, EEVS, Esta and the ADE.

Conference sessions will explore:

- What the convergence of procurement, efficiency and flexibility means for energy strategies
- How changes to charging regimes will affect businesses
- Decentralisation: What's coming and how can businesses harness their assets
- How to deliver greater benefits from generation, storage and flexibility
- How to build businesses cases that look beyond energy
- How data and intelligence is disrupting procurement
- Emerging service and finance models for decentralised generation and efficiency
- The implications and opportunities of heat, power and storage convergence

The conference will also mark the launch of two new reports: one around lower carbon heat for businesses, the other around demand-side response within mission critical environments.

Meanwhile, the exhibition brings together the energy industry's most forward thinking companies, many of whom will unveil new services and technologies designed to deliver energy and carbon savings and flexibility benefits to organisations large and small.

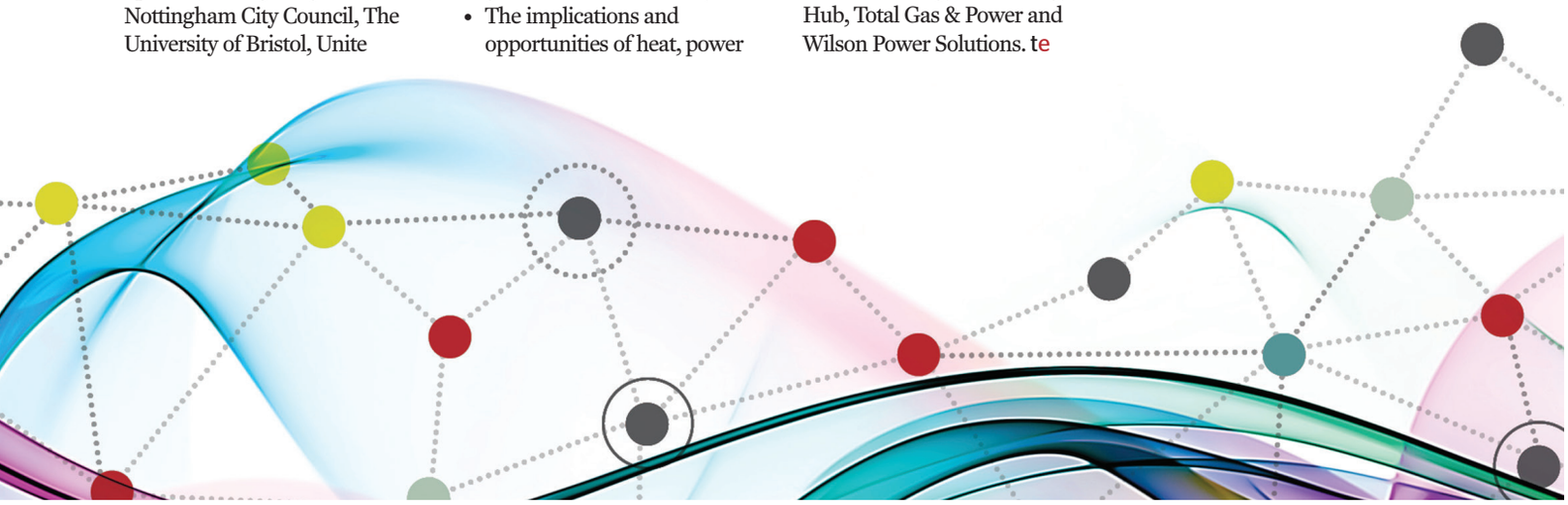
Event sponsors include: Green Energy Consulting, Ørsted, Restore, Baxi Group, Endeco, Enernoc, Engie, Flexitricity, Haven Power, Inenco, PCMG and Scottish Power.

Exhibitors also include: Chauvin Arnoux, Danlers, Edina, Electroroute, Energy for Good, Energy Institute, Flo Gas, G59 Professional Services, Kiwi Power, New Found Energy, Open Energi, Ørsted, Packaged Plant Solutions, ReStore, Smartest Energy, The Energy Hub, Total Gas & Power and Wilson Power Solutions. te

The conference and exhibition is free to attend and event organiser Energyst Media aims for it to become the industry's most focused, and most valuable, event for energy professionals.

Please join us on 17 and 18 April at the National Motorcycle Museum, Birmingham to contribute to the discussion and make full use of extensive knowledge sharing, networking and collaboration opportunities.

Secure your free ticket at **theenergystevent.com**



Register for your **free** ticket at **theenergystevent.com**

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Energy is changing. Here's how we're helping.

From 100% renewable power as standard to dedicated expert support, we help businesses like yours to spend less time and money on energy. This means you can spend more time on what really matters.

Find out more at **The Energyst Event** in Birmingham on **17-18 April**.

Simply visit **havenpower.com/energystevent** to book your appointment.

havenpower

A better use of energy

AI pilot to cut waste

A pilot scheme involving Anglia Ruskin, Bath, Bristol, Newcastle, Regents and York universities facilitated by The Energy Consortium (TEC) will mine smart-meter data using AI to identify energy waste, improve efficiency and cut costs.

The project, in partnership with AMR-DNA, an Energy Assets service, will use AI software developed by kWIQly to interrogate energy consumption data of hundreds of buildings to identify energy efficiency opportunities.

Steve Creighton, head of member services at TEC, explains: "Activity can be reverse engineered from consumption allowing AI to search, quantify and prioritise. This in turn makes it possible to manage problems on a daily basis for even the largest estates."

Stewart Love, group commercial director for Energy Assets, explains why significant multi-site portfolios have, until now, been less interesting to suppliers of software solutions.

He comments: "99.8 % of companies rely on data from under 20 meters – corresponding to one or perhaps a handful of buildings where local problems are obvious and relatively easy to examine.

However universities, supermarkets, high-street retail chains, pubs, banks and local government fall in the remaining 0.02% that have far more complex and dispersed challenges."

kWIQly's CEO James Ferguson notes that: "As climate change bites, we must deliver solutions for unmanaged energy issues. If an energy manager can reduce energy spend by 30% or more in single buildings without major investment, then it is essential that waste is identified and savings are tracked automatically at scale."

See kWIQly on stand MS-2

Transforming energy management

EnerNOC experts will be on hand to discuss how businesses can strengthen their bottom lines operationally and financially through transformational approaches to energy management. With a combination of advisory and flexibility services, EnerNOC helps businesses gain competitive advantage through managing energy in a comprehensive and independent way. The EnerNOC stand will showcase the company's full suite of solutions-oriented capabilities and share customer examples of solution assessment and design, arming visitors with all the information they need to begin to build their own business case for investing in Energy-as-a-Service (EaaS).

EnerNOC is a pioneer of demand-side response, managing 6.8GW of dispatchable capacity from 14,000 customers across various industries in 10 countries. EnerNOC is also a global leader in technology-enabled energy procurement and utility bill management services, with nearly $50bn commodities spend and £5bn annual energy spend managed with EnerNOC, respectively.

EnerNOC, is now part of the Enel Group's new global business line, Enel X, which is dedicated to developing innovative products and digital solutions in sectors which energy is showing the greatest potential for transformation: cities, homes, industries and electric mobility. Through EnelX, EnerNOC partners with enterprises to reduce costs, manage risk, increase sustainability and maximise the value of emerging energy technologies through bespoke energy management strategies.

EnerNOC wants to hear about your organisation's energy management aspirations and discuss how an Enel X solution can help you achieve it.

Visit the team at stand MS-6

Flexitricity+

Introducing Flexitricity+ Energy Supply

Flexitricity will be the first demand response aggregator in Britain to provide full energy supply, including active participation in the Balancing Mechanism. For energy users, this is a major new revenue source.

Flexitricity created and now operates the first, largest and most advanced demand-response portfolio in Britain. By also becoming a supplier, we can always seek out the most profitable activity. When the revenue opportunities shift, we're ready to shift with them.

Ideal fit for...

- Battery storage
- Combined Heat and Power
- Flexible consumers in sectors such as cold storage, water and chemicals

Join us for the Flexitricity+ launch at the Energyst Event on 17th and 18th April.

GridBeyond: Going beyond demand-side response

Grab a coffee and take a seat at the GridBeyond (formerly Endeco Technologies) stand BS-42 for a chat about how to transform energy demand into opportunity.

The demand-side response aggregator will showcase the way business's untapped energy flexibility is rewarded through demand-side response programmes and world-class technologies. The company's state-of-the-art technology platform and world's first hybrid battery-demand side network are future-proofing clients' participation in demand-side response.

While GridBeyond ensures opportunities in National Grid revenue schemes and savings programmes are optimised, there is also its advanced energy portal. It will be providing live demonstrations of the portal, so you can see how the dashboard, analytics, reporting and benchmarking offer invaluable OEE and predictive maintenance information, as well as revenue data and triad prediction.

By working with GridBeyond, your business and sites not only benefit from its in-depth understanding of energy opportunities but from a hub of expertise. The highly qualified team collaborate with third party maintenance providers, energy suppliers, equipment manufacturers, commercial battery suppliers and financers to prepare a free feasibility site audit and customer journey plan.

Visit GridBeyond at stand BS-42

Flexitricity: Unlocking flexible assets and flexible supply contracts

Demand-side response specialist Flexitricity works with a wide range of customers, across many different sectors, to maximise the value from their assets – whether it is a CHP, battery, backup generator, peaking plant or flexible consumption within in the industrial and commercial sector.

Its team are looking forward to meeting you at The Energyst Event and discussing how you can earn extra revenue from ancillary services (such as STOR and frequency response), Capacity Market and its brand new energy supply offering.

In the 10 years since it started live demand-response operations from its Edinburgh control room, the energy market has changed radically. That is why it is now going head to head with large power stations and Big Six energy companies and becoming a supplier. This will unlock more value for customers and all bill-payers across the country, and will make our electricity system more flexible and efficient.

Flexitricity says its energy supply contract presents a significant opportunity for electricity customers and small generator owners to optimise their flexibility on the day, by trading in the balancing mechanism (BM).

For energy users, this is a major new revenue source. The value in the flexibility market may be shifting but without a doubt the market is growing and presents a host of lucrative opportunities. The challenge lies in making the most of these opportunities and that's not easy – flexibility is complexity.

For those new to the world of demand response, that might initially seem intimidating. It also means that in order to navigate these complex waters, you need the right kind of expertise, knowledge and experience. That is what Flexitricity says it can offer – clarity amid complexity and an assurance of delivery backed by a demonstrable track record in the industry.

Visit Flexitricity at stand MS-10

Career surgery for energy managers

The Energy Institute will run a career surgery throughout the event. Representatives from the EI's energy management and professional development teams will hold informal conversations with energy managers every 15 minutes to help them maximise their expertise and opportunities.

Helping small businesses navigate energy

Energy experts from the Federation of Small Business (FSB) will be on hand at The Energyst Event to help smaller firms navigate what can appear to be a complex market. The FSB has helped thousands of members save an average of £1,150 by switching energy supplier and has produced guidance around carrying out energy audits and energy efficiency improvements.

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New reports: Heat challenges and DSR at critical sites

The Energyst will also launch two new reports at the Energyst Event.

The Heat report will outline the challenges in decarbonising heat, containing expert views from academics, financiers, consultants, energy networks and equipment manufacturers. It also includes a reader survey, providing end-user views on lower carbon heating options.

The Mission Critical DSR report will outline the challenges and opportunities of harnessing the considerable flexibility within critical environments: what is stopping companies from harnessing their assets and how these barriers might be overcome.

Balance performance with environmental responsibility

The ENGIE stand will focus on ways for organisations to embrace a lower carbon, more efficient and increasingly digital world.

The past few years have seen a rapidly changing landscape, with the acceleration of the 'energy transition', accompanied by a new focus on decarbonisation, decentralisation and digitalisation of the energy industry. With this comes a shift of emphasis from security of supply to the use of new technologies – with energy increasingly becoming a 'service', embedded within buildings.

Visitors to the stand will be able to discuss the new

technologies and industry developments that contribute to this 'bigger picture' and explore how to take advantage of them. These include smart buildings, data analytics, solar photovoltaics, battery storage, demand-side response and electric vehicles.

As well as its innovative, flexible and renewable options for energy supply, it will also be able to discuss how ENGIE can help you to meet your carbon-reduction, cost-saving and sustainability targets through ongoing collaboration – helping you to balance performance with environmental responsibility.

With its focus on both energy and services, ENGIE is ideally positioned to partner with its customers to meet the challenges ahead as the market evolves.

Visit ENGIE at stand BS-16

Off-grid energy solutions for every type of business

Flogas will showcase its full range of commercial off-grid energy options at The Energyst Event.

Flogas has more than 30 years' experience in providing businesses of all shapes and sizes with tailored, off-grid energy solutions – including LPG cylinders, bulk LPG and LNG (liquefied natural gas). Customers span hotels, pubs and restaurants to farms, warehouses and manufacturing plants. They use Flogas fuel for a range of day-to-day uses, including heating, hot water, cooking, powering industrial processes and even

running forklift truck (FLT) fleets.

Visitors to stand BS-40 will have the opportunity to talk to the company's experts in energy face-to-face about their businesses' individual fuel needs, and how a switch to LPG could save them money, energy and carbon.

Visit Flogas at stand BS-40

Underpinning convergence, collaboration and value

REstore invites *Energyst* readers to find out how they can maximise their flexibility and financial returns across all markets, with minimum fuss.

In the conference panel sessions, it will discuss how procurement, efficiency and flexibility are converging, and the collaboration required from multiple parties, such as suppliers, technology companies and brokers, to deliver best possible outcomes for industrial and commercial businesses.

REstore's exhibition stand will outline how its technology platform provides energy management and demand-side response solutions to commercial and industrial consumers – as well as domestic customers in some of its European operations.

REstore also provides services to transmission system operators and utility companies globally – and is now part of the Centrica Distributed Energy & Power division, following acquisition in November 2017.

Its patented technology platform, FlexPond, pools residential and industrial devices, batteries, CHPs and other resources into virtual power plants which help maintain balance on the power grid. The company's mission is to help customers take advantage of the transition to a real-time energy market, maximise opportunities and minimise costs.

Visit REstore at stand BS-24

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Helping smart UK businesses navigate the energy revolution

Asset Optimisation

Full service to unlock new revenues from flexible assets

Electricity Supply

Leading supplier of independently certified renewable electricity

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Proven partner for independent energy entrepreneurs

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What can blockchain do for I&C firms today?

Blockchain proponents believe it may in the mid-term help make the energy system much more efficient and transparent. But Electron's 'kWhackathon' suggests there are also immediate opportunities for business benefits. Brendan Coyne reports

Electron invited teams to develop blockchain-based energy applications in a day in London in February.

A team led by Octopus Energy was judged the overall winner for a concept that used the blockchain asset register and smart contracts to 'unchain' prepayment, making it easier for prepayment customers to pay and switch.

However, there were many other ideas with strong immediate potential in the energy sector, including:

Effchain: a team combining Engie and SQS, proposed using blockchain to create a register of EPC data from millions of buildings, as well as consumption data, which could be updated by installers and suppliers as improvement measures are undertaken to buildings. The register would then allow targeted energy efficiency measures to be pushed, as well as smart contracts based on building energy efficiency.

ReNuCoin: A solution to the fact that renewable guaranties of origin (Regos) do not account for grid losses. The team, lead by Ecotricity, "wanted to create a blockchain registry that calculates decay over distance". The idea is that buyers of renewable power "select their preferred source and can see how much energy is being lost [through decay over distance], incentivising local choice."

A decentralised social register: A large team involving Centrica, Halo Cleantech, University College Cork, Wheatley Solutions and West Sussex County Council. It aimed to tackle the fact that millions of people who should receive priority services are not on the priority services register. By putting priority service data in one place, multiple agencies could help to ensure all 11m people that should be on the priority services register are on it – and stay on it - as opposed to the 2.9 million people currently registered.

Shared EV charging points: A team from Utility Warehouse came up with a platform that enables electric vehicle chargepoint owners to share them with other EV owners. The system's aim is to enable chargepoint owners to notify other EV owners when their chargepoint is available, how long it is available for, and to use them. This could be integrated with a billing platform and could potentially enable distribution network operators to better manage constraints, maximise use of existing infrastructure and lower overall costs to consumers. te

Blockchain for battery storage

Perhaps most of interest to *Energyst* readers was a blockchain application to enable energy storage as service via smart contracts. It was created by a team comprising Northumbrian Water, Tees University, Element Energy and Wipro.

Presenting the idea, Northumbrian Water's Anthony Browne said the firm sought to address energy costs rising "at three times RPI" and the impact of decarbonisation goals on the cost to serve customers.

To help mitigate cost increases, the firm is implementing behind the meter (BTM) renewables. A third party builds renewables on Northumbrian Water's land, supplies power at a lower cost and the firm receives a net benefit. "But it doesn't optimise energy flows in terms of impact on local and national grids," said Browne. "Storage as a service could solve that."

However, as well as network charge avoidance, battery storage economics can require a revenue stack combining different forms of frequency response, Capacity Market agreements and potentially DNO voltage control and resilience benefits. "That becomes quite complex, and while battery developers are approaching us offering fixed monthly fees in return for a battery, we are not sure if it is for their benefit, or for ours," said Browne. "That is where blockchain can help."

An open blockchain platform "allows both parties to be very clear on the benefit and share it fairly and would require light or zero touch from the regulator" in what is currently quite a murky set up, he explained.

Without requiring a specialist blockchain developer in its team, "we have implemented and deployed a smart contract and trading system using an Ethereum platform", said Browne.

Will Northumbrian Water take smart storage contracts forward?

The Energyst caught up with Northumbrian Water after the 'kWhackathon' to see if the firm would progress with both battery storage and smart contracts

"We're having discussions with the team that co-developed the smart contracts idea (Tees University, Element Energy and Wipro) but it's early days," said Northumbrian Water's Anthony Browne.

"Smart contracts look like a powerful tool but there is a piece of work for us to do in the wider context of the business in terms of how we work in the future."

However, the firm is exploring whether to implement on-site energy storage.

"It is something we are actively exploring, whether parties in the market can offer [storage] agreements with sufficient transparency to ensure it will deliver value to our customers."

In that regard, Browne said the firm is running the rule over two potential storage providers.

"It's at an early stage, so I can't share the detail, but hopefully it will be possible," he said. "There are many ways to structure a contract, but ultimately, the business case comes down to what the market is willing to offer us."

The company's interest in storage is being driven primarily by non-commodity elements of power bills, said Browne.

"Depending on what the offer looks like, if it mitigates charges and we can assess

the benefits to customers, that will drive us to make the decision on storage."

While avoiding peak charges is a mainstay of current storage business cases, Browne said the firm takes a keen interest in potentially significant changes to charging regimes being worked up by Ofgem, which may ultimately alter project economics.

While it is too early to predict the outcome of Ofgem's charging review, resilience is another important facet of the business case: Back-up power capability can have significant value for a firm operating assets such as pumping stations, said Browne.

[Improving resilience] is an area that we are very interested in," he said. "We constantly look to innovate in every aspect of the business in order to improve the quality we deliver to customers." te

New grids on the block

Can blockchain unlock the potential of microgrids – and what's in it for businesses? Delta-ee analyst Will Van Der Byl outlines how the technology helps facilitate peer-to-peer trading

The composition and nature of microgrids can vary greatly from one project to the next but they all generally contain bi-directional flow of energy and the potential to have several independent prosumers. The bi-directional flow of energy among multiple prosumers increases the complexity of the tracking, recording and balancing of produced and consumed energy within the microgrid. This is where blockchain technology can come into play. The shared nature of energy resources within a microgrid, balancing of supply and demand and the difficulty of tracking large volumes of transactions (energy supply, demand and sales) are problems well suited to the attributes of blockchain technology.

Removing middlemen

A good way to think about a blockchain is that it is a distributed and chronological ledger that is updated and validated in a synchronised manner. This is performed by a network of independent nodes – a multitude of computers connected to the blockchain network. Consequently, transactions can be tracked and recorded in a transparent, distributed, accurate and incorruptible way. This is an automated process that allows the middleman to be removed, reducing transaction costs and lowering overheads. It means that energy supplied to and consumed from a microgrid can be tracked and recorded using blockchain-enabled meters. This helps address the aforementioned microgrid problems in an efficient and low-cost manner. The idea of tracking and recording energy can be expanded to include the associated monetary value and, subsequently, the financial aspect of this process.

Smart contracts and trading

Smart contracts are another aspect of blockchain technology. These are automated contracts that self-execute when the pre-programmed criteria (which are coded into the blockchain) are met. This solves the problem of consensus authorisation associated with transactions. Smart contracts allow prosumers and consumers within a microgrid to enter directly into energy exchanges with each other, enabling P2P trading and creating a virtual energy marketplace. These energy exchanges are instant, automated and can facilitate balancing the supply and demand of the microgrid. Because these exchanges are performed in almost real time, it creates a cost reflective marketplace where energy is appropriately priced. This is best explained with a simple example:

If company A is generating more energy than it needs, then it is able to export that surplus energy to the microgrid and set the transaction conditions (for example, it can set a minimum price on exported energy). If company B requires energy and has set its willingness to pay (via an app connected to its blockchain enabled meter) which is higher than the minimum price set by company A, then the two businesses are automatically matched (via algorithms that enable dynamic trading) and the smart contract is executed as the desired criteria are met.

The flow of energy and associated monetary transaction are automatically coded into the blockchain, which makes the transaction indisputable and available for everyone to see. If company A is generating surplus energy when the demand is high and supply is low, then it can alter its transaction conditions and increase the minimum price. It is important to note that the exact electrons supplied to the grid by company A will almost definitely not be the same electrons consumed by company B. However, as long as electrons are supplied to and consumed from the grid at the same price and rate, then this 'virtual energy marketplace' will act as an enabler for microgrids.

Hype versus reality

P2P trading is perhaps the most well-known and commercially progressive application of blockchain use in the energy sector. Companies such as LO3, Power Ledger Open Utility and Grid Singularity are first movers in this field and have made some exciting progress such as LO3's Brooklyn microgrid and Power Ledger raising more than $34m in a funding round.

That being said, there is an incredible amount of hype surrounding blockchain at the moment and it is important to be aware that the P2P trading using blockchain technology is extremely nascent and largely untested. There are several obstacles that need to be overcome, such as government regulation and transaction speed – Bitcoin, the most well-known application of blockchain technology, has a theoretical transaction speed of seven transactions per second (tps), which is orders of magnitude lower than the likes of Paypal (450 tps) and Visa (56 000 tps). Regardless, P2P trading is an exciting prospect that could potentially have a positive transformation on microgrids in the future. te

Disruptive influence: "This is an analogue industry that is being digitised. And that will be quite disruptive," says Chris Bowden

Going for brokers

Brokers still hold huge power in the business-to-business supply market. But some firms think they are too opaque and inefficient. They believe technology can disrupt the status quo. Brendan Coyne reports

Chris Bowden founded Squeaky Clean Energy to give mid-sized firms the power to strike deals direct with renewables generators in the same way large corporates do. In a nutshell, "we cut out the middle man and buy direct", he says.

Bowden, who co-founded Utilyx before selling to Mitie, understands the limitations of the traditional procurement model. He claims Squeaky's peer-to-peer platform, which connects buyers with sellers, enables firms to buy clean power for the same price, or less, than brown power.

"The mid-sized corporates can see what Google and others are doing and want to do the same," says Bowden. "But they come up against high search and transactions costs. We have a lot of generation [signed up to the platform] and can cut through all of that. We make it easy for them to buy power like Google, right down to a megawatt – it doesn't have to be a big deal."

As well as longer-term contracts between customers and generators, the company also offers short-dated contracts, typically one or two years, targeted at SMEs.

Bowden says the firm is "very particular" about the brokers it partners with.

"They have to be fully transparent, which limits considerably who we can work with. Many are just not treating us, or the customer, fairly in terms of the fees they charge. It is rife and I have no idea why Ofgem does not regulate the market properly."

Bowden thinks non-disclosure agreements between suppliers and brokers should be challenged. But in the meantime, "Our business model is squeaky clean," he says. "If you are going to rip off your customer, you are not going to work with us. We will not give you prices."

Bowden claims Squeaky is not just a P2P platform but an energy technology, or 'entech' firm "disrupting a legacy industry".

"It is not just about cutting out the middle man. It is about what tech and data can do. This is an analogue industry that is being digitised. And that will be quite disruptive."

He cites time of use tariffs, which Squeaky is starting to trial, by way of example.

"We have an abundance of data from both generators and customers – when and why they are consuming. We are building databases to find patterns that enable us to offer different approaches to pricing energy," says Bowden.

"Corporate contracts are all day-night rates. Why? Because suppliers can only bill day and nights – and they struggle to do that. But you could split the day into five periods, similar to time of use tariffs emerging in the US. That is the sort of thing we need to look at."

Bowden says Squeaky will "probably" offer ToU tariffs this year but expects uptake to be a "slow burn". »

> *It is not just about cutting out the middle man. It is about what tech and data can do*
>
> **Chris Bowden, Squeaky Clean Energy**

"We need at least a year's cycle of adoption to build data, refine and show case studies."

While tariff innovation may take some time to deliver, Bowden suggests companies should in the meantime simply question whether they are paying a fair, transparent price for their energy – and not be afraid of the answer.

Opening the energy market

Open Energy Market is another platform trying to make procurement more efficient. CEO and founder Chris Maclean underlines that the company is still a broker but instead of using "an army of people with spreadsheets", is attempting to use technology to strip out cost, opacity and complexity to give customers a better deal.

"The industry is relatively backward. You have to acknowledge that and innovate to make it simpler for customers. So the platform first and foremost enables a closer way for suppliers to interact with buyers and buyers to take more control of the process."

Crucially, Maclean says the

> *The industry is relatively backward. You have to acknowledge that and innovate to make it simpler for customers*
>
> **Chris Mclean, Open Energy Market**

platform "captures a lot of the data that goes with that process" then automates as much as possible so that "a buyer can sit in front of the platform and know instantly what they have to do".

He says transparency is at the heart of the platform, with suppliers pitched on a like-for-like basis. That is not always the case when comparing contracts in the broader market, Maclean suggests. He says Open Energy Market's fee is also transparent.

Meanwhile, following Open Energy Market's acquisition of customer data, customers are not obliged to take a contract.

"It is fully transparent. The customer knows what the outturn price is going to be and if they don't like it, they don't have to take it. It's a bit like a price comparison site in that it allows customers to very easily get a price without being bound and without any cost," says Maclean.

"That is important because it enables people to benchmark. One of the biggest issue for people who contract upfront is that they go through the process, then find themselves bound by a legal agreement that locks them in with no regulation on that broker to adhere to a price."

Open Energy Market has just secured £3m in funding from Calculus Capital to scale its operations. As well as expanding into the US market, Maclean says the firm plans platform improvements that enable better integration of on-site generation data with site consumption data, and how that affects procurement.

Maclean agrees with Squeaky Clean's Bowden that there is significant potential for emerging platforms to do the job that some feel is the remit of a regulator.

"Yes, there is growing competition – and I welcome it. Because the greater the competition, the greater the focus on transparency, the more savvy buyers will become," says Bowden.

"We've been waiting for regulation for 15 years and nothing's happened. But smarter, more educated buyers enables self-regulation," he says.

"There are some really good brokers, whether they have technology or not. There are also those looking to make a fast buck and leave – and I think it will be harder for those guys going forward." te

Helping SMEs to help themselves

Former Utilitywise finance director Andrew Richardson (pictured) has just launched a benchmarking and switching platform for small businesses called Troocost. He says it does not uplift suppliers' kilowatt hour rates and discloses the same flat fee it is paid by all suppliers should customers decide to switch.

Richardson, pointing to CMA findings that small businesses are being ripped off by about £500m on energy contracts, says the aim "is to put some efficiency back into the market". In a soft launch phase, the company has around 600 customers signed up to the platform. Richardson says the average saving per switch is about 30%, "which is not surprising, considering broker fees are typically between 10-40%".

"Troocost came about because the TPI business model is based on a fee provided from a supplier and an uplift applied by the broker to the rate which is then passed on to the customer," says Richardson.

"I have no problem with that per se – there are a lot of good TPIs, but there are also a lot of rubbish ones. The problem I have is that it is not transparent, it is unregulated and they do not have to disclose the fee to customers. So it is very difficult for customers to get an idea of value."

A flat fee means Troocost is not incentivised to push one supplier over another. There is no cost to customers, who "at worst can benchmark", says Richardson.

He says the platform takes the hassle out of switching by simplifying the required data into "an easily digestible list"

"If you are concentrating on cutting hair or making widgets, your contract renewable comes up once a year and it can be quite complicated: Location, industry sector, type of meter etc. It can be difficult for people to get heads around," says Richardson. "Our system cuts through that, presents the choices, and the customer decides what they want to do."

He says while some TPIs "attempt to be the sage of the energy industry", Troocost wants to be the opposite.

"If you want a complicated plan, we are not the people to come to. If you want a straightforward, transparent switching service, we are."

He says one SME – a hotel chain – that switched saved £80,000 on what it had been paying via a broker.

"That's a compelling story and a huge swathe of the market is yet to realise how brokers make their money. That client thought it was receiving a good service [from its broker]," says Richardson. "Direct selling is a tough job, so they are very good sales people. They befriend clients – and the last thing anybody wants to realise is their 'friend' has been diddling them for years. So we think we are pushing at an open door."

He advises businesses that use brokers to ensure they obtain permission from the broker to ask suppliers to disclose on the bill the brokerage fee charged. If that consent is obtained, "the supplier has to tell you the truth", says Richardson.

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Lower carbon heat: *Energyst* readers' views

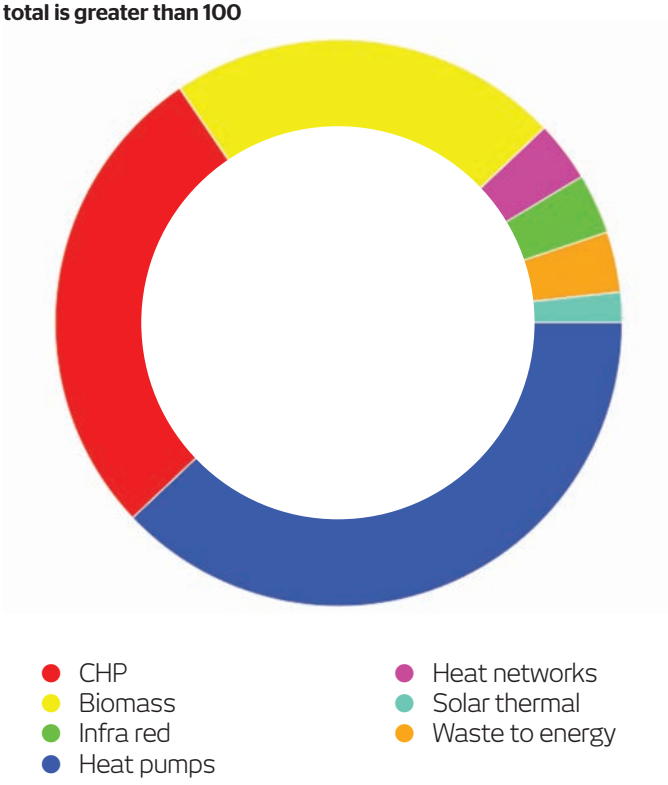
The Energyst is surveying readers for their thoughts on lower carbon heat technologies, incentives and applications. Here are some early findings

About 80% of respondents say they have specified some form of lower carbon heat-related equipment in their buildings, or are at least looking at low carbon heating methods.

Asked what kind of technologies they are considering, heat pumps (of various types) were mentioned more than any other technology, followed by combined heat and power (CHP) and biomass.

Heat pumps featured in 59% of answers, CHP in 43% of answers and biomass in 35% of answers (see figure 1 for breakdown).

Figure 1: Heat choices – respondents use multiple technologies so total is greater than 100



Heat networks

The survey suggests broad support for heat networks. Some 75% of respondents believe heat networks can be part of the solution to decarbonise heat over the next five years. However, many respondents stated that there are significant cost and acceptance hurdles to negotiate.

Policy and incentives

Respondents are divided on whether the Renewable Heat Incentive (RHI) has been an effective instrument. Some 54% think is has been effective versus 46% that think it has not.

Those that thought the RHI has not been effective were asked why. Responses included: "The funding programme has been abused and not applied fairly."

"Yes [effective] for biomass – not sufficient and too complex for heat pumps."

"It is technically flawed, subsidises some of the least effective options the most and provides £0 for some effective options. It is less beneficial than doing nothing."

"We have not found biomass solutions sufficiently compelling and the requirements of the RHI appear complex and bureaucratic."

"Complication around registering products."

"It has encouraged profiteering rather than sensible heat source replacement."

Respondents were asked what might better incentivise or reward low carbon heat. Responses included: "Guarantee that RHI will continue."

"Simplify heat pump incentives. Encourage hybrid heat pumps."

"A cut off date when only lower emissions [technology] can be sold and fitted from then on. Further [deadlines] when all businesses can only [specify] low carbon heat. Starting with major corporations then larger SMEs and down. Another cut off date thereafter for landlords, housing associations etc."

"Cross subsidising the cost of electricity from increased CCL on gas as carbon intensity of the grid decreases, so that it becomes gradually more financially viable to install."

"Stronger enforcement of building legislation."

"Capital grants for district heating."

"Adjust business rates for better EPC ratings; Tax incentive on capital; Zero vat."

"Link Council Tax to heating energy – make greedy buildings pay much more tax."

"Priority planning approval for councils partnering with existing community in heat and power provision for new housing developments; Requirement all councils to ensure boiler replacements utilises renewable technologies. Market incentive for products made with low embedded carbon."

"Any policy that stays its course. Too often incentives are taken away once a project is a success, which makes investors nervous in future."

"Simplicity and clarity – particularly with regards to metering requirements."

"Scrappage schemes for old oil and gas boilers; incentives for thermal storage; innovative heating tariffs."

"A mixture of carrot and stick: basic subsidy, genuinely low interest finance, clear and long term policies, higher tax on burning fossil fuels."

"Increase CCL on gas. Allow direct award of district heat contracts by public sector."

Respondent snapshots: A local authority energy manager: Is looking at heat pumps, CHP, and says "we have some biomass already".

When specifying heat technologies "Capex is main concern and as long as kit is working reliably, will not consider replacing it."

Thinks the RHI has been effective.

Asked what policy or regulatory measure might best decarbonise heat, says: "It would be great to see some central government or Ofgem guidance on sleeving arrangements for exported electricity. The holy grail for us really would be in being able to export at any given location within the DNO network and to be able to have access to that amount of electricity to import with a reduction in TUoS charges. I see the solution for decentralised energy as hybrid energy centre systems which can use electricity or fuel to generate heat, and can export, import and store electricity and store heat and distribute heat and electricity through a network.

Does not see heat networks as a solution in next five years because "I'm not sure that the economic priorities of LAs will support heat networks."

A senior energy manager at a large IT firm: Is not looking at low carbon heating methods.

Does not think the RHI has been effective: "We have not found biomass solutions sufficiently compelling and the requirements of the RHI appear complex and bureaucratic."

Asked what policy or regulatory measure might best decarbonise heat, says: "Simplicity and clarity – particularly with regards to metering requirements."

Does see heat networks as a solution in next five years if they can use waste heat, and sees them applied in industrial sector.

A university sustainability manager: Is looking at low carbon heating, "including heat pumps, CHP, district heat (gas-fed CHP, initially, with the potential to link to waste heat sources in future" and already has some CHP as part of a hybrid system in conjunction with gas fired boilers.

Thinks RHI has been effective.

Asked what policy or regulatory measure might best decarbonise heat, says: "Increase CCL on gas. Allow direct award of district heat contracts by public sector."

Does see heat networks as a solution in next five years: "For big users or users in heritage buildings which require high temperature heat, they are probably a good solution." Sees them best deployed in "the public sector, provided procurement issues can be solved".

An NHS estates manager: Is looking at lower carbon heating technologies, already has a hybrid, gas-fired boilers CHP system.

Thinks the RHI has not been effective and has instead taken a performance contracting route to help fund lower carbon heat infrastructure.

Does see heat networks as a solution in next five years, particularly for the industrial and commercial sector, with some caveats around cost.

"Yes it is a solution. However, our personal experience was it is too expensive. [Our city] has a long established district heating network, which we considered connecting a new building to. The district heating cost is currently more expensive than gas (although the supplier suggests that in the longer term it will be 10% cheaper than gas). When we compared this to a gas-fired CHP even allowing for writing off some significant sunk costs, the CHP was far more cost effective." te

The Heat Report will be launched and discussed at The Energyst Event

Figure 2: Which low carbon technologies have you installed within your building?

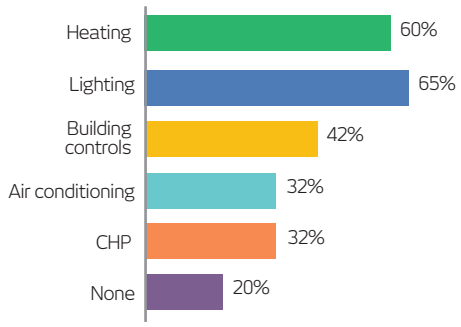


Figure 3: Within the next five years do you see heat networks as a solution to decarbonisation in the UK?

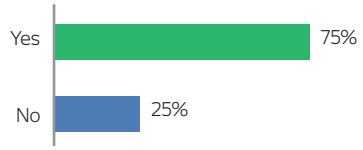
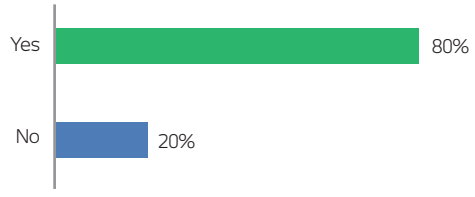


Figure 4: Is your organisation looking at low carbon methods of heating?



Give us your views

The Energyst needs your views on heat for a report we will publish in April in association with Baxi Group. The survey, which on average has taken respondents seven minutes to complete, will remain live until the end of March.
All respondents will receive a free copy of the report.
Please take the survey at: http://bit.ly/2CHsfuK

Heat networks 'need regulation and a regulator'

A report on heat network investment by the Association for Decentralised Energy moots creating a regulated market backed by investor and consumer guarantees. The Energyst attended the launch

Demand Assurance: The pipe is right?

Heat networks should be regulated under the remit of an existing or new regulator, an industry alliance has told government.

A regulated approach could derisk investment in new heat networks and ensure consumer protections, according to the Heat Network Task Force.

The report spells out the key challenges for heat networks: Investors do not commit until heat customers are assured but heat customers will not sign up until there is a viable proposition in front of them.

Meanwhile, risks of underperformance or stranded assets compound risk, driving up the cost of capital and therefore costs to consumers.

Moreover, consumers do not have the same protections as other regulated energy sectors, such as gas and power networks. If things go wrong, or they are held to ransom over prices, there is little recourse.

The task force, led by the Association for Decentralised Energy, appears open to an existing regulator taking on heat networks, or a new one being created.

That regulator would oversee a framework hinging around a proposal called 'Demand Assurance'. This would allow developers to submit heat network plans to a regulator and, if approved, provide regulatory protection for some parts of the investment should heat customers fail to appear on time, or at all.

As a minimum, this protection for investors would cover the cost of capital for demand shortfall, the report suggests.

To receive those financial guarantees, heat networks would have to sign up to a set of minimum standards, including consumer protections around service and price.

Heat networks: an investor's view

Should heat networks be regulated, or are there more pressing concerns for investors? Brendan Coyne spoke with Amber Infrastructure's Jenny Curtis

Amber Infrastructure is a significant investor in heat networks. Two years ago, origination director Jenny Curtis told *The Energyst* that local authorities must get better at scoping projects to attract investor interest. She said poor data, planning and leadership was undermining otherwise viable projects.

Some progress has been made since then, she suggests, but there's still a lot of work to be done.

"A lot more schemes have come to market in the last couple of years and the quality of those schemes has generally improved. But they are still some way off being a standard investible asset class," says Curtis.

"Procurement and resources within local authorities is still an issue. The government's Heat Network Delivery Unit has done much to get good guidance out in the market. But our experience is that these projects are not cookie cutter, so there is only so much standardisation that can be done – and that is the challenge."

Meanwhile, Curtis points out that heat networks cannot currently be considered a genuinely low carbon solution.

"There is still a gap in government policy in terms of decarbonising heat. There is a push for gas-fired heat networks at the moment, but thinking longer-term, they will not provide the levels of decarbonisation we require to hit targets," she says.

"What are the next steps: hydrogen, green gas, heat pumps? More long-term thinking is required in future

The task force said further work was needed to determine who picks up the tab for these investor guarantees, and whether these should be socialised.

Energy and clean growth minister Claire Perry (pictured) welcomed the report's "clear proposals".

ADE director Tim Rotheray hoped it would enable government and regulators "to build on current policy support to create a long-term sustainable investment market for heat networks".

The report sets out how different elements of regulatory regimes might be incorporated into regulated heat networks, such as price controls, unbundling of generation, distribution and supply, customer protection and decarbonisation targets or instruments.

It also outlines the number of heat networks currently operational in the UK (it suggests around 17,000), how these may be decarbonised in the future in order to meet climate targets, and how heat networks and associated infrastructure could help balance the energy system.

Energy minister: Heat investment at 'tipping point'

Perry attended the launch of the ADE's report. She outlined the government's commitment to clean growth and applauded power sector progress on decarbonisation, and said heat and transport are firmly in its sights.

Perry acknowledged the challenge of decarbonising heat – but suggested that there is a groundswell of support for heat networks and that the UK may be approaching a "tipping point" in terms of unlocking investment.

Cost reduction of lower carbon heat solutions will be key to unlocking investment from both public and private sector, she suggested. Perry nodded to the £320m government support (the Heat Network Investment Project, or HNIP) allocated to helping development of heat network projects, but suggested "further reforms" may be necessary to "help create the conditions for a sustainable [heat network] market to emerge in the 2020s."

"The reason the [ADE] report is so valuable is that it sets out options for growing a market that provides sufficiently attractive returns for investors, while at the same time, protecting consumers," said Perry.

"If you can demonstrate that there is an effective market, that works well – and there are potentially changes that need to happen to bring forward further reform – that really rolls the turf very effectively for a huge upsurge in investment and adoption.

"When I speak with metro mayors and forward-thinking local authorities, there is an enormous interest in heat networks." te

Download the ADE's report at: http://bit.ly/2HHcU0R

proofing these schemes."

Asked whether the heat network market should be regulated, as suggested in the ADE's report, Curtis is cautiously supportive.

"We always treat our heat network investments as if it is a regulated market," says Curtis. "I think it's inevitable that regulation will come and we would welcome that as long as it is commercially reasonable – because all of this does add cost to schemes."

Curtis offers qualified support for the 'Demand Assurance' instrument mooted within the ADE's report as a way of protecting investors and consumers, but acknowledged that such instruments are "difficult" for government accounting structures and "therefore may not be the solution".

She thinks if local authorities could do more to supply anchor tenancies earlier in the process it may be a more practical way to derisk investment.

Moreover, heat should no longer be viewed in isolation by local planners, Curtis suggests.

"Amber Infrastructure increasingly sees this [heat] sector as part of the smart cities agenda. We invest in solar, storage, EV chargers," she says.

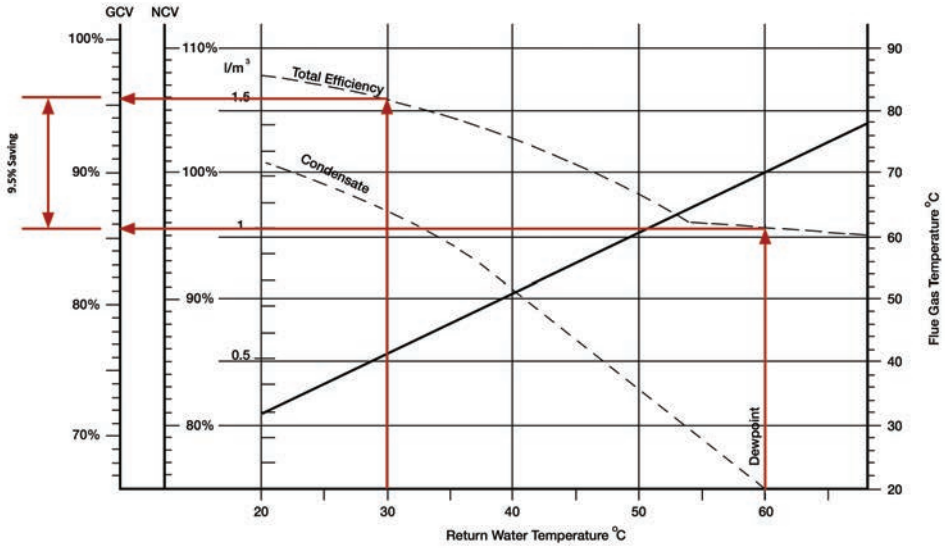
"Where you can link those projects together in one area often makes more economic sense; while the risks can be greater, you can end up with a stronger project."

Location is key for CHP

Combined heat and power can deliver significant cost benefits but only if the systems are correctly sized, located and maintained, says Remeha CHP general manager Mike Hefford

CHP converts a single fuel – usually natural gas – into useful electricity and high grade heat in a single process at the point of use. In this way, CHP can reduce energy costs by up to 30% and emissions by 20% compared with traditional heating plant and electricity supplied solely from the grid.

A heat network will typically integrate CHP with a combination of heat sources, including condensing boilers, heat pumps or HIUs. To ensure optimum performance from a CHP-powered heat network, three key areas to address are sizing, integration and maintenance.



Correct system configuration could reduce gas bills by up to 9.5%

Size for optimum performance

Accurate sizing of CHP is essential to minimise the total costs of energy supply for the site. The best approach is traditionally to match CHP heat output to the building baseload, with condensing boilers specified in conjunction to meet peak heat demand. In existing buildings, obtaining gas and electrical energy usage will help profile the demand.

An oversized CHP unit will shut down during periods of low thermal demand, resulting in frequent stop/start cycling. So beware of oversizing CHP. Depending on the base thermal load of the building, it may be advisable instead to include a suitably sized buffer tank between the CHP unit and the heating/hot water circuits.

In reality, there is no straightforward way to size CHP as each building will have unique requirements. For this reason, there is no 'one size fits all' solution and each project must be assessed on an individual basis.

Location, location – up to 9.5% more efficient

Integration is the second factor that can influence efficiency.

It is important to ensure that optimising performance from one technology will not sacrifice the efficiency of another. So, when pairing condensing boilers with CHP, remember that condensing boilers operate most efficiently at low return temperatures.

Something as simple as the location of the hydraulic connection between CHP and condensing boilers could have a major impact on the operation and seasonal efficiency of both the boilers and the CHP.

Connecting the CHP to the common return supplying the boilers, for example, will increase the return temperature. While this is not an issue with non-condensing boilers, it will reduce the efficiency of condensing boilers, resulting in significant additional costs during its lifecycle.

Configuring the system correctly to ensure lower return temperatures could shave as much as 9.5% off gas bills (see chart). Even reducing the return temperature by just 10°C would deliver an impressive annual gas saving in the region of 4.5%

Tip: connect the CHP to the common return from the heating system rather than to the boiler return to maximise system operation and seasonal efficiency.

Remote management

Once accurately sized and correctly integrated, the next step is to ensure that the CHP achieves the best energy efficiencies over its lifetime.

Remote management is central to optimising CHP performance, enabling faults to be corrected or even predicted – and therefore avoided. Our research indicates that 85% of reported CHP faults can be corrected and reset remotely, reducing downtime, inconvenience and unnecessary costs. Yet while remote management should be part of the service plan, all too often this is not possible as there is no data in place.

Tip: make sure visualisation of the CHP system is discussed at the early stages.

According to the Association for Decentralised Energy, while average grid emissions may fall through throughout the 2020s, gas CHP will continue to reduce carbon emissions by up to 30% far into the 2030s. Heat networks powered by CHP can offer reliable, easy-to-maintain heating solutions that will deliver optimum energy and emission savings. At the same time, they can provide greater resilience for businesses and organisations, reducing reliance on carbon-based energy and producing electricity at lower gas prices for lower operating costs.

As such, heat networks powered by CHP offer huge opportunities. te

Hydrogen for heat?

Gas firms believe hydrogen trial could resuscitate carbon capture and storage

A consortium led by gas networks aims to work out whether using more hydrogen within existing infrastructure could cut UK carbon emissions.

Cadent and Northern Gas Networks believe it could also lay the ground for renewed efforts to crack carbon capture and storage.

The HyDeploy project, funded by bill payers under Ofgem's Network Innovation Competition, aims to inject a gas blend of up to 20% hydrogen across Keele University's private gas network to work out how much hydrogen could be safely used within existing infrastructure without affecting gas appliances.

Keele's campus was chosen because, with 12,000 students and staff and 350 mixed-use buildings, it arguably has a profile resembling a small town. Results could provide a platform for a wider public trial.

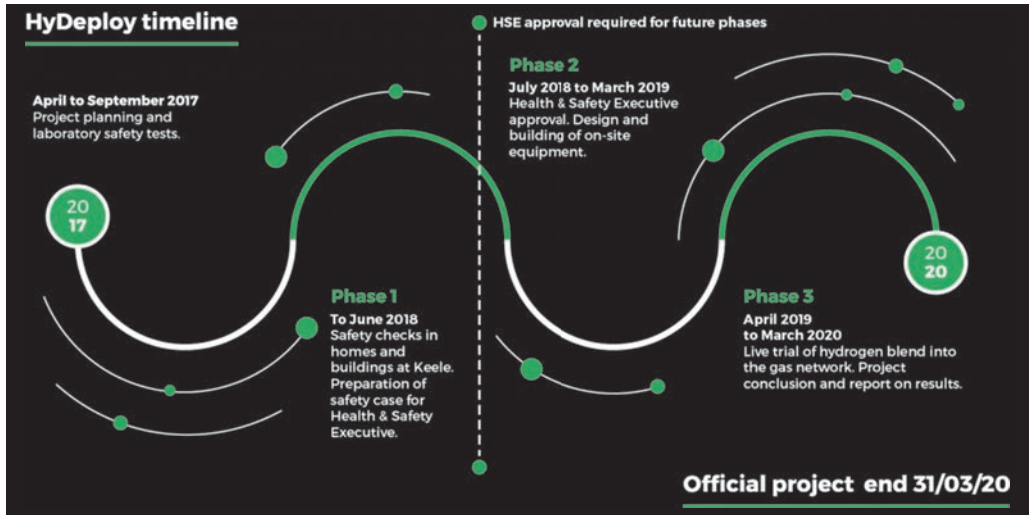
Using hydrogen, or other 'green' gases within existing gas networks is one of the pathways industry and government are considering in a bid to decarbonise heat. Another pathway is electrification, which proponents argue may be a cleaner approach.

Electrification arguments hinge on the fact creating clean hydrogen at scale would require carbon capture and storage, a technology not yet proven at commercial scale.

Counter arguments revolve around the peak loads electrification of heat would create, and how these could be managed in a system with high penetration of intermittent renewables, and where consumers display little appetite to change consumption patterns.

Under the HyDeploy trial, hydrogen will be created via electrolysis, which breaks up water molecules into electricity and oxygen.

For large-scale operations, it is likely that steam methane reformation (SMR) methods of production would be required. Making SMR hydrogen 'clean' would require carbon capture and storage.



Mark Horsley, CEO of Northern Gas Networks, told *The Energyst* the firm "makes no bones" about the fact large-scale deployment of hydrogen within gas networks would require CCS.

However, he said if hydrogen can safely be proven for use in significant concentrations within gas networks, such a requirement would help create "anchor projects for people wanting to build carbon capture networks" and make them "more viable".

David Parkin, director, network strategy at Cadent, admitted that CCS support has a "chequered history" in the UK. However, he is "very confident that the government is now focused on delivering CCS ... [Beis] and the Committee on Climate Change have said that the UK will not achieve 2050 carbon targets without it".

> ***We are very confident about the technology... but there is potential to use the pipe network for other bio or synthetic gases***

While previous CCS initiatives focused on decarbonising power, Parkin said the current cycle is "moving towards the decarbonisation of heat, transport and industry – and the HyDeploy project aligns with that broader strategy".

Using higher blends of hydrogen in the gas network will require plastic pipes. The UK-wide iron ring main replacement programme is about 70% complete, according to Horsley, and will be 100% complete by 2032, potentially creating strong alignment for higher hydrogen use in the next decade.

While gas appliances manufactured after 1996 are designed to operate with a hydrogen mix up to 23%, the government is funding a £25m project to determine implications of higher hydrogen blends for gas-fired equipment such as cookers and boilers. Manufacturers such as Worcester Bosch have already started designing boilers to handle higher hydrogen mixes.

Horsley suggested the Beis appliance funding and Ofgem innovation allowances are an indication that "government, regulator and industry are ensuring all the requisite [hydrogen] elements are joined up".

However, he rebutted claims by academics, most recently the UK Energy Research Centre, which suggest gas networks may be "promoting options which clearly cannot deliver a transformation to low carbon heat ... as a means to progress their own financial agenda".

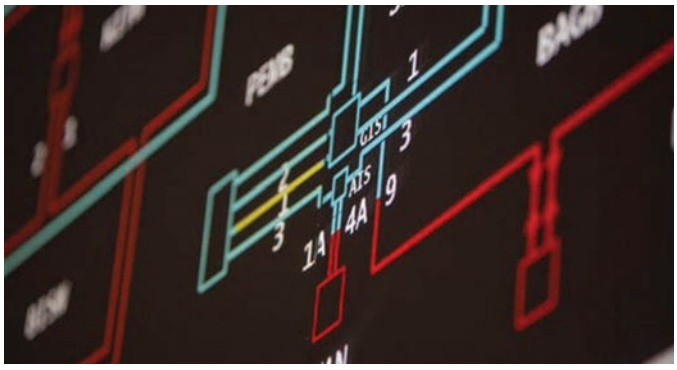
"That is not fair comment," said Horsley. "There is not a silver bullet in any solution and we do not preclude that as an industry. We very much support the work of the electricity sector, but different circumstances require different solutions. So I can categorically state that [progressing a financial agenda] is not the case.

"We are very confident about the technology – hydrogen production is a known technology – but there is potential to use the pipe network for other bio or synthetic gases. So we think the project has real merit." te

See details of the trial at https://hydeploy.co.uk

Bring small firms into DSR

National Grid outlines aims for flexible power campaign with smaller firms, electric vehicles and households in its sights in 2018



National Grid will start to focus more keenly on bringing smaller businesses, electric vehicles and households into demand-side response this year.

The system operator outlined its plans in its Power Responsive annual report.

National Grid said while it has traditionally focused on bringing industrial and commercial firms into demand-side response (or, more broadly, demand-side flexibility), "attention is shifting to the potential of smaller-scale buildings and domestic level DSR, including smart charging of electric vehicles and two-way charging solutions (vehicle to grid)".

"We anticipate this will become more prominent in the coming year and, as such, these opportunities will be incorporated in to Power Responsive's engagement activities," it stated.

The report also suggests patchy geographical uptake of DSR/DSF to date.

A survey of aggregators and suppliers conducted by the Association for Decentralised Energy suggests flexibility providers are concentrated within certain regions. For example, 36% is concentrated in London and the South East, with only 2% in the North East, and 1% coming from Scotland.

National Grid said this represents an opportunity to tap less engaged regions.

The report also confirms the increasing number of providers of higher value firm frequency response services, which is increasing liquidity and driving down prices.

While that provides better value for bill payers, National Grid said it was therefore important for service providers to work out how to stack revenue streams in order to build viable business cases.

National Grid also outlined how incoming legislation such as the Medium Combustion Plant Directive (MCPD) may affect the mix of technologies providing short term operating reserve (Stor), one of its most mature balancing services. The directive stipulates that thermal plant cannot take on new balancing services contracts without meeting strict emissions limits. Those limits will particularly impact diesel generators.

MCPD's impact on back-up diesel generators will also need to be considered this year, said National Grid. te

See the full report at http://bit.ly/2ELgBAX

... and bring large firms into flexibility

A report by respected academics has urged government to make it easier for UK industry to provide grid balancing services and to allow them to buy power direct from overseas generators.

Professor Michael Grubb and Paul Drummond of University College London wrote the report for think tank The Aldersgate Group, highlighting the premium paid for power by UK firms versus European competitors and how to address it.

Other recommendations include: bringing onshore wind and a carbon tax escalator back to the table; continuing to build out interconnectors; and better coordination of network and generation infrastructure, with a review of transmission funding and charging approaches, including Triad. It also calls for the creation of a zero carbon electricity contracts market.

Allowing firms to buy power direct from continental sources through interconnectors could work if the carbon price was applied to any imported power, the report suggests.

Meanwhile, it urges government to use its five-year review of the electricity market reform (EMR) programme to examine how to bring more industrial and commercial companies into the capacity market, demand-side response and flexibility programmes.

Industrial firms used 26% of UK power in 2016, commercial firms 21%, yet very little of that load is currently used to balance the grid, states the report.

While some energy intensive firms have stated they have limited ability to provide flexibility, the report suggests better engaging big business could enable them to offset power costs – and potentially throw-up new ways of bundling such services in new types of industrial electricity contracts.

Establishing a market for long-term, tradeable zero-carbon electricity contracts would enable businesses holding such contracts to avoid exposure to a rising carbon price, argues the report.

"Balancing and backup costs will be minimised if the renewable energy contracts are aggregated though a 'green power pool', which passes these costs on to the renewable generators, while consumers offering demand flexibility and other system services benefit from lower contract prices," it states.

The report recommends either the Low Carbon Contracts Company or potentially the system operator should be charged with looking at how that might work for deployment in the mid-2020s when the carbon price escalator resumes. te

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The trends to watch in 2018

How will the global shift to digitised, decentralised energy affect businesses? Open Energi's commercial manager Sebastian Blake looks at five key changes shaping UK energy markets

In the past few years coal has vanished almost entirely from the UK electricity grid as renewable generation has grown. As solar and wind power is inherently variable and inflexible, their rise has brought new challenges, so much so that the summer demand minimum is becoming as much if not more of a challenge than the winter peak.

Gas plants must be kept on to provide vital flexibility services, such as frequency response and reserve, which often results in over-supply during times of high wind and low demand. The current solution is to pay wind farms millions to turn off, which ultimately costs the consumer. Instances of oversupply create negative pricing events and these will become more frequent unless alternative sources of flexibility to gas can be found.

Solutions are coming forward – such as energy storage, demand-side response and interconnectors – and markets are starting to adapt.

For businesses, these changes are creating new opportunities to participate and unlock value from their assets, from industrial equipment and batteries, through to onsite generation and electric vehicles (EVs).

Here are five evolving demand-side trends and what they could mean for UK businesses.

1) National Grid balancing market reform

National Grid has traditionally relied on a few, large centralised power stations to help it balance the system. Now it is faced with many distributed participants with different technological characteristics competing for the same products. Procurement processes are catching up with two significant changes due to be introduced by the end of 2018.

Balancing services will be procured closer to real-time. This means providers of variable profiles, such as DSR, can tender with greater accuracy unlocking more volumes and value for businesses. This will also open up markets – such as mandatory frequency response – previously accessible only to large generators.

National Grid will start moving from pay-as-bid tenders to pay-as clear auctions where everyone gets the same price. This will deliver much needed transparency to the market and allow a flexibility merit order to emerge, based on the marginal operational cost of dispatching different technologies. DSR, which can cost nothing to dispatch with no opportunity cost to the end consumer, should outcompete all other options; including diesel generation which has a fuel cost and even battery storage which has degradation and efficiency losses.

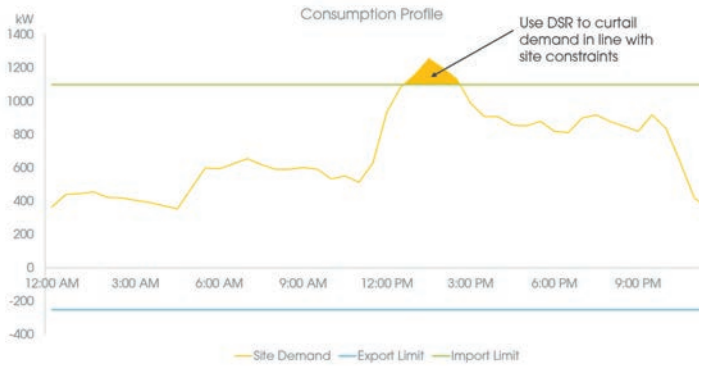
2) Network charging

Network charging reforms are arriving as the existing charging arrangements are deemed "philosophically unfair" by Ofgem. Currently the price of electricity for a half-hourly metered user is heavily weighted to the 4-7pm period, with Triad and DUoS costs creating a massive disincentive to consume electricity when demand is highest. New technology is helping large businesses to automate their avoidance of these charges, which leaves

households, and ultimately the most vulnerable in society, sharing an unfair burden of the costs of maintaining the network. Changes to 'flatten out' DUoS charges across the day will be implemented in April and Ofgem's review of the Triad mechanism will likely replace variable network charges with a standing charge per kW according to the size of the consumer's grid connection.

This does not necessarily hamper the argument for behind-the-meter flexibility as these charges can still be reduced. However, this becomes an intricate and complex exercise. The task is to flexibly manage demand and generation assets (like CHPs) to make best use of whatever connection size is in place, optimising day-ahead power consumption and production scheduling within these constraints.

As each business site will have different characteristics (technology, subsidies, weather dependencies, import and export limits etc) bespoke, localised demand management strategies will be needed to maximise value for each site.



Peak practice: using DSR to manage loads and constraints

3) Energy trading

Energy trading has traditionally been conducted over-the-counter via long-term contracts but the role of traders is changing. It may have been possible to predict coal-fired power generation months or years in advance, but wind and solar being variable and unpredictable are increasing wholesale price volatility and making trading a more real-time activity. Also changes to the imbalance mechanism (the penalty suppliers face for forecasting their total customer demand wrong) is pushing greater responsibility for balancing intermittent renewable generation on to the market. Imbalance prices can reach more than £1,000/MWh and hence businesses can help their supplier greatly by responding during these events.

These changes mean traders need more tools to shift electricity intra-day, and the ability to automatically dispatch assets. Real-time demand flexibility is a valuable solution. Electricity suppliers are looking to work with their customers who can flex their demand to drive down costs for both parties with nearly all suppliers now bringing DSR offerings for customers.

4) Batteries

About 70% of UK system inertia – which helps to stabilise the system – is provided by thermal generation, so as more coal-fired power stations close, frequency (an indicator of the balance between electricity supply and demand) is becoming more erratic. The problem is most acute in the summer, when fluctuating wind output is set against low demand. National Grid has responded by buying faster frequency response services, in the form of enhanced frequency response.

> *National Grid will move from pay-as-bid tenders to pay-as-clear auctions, where everyone gets the same price. DSR... should outcompete all other options*

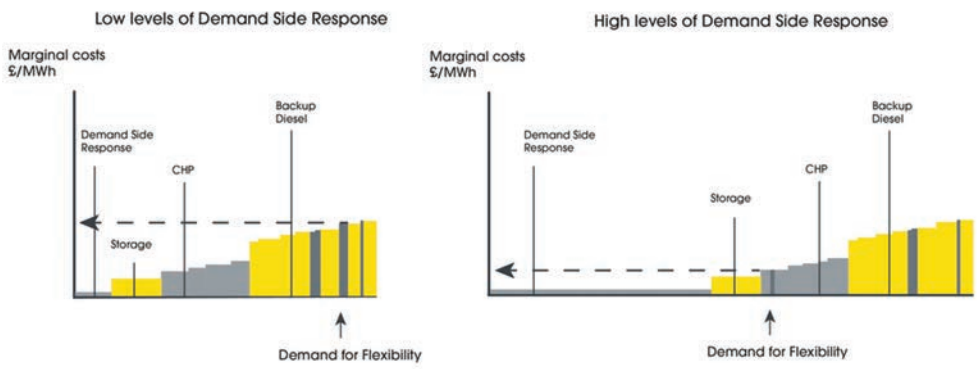
Lithium batteries, featuring rapid response speeds and fine control of power, are the ideal technology to provide this service. But there is a danger that market hype (or the Musk effect?) is leading to a case of 'irrational overbuild'. There are around 1GW of batteries already built or in construction (and many more in planning) which when compared with National Grid's dynamic frequency response requirement (around 600MW) leaves some questions. Investors and developers will need to find other ways to extract value from batteries and the best opportunities look to lie behind-the-meter where batteries can offer a wider range of benefits; like site constraint management, UPS capability and renewable integration.

5) Electric vehicles

EVs have taken off as battery prices have plummeted, and the only question seems to be how fast they will be deployed? But turning them from a threat to grid stability into an asset means smart charging is essential. DNOs are particularly concerned about how their rapid uptake could swamp already strained networks. Government has awarded large pots of funding to research in this area, including a vehicle-to-grid (V2G) project involving Open Energi. Our own analysis suggests that, appropriately managed, EVs could provide up to 11GW of flexible capacity to the grid by 2030.

Work-place charging will feature heavily in the EV revolution, so companies should start thinking about how their sites need to adapt to support – and take advantage – of these assets.

Utilising the energy storage potential of EVs through smart charging presents opportunities to earn revenue and lower costs through smart strategies. DNOs in particular are realising smart EVs can help instead of hinder the network and will reward users who can use their EVs in this way. te



Timing is everything: greater value can be earned from making smarter choices

Northern Powergrid digitises and plans flexibility tender

Distribution network operator starts digital transformation by laying smart grid comms 'backbone' and plans DSR tender, potentially this year. Brendan Coyne reports

Northern Powergrid will spend £83m digitising and upgrading its network to create a smart grid backbone. Meanwhile the company will be ready to launch a flexibility tender by the end of 2018.

The network operator told *The Energyst* that the infrastructure upgrade will lay the foundation for its transition to a smart grid, or distribution system operator (DSO).

The 'Smart Grid Enablers' project will add communications technology to sbout 8,000 substations so Northern Powergrid can better monitor and control those assets, with controls upgrades or replacements planned for 1,900 substations over the five-year project.

The upgrades will enable it to manage the grid more intelligently as generation or demand dictates.

Jim Cardwell, Northern Powergrid's head of trading and innovation, said the project boiled down to three elements: visibility, communication and control.

> ***We can bolt stuff on to this common platform and move quite quickly, so that we are a smart grid enabler, not a blocker***
>
> **Jim Cardwell, Northern Powergrid**

He said that while the industrial legacy of the north provides more headroom compared with DNOs operating in other geographies, Northern Powergrid wanted to lay smart grid foundations to manage local challenges as they arise.

"This investment is the bedrock and then we can bolt stuff on to this common platform and move quite quickly, so that we are a smart grid enabler, not a blocker."

He cited electric vehicles as an example. "Overall we have decent capacity in the North East to soak up charging patterns. But there may be EV charging hotspots, or areas where there is less diversity in charging behaviours, such as commercial fleets aligned to shift patterns compared to residential areas. That is when we might need to control network devices," said Cardwell.

"So once we get visibility of areas that require interventions, we can do that quite quickly without affecting reliability of supply."

The firm will spend £83m on the upgrade at a time when DNOs are accused of being allowed to make excess profits. But Cardwell said the alternative network reinforcement approach – installing bigger cables and transformers – could cost more than half a billion pounds by 2031, under high deployment of EVs and electrification of heat.

While heat's decarbonisation pathway is yet to be determined, Cardwell said building a digitised backbone gives customers a better deal on a more flexible network with greater functionality, "without having to dig up roads".

Flexibility tender

Cardwell said Northern Powergrid is eyeing flexibility solutions instead of reinforcing two primary substations. "We could be coming to market [for flexibility services] later this year," said Cardwell. "We established a number of years ago this is the direction we will take, so it is just a question of timing; a matter of when, not if."

"If it is needed, we will be in a position to go to market at the end of this year."

Cardwell said simplicity would be central to successful flexibility procurement. "We are looking at a wide range of contracting models but, crucially, we want to make it straightforward in terms of response and recompense. That is our key message. We will make it straightforward and align our proposition so that is not completely bespoke to other network operators," he said.

"If we can standardise [flexibility procurement] across the networks, we make it more straightforward for everybody." te

Western Power Distribution to launch flexibility tenders across all networks

Western Power Distribution will launch flexibility across all of its network areas next year. WPD has published a timetable for key elements of its smart grid, or DSO transition, which indicates flexibility tenders will launch across all networks in 2019 through to new, time-of-use-based network charges for customers in 2023. Looking further ahead, the company said it expects 8GW of energy storage to be connected to its networks by 2030.

In the meantime, to manage its networks and help National Grid manage the national system, WPD said it will use a mixture of tenders and market based arrangements. The company noted concerns from stakeholders around DNOs becoming commercial aggregators and said it will not invest in smart grid flexibility services where the market can do so more economically.

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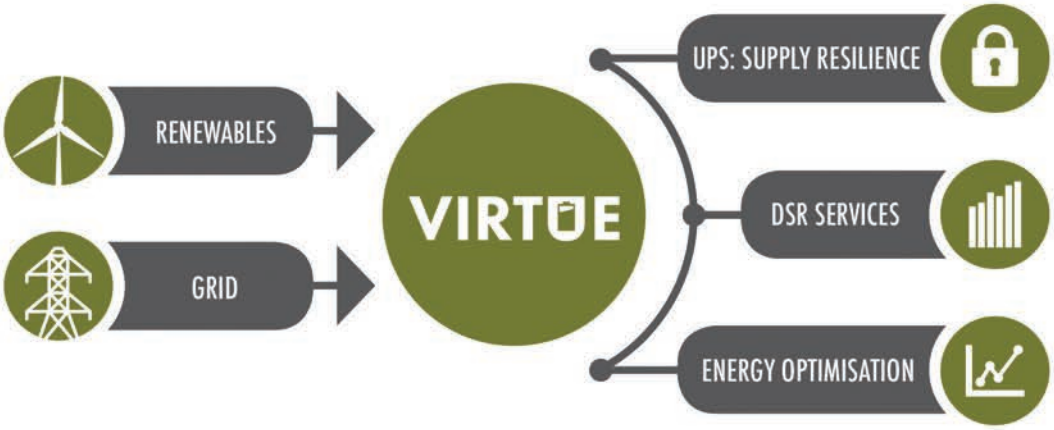
*Based on 2017 figures, VIRTUE holds more than 75% of the BtM battery energy storage systems market.



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Bring SMEs into grid balancing without them even noticing

GridIMP has partnered with EDF in a bid to bring smaller firms into demand-side response. Its founders say open standards, intelligence and automation are key. Brendan Coyne reports

GridIMP's Richard Ryan and Ed Ross

Start-up GridIMP has partnered with EDF on a government-funded trial to develop fully automated demand-response systems that bring smaller firms and sites into grid balancing without specialist knowledge or kit and at lowest cost.

Directors Richard Ryan and Ed Ross believe their technology could ultimately bring households into demand-side response without occupants having to do anything.

The firm must first prove its technology at commercial scale by demonstrating it can react to grid and market signals without intervention and with no impact on core operations. A trial with EDF at Wells Cathedral School in Somerset aims to make that case and improve the intelligence behind the platform, which Ryan and Ross say is based upon machine learning algorithms.

The system uses wireless sensors to feed real-time energy data into the platform, which then learns consumption patterns and automatically optimises for DSR balancing – and takes actions via control systems – without the need for intervention.

Some DSR technology companies might ask what's new. Ryan and Ross claim their system can connect to any standard controls and sensors – and that they are not trying to build a walled garden. The firm believes using ZigBee standards included in Smets2 smart meter specifications, ensures broad interoperability.

"Our strategy is perhaps unusual, in that while there are competitors [working to automate DSR and bring in smaller sites], they have closed systems which only work with their own technology," says Ross.

"That is a way of locking people in. Our focus with the control hub is to be as widely compatible with standards-compliant kit as possible. If you follow the standards, you can connect to devices which we think will coalesce around the standards that are out there."

Resource issues

Interoperability removes technology and cost barriers that can prevent smaller firms from providing DSR.

"There are clear financial benefits for medium-sized companies to involve themselves in demand-side management," says Ryan. The problem is, setting up and managing systems can require a fair degree of interaction, either from a consultant or qualified, dedicated person.

"Many consumers are not large enough to spare that sort of resource, or employ a dedicated energy manager. Most are busy managing business, not energy – which is why so few small and mid-sized firms are looking at DSR."

No brain, no pain

Automating responses literally creates "no brainer actions that have solid financial benefits and that require neither time commitment nor a large degree of upskilling for operators", says Ryan.

"So we have designed our solution around a business as usual approach: no customer training whatsoever, no reconfiguration by a specialist; self-configuring technology that is automated and adaptable."

But convincing businesses to cede control of key pieces of kit – either to humans or algorithms – is a key emotional barrier that DSR aggregators must overcome. What is gridIMP doing differently where others have struggled to fully unlock the large corporate sector, let alone the SME market?

"Engaging smaller commercial users will be more challenging. People will not accept interference, which is where they need reassurance that DSR is controlling non-critical systems and can be overridden very easily," says Ryan.

"You have to demonstrate to them that it is, in effect, impossible for the system to interfere with business operations where it would pose a risk commercially," he adds.

"The system will only deliver a response as and when it can and will learn from availability periods, so it becomes increasingly unlikely to do something a customer does not like."

Big plans

The company aims to have a "minimum viable product available for large industrial and commercial firms by July this year", followed by full commercialisation over the next two years. The goal is to bring in solutions for standard office equipment – heating and lighting etc – over that period.

Ryan says GridIMP's ultimate goal is to bring "every smart meter in the UK" into DSR. te

Caution: may shrink with use

The Electricity Storage Network's Victoria Box outlines key degradation considerations for those planning investment in battery storage

Honey, I shrunk the battery: when buying a battery you need to be realistic and allow extra capacity for degradation

Pic: Disney

Degradation affects batteries. This is, effectively, the battery wearing out and it is a combination of its use and its age. Thankfully, with modern batteries, this process is manageable.

Degradation can affect a battery's maximum power (MW) or maximum energy (MWh) – either, or both, of these will reduce over time. For example, lithium-ion batteries typically experience very low degradation in power but a progressive degradation in capacity over years of use.

Most people will be familiar with the capacity degradation of a mobile phone's battery: after a year of daily use, the battery seems to discharge more quickly and, disappointingly, even if it is just left on the shelf after a long period, the battery will fade. Perhaps you have noticed that the same phone and battery degrades at a slower rate when it is used, charged and kept differently: this illustrates that temperature conditions, as well as operation, influence performance. By its very nature, the chemical reaction taking place affects the electrolyte and electrodes – and each charge cycle has a small impact on them, so that after many cycles that impact is noticeable in the battery's capacity or power.

Be realistic

So what does that mean for a prospective buyer? Well, we need to be realistic and plan for degradation and allow extra capacity or power if we want to keep the battery system operational for a long time. This also means we need to know the chemistry of our batteries. Different battery types have different degradation profiles: lead-acid will degrade differently from lithium-ion, and they are both different to the various chemistries in flow batteries.

When planning for a battery, keep in mind the factors that affect degradation – as these affect a battery's warranty, too. Factoring depth of discharge, average state of charge and a battery's operating temperature into your storage system planning will result in a battery doing the tasks that you want it to do long-term.

> *Knowing you need to allow for a little shrinkage will save a poor fit later on*

Spec well

Take advice from the system vendor – it is often best to issue a functional specification, and ensure that the vendor then provides a system that meets your requirements. Time spent preparing your business case and developing the specification will reap rewards in the long term. You will need to allow for ambient and operational temperatures, access and maintenance, and be sure to check that the warranties will be applicable for your applications.

You do not need to abandon the whole battery system when it has aged; a good system design will allow for replacement of the battery without a complete rebuild.

Get what you pay for

A battery system plan should reflect the total cost of ownership over the system's entire lifetime: the lowest initial cost may not be the best purchase in the long term, once all operating costs are taken into account and the effect of degradation brought into the equation.

Proper storage system planning will result in a battery doing the tasks that you want it to do long-term

Realistic battery planning takes degradation into account, ensuring your battery can continue to meet your expectations throughout its operating life. Knowing that you need to allow for a little shrinkage will save a poor fit later on. te

VLC Energy connects 50MW battery storage portfolio

Combined heat and power giant behind joint venture to deploy grid-scale batteries

National Grid estimates it will save £200m over four years using the EFR service

VLC Energy has connected 50MW of battery storage.

The firm, a joint venture between developer Low Carbon and VPI Immingham, has two main sites: the 40MW battery park in Glassenbury, Kent; and a 10MW battery park in Cleator in Cumbria.

Both sites won contracts as part of National Grid's enhanced frequency response (EFR) tender in 2016 and both have secured capacity market contracts.

The developments use LG Chem lithium-ion battery modules and energy management systems from NEC.

Low Carbon chief executive Roy Bedlow said the company planned to expand its portfolio, stating storage is "critical to managing the demands on the grid, ensuring consumer needs are met, and increasing our reliance on low-carbon forms of electricity generation. These sites will help us tackle climate change and help the UK realise a cleaner and more energy efficient future."

Russell Hardy, chairman of VPI Immingham and CEO EMEA of parent firm Vitol, said battery storage "holds the key to the future of the power landscape, both in the UK and internationally. Ensuring grid resilience is a necessary step in the growth of renewable generation".

Leon Walker, quantitative analysis manager at National Grid, said the EFR service would save the system operator an estimated £200m over four years by enabling "ultra-fast" system balancing.

"This is good news for consumers who benefit from our cost efficiencies, and paves the way for battery technology to establish itself as an important component of our energy system," said Walker. te

Farmers offered 40% battery storage grants

Farmers are being offered government grants that enable them to claim up to 40% of the cost of a battery storage system.

They can also claim grants for heat network infrastructure and other energy efficiency projects via the RDPE Countryside Productivity Scheme.

The grants are subject to some limitations. For example, the minimum amount is £35,000 and the maximum amount is £1m. In the case of battery storage, the total system cannot exceed 1MW and there are restrictions around its capacity versus the farm's total energy use.

However, taking up the grant could effectively enable farmers to access grid balancing revenue streams while taking advantage of a substantial discount.

Systems must be purchased upfront, or leases paid off, before funding is granted.

For further details on the RDPE Countryside Productivity Scheme, see: http://bit.ly/2w1bE2X

Storage firm lands £28.5m to build 100MW

Battery Energy Storage Solutions (Bess) has secured £28.5m in project finance funding from Santander Corporate & Commercial. The firm, which is a developer, operator and owner of a range of battery storage assets in the UK, has five operational sites and a large pipeline of projects currently in development for delivery in 2018.

The company will use the money to help execute its strategy to have 100MW of grid scale battery storage assets online by the end of this year.

Battery developers are racing to deploy assets in a bid to beat falling frequency response prices as the market becomes saturated. By end of 2017, Bess had 14MW of battery storage up and running, either standalone or co-located with storage. By the end of January, the firm said it had connected a further 49MW to the grid.

In December, the company raised £50m in private equity in a round led by Tiger Infrastructure Partners.

Aurora: electric vehicles won't require new power stations

The UK will not necessarily need to build new power stations even if a third of the cars on the road are electric, according to Aurora Energy Research

Aurora's modelling of electric vehicle charging suggests time-of-use tariffs and controlled charging regimes could add as little as half a gigawatt to evening peak demand to handle 10 million EVs by 2035.

Even if owners do not respond to cheaper off-peak charges, and most charge their cars when they like, the firm suggests an additional 3GW would handle that scenario.

Three gigawatts for a third of UK cars is a fraction of the "10 Hinkley Cs" that some claim may be required if *all* cars were electric. Others, such as Flexitricity chief strategy officer Alastair Martin, have suggested the UK already has "enough spare capacity to electrify every car on the road" and could do so if the energy system were more efficient.

EVs could help absorb power from renewable generators when demand is low

Aurora's modelling suggests that smart charging regimes mean EVs will be able to help absorb power from renewable generators when demand is low. Last year, about 3% of wind power was 'wasted' because it couldn't be accommodated by the power system, according to EnAppSys, and generators are routinely paid constraint fees in those circumstances.

Aurora's report also outlines emerging business models for aggregators, energy companies and carmakers – with some of the latter already calling themselves energy companies.

While the report suggests significant peak demand increases may be avoided through smart charging, distribution network operators acknowledge that they need to make substantial investments to digitise their networks in order to accommodate EVs, potentially in tandem with greater electrification of heat, to meet binding carbon and climate change targets. te

See the report's findings at http://bit.ly/2DDvRT6

Green light for £7m vehicle-to-grid battery storage


Project aims to work out whether EVs can help balance the power system

A consortium has secured £3m in funding to see how electric vehicles can deliver demand-side response and battery storage. The aim is to work out whether EVs can help balance the power system.

Octopus Energy, Octopus Electric Vehicles, Open Energi, UK Power Networks, ChargePoint Services, Energy Saving Trust and Navigant make up the consortium, with the £7m project part-funded by Beis and Olev via innovation agency Innovate UK.

The project will enable drivers to charge their vehicle intelligently (ie at lowest cost off peak times), use the battery to power their homes at peak times or sell power back to the grid.

While some EV owners doubt the premise of using EV batteries to balance the grid due to charging times, lack of public infrastructure and battery degradation, the consortium suggests vehicle-to-grid (V2G) use has the potential to increase battery life.

The project is one of a number to secure funding from Innovate UK, with others looking at EV fleets, busses and on-street smart charging.

Details on lots of funding for smart cities, autonomous vehicles and a plethora of other interesting research areas can be found at http://bit.ly/2BRC4cG

Five things I learned from the Triad court hearing

Having previously predicted defeat for the regulator, Franck Latrémolière digests the first round of generators versus Ofgem over Triad benefit cuts

I observed part of the hearing in the judicial review of Ofgem's decision to reduce Triad benefits for distributed generation by changing the charging base for the Triad charging element of transmission network use of system charges from net demand (the power drawn by distribution systems from the transmission system to serve a supplier's customers) to gross demand (the power drawn from distribution systems by the supplier's demand customers).

A group of distributed generation operators, led by Peak Gen, is attacking Ofgem's decision. Ofgem and SSE are defending the decision. The hearing was to examine a request from the claimants for an interim injunction to delay application of Ofgem's decision by one year.

The reason that the claimants put forward in favour of the interim injunction was that uncertainty about whether Ofgem's decision would survive would unduly push up prices in the (now passed) capacity market auction (for capacity available in winter 2018/2019), and might lead to a loss of opportunity for distributed generation projects to succeed in that auction.

The request was refused because there was no evidence of harm to the claimants from uncertainty during the capacity market auction: a higher clearing price in the capacity market auction would, if anything, be beneficial to them; and the claimants did not develop the loss of opportunity point beyond a purely theoretical hypothesis. Against this, granting the injunction would have unnecessarily led to the payment of higher triad benefits, even if the court ended up rejecting the challenge to Ofgem's decision.

Here are five things that I learned:

1. The main hearing is scheduled for three days at the end of April 2018

Everyone involved expects that there will be an immediate revision of the TNUoS tariff if Ofgem's decision is quashed following that hearing. While it would be a mid-year price change, it would not be retrospective because it would affect charges that apply to power flows in the winter only.

2. None of the parties wants the wider industry or the public to know what is going on

This is unsurprising in respect of the claimants, and the large generators on the other side of the argument: most generators will have benefitted financially if the quashing of Ofgem's decision comes as a surprise, since they will extract higher prices from the capacity market and from forward markets for 2018/2019 winter energy if more market participants expect the Ofgem decision cutting Triad benefit to stand. But what is Ofgem's reason for not doing a better job of informing the industry participants who do not attend hearings in central London about events in open court that have a material impact on Ofgem regulation and on energy markets?

3. There might be something wrong with Beis, the buyer in the capacity market (which seems to have had no involvement in the case)

The judge asked the parties whether a court ruling quashing Ofgem's decision could be followed by some kind of adjustment to the capacity market auction result so as to reduce the windfall that distributed generators with capacity market contracts would get from the higher capacity market clearing price (assuming no injunction). Both Peak Gen and Ofgem were adamant that no such adjustment would happen. I perceived a note of surprise on the part of the judge when he asked for that position to be confirmed, but maybe I imagined that. Surprise would have been legitimate, as "no adjustment" is stupid. A good buyer of generation capacity in the current circumstances would put a clause in the terms of the auction to provide for sharing of the windfall with customers in the event of a successful judicial review.

4. The High Court is a good place to conduct regulatory business

The judge and the barristers were in control of their material at the right level of detail. Discussion (mainly questions from the judge in this case) quickly highlighted the important issues. There were hardly any irrelevant tangents. And this all happens in public. At the same time, there are problems in terms of access to information: very limited website, need to travel to London and to attend the hearings to find out what is going on. The forum of my dreams would combine the High Court process with a Competition Appeal Tribunal-grade website, including hearing transcripts. Could Ofgem pay for transcripts of hearings in open court and publish them, for information only, on its website?

5. The claim might not as powerful as I had speculated in my piece published last issue

On that last point, it seems that permission to proceed was granted on two grounds. One was do to with an EU law rule against discrimination. I did not pick up what exact undue discrimination Ofgem was accused of; it might be between distributed generation and behind-the-meter embedded generation. The other ground was about Ofgem's alleged failure to take proper account of other relevant factors, in particular the distribution charging regime, when approving the change to the transmission charging regime to cut Triad benefits.

I have my doubts about the prospects of success on the discrimination ground. I can see no outright discrimination in the sense of basing charges on factors that are totally irrelevant. It seems that the arguments will be about cases where a relevant difference in circumstances leads to a difference in charges that is greater than what can

be explained by cost analysis.

But detailed examination of anything as complicated as a network charging system will often reveal such things, especially for charges which I have argued as currently very far from cost-reflectivity.

I am guessing that the judgement will acknowledge Ofgem's point that the change reduces one kind of undue discrimination, and acknowledge the claimants' point that it creates another kind of undue discrimination. The parties might try to have an argument about whose discrimination is most harmful to customers, but hopefully the judge will cut that off as irrelevant.

In the end the judge will decide that he does not have either the time or the power to redesign the entire charging system, and the claim on grounds of discrimination will fail.

Ofgem's failure to take account of interactions with distribution charging, in particular the fact that the change has the effect of introducing a charge on use of distribution systems through the transmission charging regime, looks like a much more promising argument to me, as I said last issue. Since that line of argument is still alive, I still expect Ofgem to lose.

But I am less confident than I was before I had seen the claimants in action. te

Franck Latrémolière is an economics consultant, partner of Reckon LLP and editor of the dcmf.co.uk website

> ***Ofgem's failure to take account of interactions with distribution charging, in particular the fact that the change has the effect of introducing a charge on use of distribution systems through the transmission charging regime, looks like a much more promising argument to me***

Risky business: Carillion's demise a warning for FM firms

Carillion's recent collapse illustrates the need for firms involved in the FM sector to carefully manage cost and risk, because the energy world is only becoming more complex, says Lisa Gingell

Smart cities, smart buildings, industry 4.0 and the move to more decentralised utilities and communications networks are creating a world filled with millions of connected devices and systems.

It also creates continuing and growing demand for specialist contractors and FM professionals to install, integrate, maintain and manage an increasingly complex technological footprint. This means more work and more pressure for this industry; how they propose, agree and deliver contracts will be pivotal to their success.

With the UK's second largest multinational facilities management and construction services company entering into liquidation, and others feeling the impact, there is no shortage of commentary around the reason for Carillion's failings and the impact on the wider economy.

City analysts suggest that failure within the business sits around contracts being bid at the wrong price and the wrong risk transfers that were poorly executed and poorly accounted for. Carillion's position does point to governance, compliance and risk management failures; in simple terms, commercial risk management processes and project controls failed the business.

Commercial risk management, governance and compliance, as well as project controls – from enquiry to delivery and through handover and into warranty – are key

> ***In simple terms, commercial risk management processes and project controls failed the business***

aspects for success within the specialist contractor and FM industry. From our experience, businesses that have tight management, or even programmatic systems in place, ensure greatest resilience as they manage the daily risk and the contracts they enter into.

Commercial resilience

The issues experienced by such large multinationals highlight the need for greater commercial resilience within the FM industry. This is where we consider data to be key – the ability to collect, store, manage and interpret data provides a platform to drive business decisions as well as maintain business processes.

After data comes the need for collaboration across the whole business, from the estimators to delivery, project managers to finance and the board. Coupled with real-time visibility, from estimation stage and throughout project delivery, this provides insights and analysis, as well as a facility to raise red flags and trigger mitigation plans to maintain margins and meet client expectations.

The continued pressures surrounding companies in the construction industry are driving business to improve the accountability and effectiveness of its operations, financial reporting and information systems by developing holistic commercial risk management programmes. Add to that the push to embed better internal controls and workflow, and the issues with integrating those programs across the business, and you have a complex challenge.

There is no doubt many companies have worked for years to implement these requirements. But they are often inefficient and unproductive, done in departmental silos with disjointed and sometimes conflicting results and using outdated technology.

Take control

Specialist contractors and FMs should take heed and learn from the mistakes of the past and the recent issues experienced by Carillion.

Cloud-based systems mean they can programmatically control their projects, manage teams, create cross-department collaboration and provide real-time visibility and analytics; creating a connected and agile workplace – and, crucially, tackle problems when they emerge, not when it is too late.

A fundamental premise of any business is cash flow. But given the increasingly complex energy and FM sector, this industry in particular must have greater control, real-time management and visibility over what they have promised and what the client expects. That must be coupled with tight management of suppliers and sub-contractors and all the contractual terms in between.

As energy, buildings and communications converge, the way in which we agree contracts, deliver on customer expectations, and ensure commercial resilience starts and stops with strong control measures, programmatic and formal systems as well as cross business, real-time collaboration and visibility.

Because if a 100-year-old business can fail despite a fairly traditional business model, managing the complex and converging challenges ahead cannot be taken lightly. te

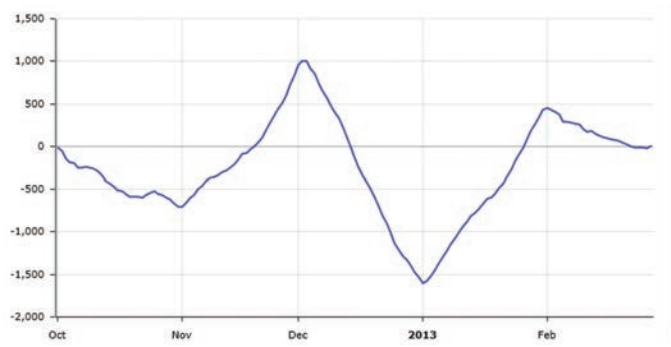
Lisa Gingell was a co-founder of t-mac technologies, which was acquired by Utilitywise in 2015. She has a background in energy and FM, particularly with software and technology. Lisa now works with ASQ Solutions on its compliance platform that is designed for the specialist contractor and FM sector

Terms of reference

Vilnis Vesma cuts through the jargon to aid the detection of excess energy consumption

Effective analysis of energy consumption data is at the heart of effective energy management. If you routinely collect and analyse the right data you should be able to detect the onset of otherwise-hidden excess energy consumption, quantify the costs of exceptions, prioritise cases for investigation and evaluate savings objectively against a background of changing weather or business activity levels. Whatever software you choose for the purpose, it will rely on three common concepts and analytical procedures which you need to understand. They are:

- Degree days: figures which provide an index against which to assess weekly fuel consumption for heating (or electricity for cooling). Computed from the outside air temperature, they give you a single number for the region and week in question, indicating how cold (or hot) the week was;
- Regression analysis: a statistical technique for establishing, on the basis of past observations, what the relationship is between consumption and the factors (such as degree days) which cause it to vary from one period to the next. The result is a formula which enables 'expected' consumption to be calculated from the measured value of those driving factors; and
- Cusum: a charting method which indicates when there have been past changes in performance. It should be used interactively during initial setup to identify periods of sustained better-than-average performance, as an aid to setting tough-but-achievable baselines for subsequent exception reporting; but it can also be used later to help diagnose persistent but otherwise untraceable deviations.



Cusum charts can help diagnose persistent, but otherwise untraceable, deviations

How do these ideas help us in practical terms? Take regression analysis first. This works out how much of your consumption is fixed and how the variable portion is related to the relevant driving factor (such as degree days, hours of darkness, or production throughput). Last year I applied the method to a factory producing frozen poultry products and uncovered an issue with their freezer plant, which appeared to be consuming four times as much electricity as was warranted by its throughput. Only by having isolated variable from fixed consumption was it possible to spot that symptom.

Similarly, cusum charts. These are time-series plots in which a horizontal trend indicates energy consumption whose actual values have been tracking expected values correctly, while an upward gradient indicates persistent excess consumption and downward slope shows persistent lower-than-expected consumption.

I recall in 2014 getting an excited call from a software developer at Smart Carbon Control (since renamed SmarterDM). Having been trained in these concepts and built them into its energy monitoring service, he had stumbled across a case with a weird zig-zag cusum (illustrated) in the air conditioning of a computer data centre which was on daily monitoring. Spotting that the chart changed direction at the start of each month, he had asked them what it was they did each month. They told him they rotated their run and standby systems.

They were, of course, blissfully unaware that one system was more energy efficient than the other and that they could save energy at no cost just by favouring the system they had used in October, December and February. te

Tackling MEES regulations

The Minimum Energy Efficiency Standards present a number of challenges in both the domestic and non-domestic rented sectors. Paul Spencer, UKAEE Committee member and energy and carbon manager, Oxford City Council, presents a brief overview of experience encountered in tackling the regulations

The Private Rented Sector Minimum Energy Efficiency Standards (MEES) regulations come in to force for domestic and non-domestic properties from 1 April 2018.

The regulations are designed to tackle the very least energy efficient properties in England and Wales and, as the Beis guidance 1 states, "not only contributing to the country's greenhouse gas emissions but also an unnecessary cost on business and the wider economy".

The domestic PRS Minimum Standard – legal framework 2011 Energy Act – gave powers to introduce a minimum standard in the private rented sector (PRS).

In March 2015, The Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015 were put into place meaning that from April 2018 private rented properties in England and Wales must reach a minimum EPC rating of E before they can be let. This applies to domestic and non-domestic sectors unless either:

- an exemption applies which has been registered on the PRS Exemptions Register; or
- all the relevant energy efficiency improvements to the property have been made (or there are none that can be made in under seven years paybacks) and the property's energy performance indicator is still below an EPC E, and this exception has been registered on the PRS Exemptions Register.

Enforcement through trading standards could see landlords of non-domestic properties leased after 1 April that are not at least an E EPC rating facing fines of up to a maximum penalty of £150,000 per property (see Figure 1).

Infringement	Penalty (less than three months in breach)	Penalty (three months or more in breach)
Renting out a non-compliant property	• Up to either: £5,000 or 10% of rateable value, with maximum penalty of £50,000 (whichever amount is the greater) • Publication of non-compliance	• Up to either £10,000 or 20% of rateable value, with maximum penalty of £150,000 (whichever amount is the greater) • Publication of non-compliance

Figure 1: Non-domestic private rented property minimum standards – landlord guidance – Feb 2017 ***(source: BEIS, February 2017)***

Non-domestic approach

Oxford City Council has been engaging in meeting the MEES regulations since first put in to place and has been taking a methodical approach in relation to its own estate.

A multi-stakeholder team was formed in late 2015 consisting of energy, property and legal stakeholders to assess the scale of the task and put together a plan of action to move towards ensuring its properties are compliant.

Close engagement with the MEES team at Beis has also helped from both sides of the fence in terms of interpretation of the regulations and how these translate into real life issues in a diverse commercial property portfolio.

The first stage of the process was to identify the current status of leases across the estate – with the primary focus on those whose leases come up for renewal on or after 1 April 2018 in a first phase programme and those (from a non-domestic focus) after 1st April 2023.

Next was to review the current status of EPCs for these properties yielding around 70 properties out of a total universe of more than 400 due for lease renewals on or after 1 April 2018. Those with F and G rating EPCs were quickly identified and work started through an initial pilot programme to review measures that could be taken to improve the EPC rating to an E minimum.

Issues thrown up have included how to tackle listed buildings or older buildings and complexities around the regulations related to these properties, checking that wording of leases includes specific mention of MEES regulations and landlord/tenant responsibilities and work involved in implementing the various energy efficiency measures required. Other learning has included double checking and sense checking existing EPC reports and where default ratings for M&E plant (for example) have been entered by the assessor. This can end up underrating the property EPC rating and needs to be addressed primarily by getting the missing details and resubmitting.

For the retail sector properties, not surprisingly perhaps, the prevalence of metal halide or older fluorescent lighting presents rich pickings for moving the EPC rating well beyond the threshold for compliance. te

UKAEE is the UK chapter of the global energy management organisation, the Association of Energy Engineers (AEE) in the US. It offers Continued Professional Development opportunities for AEE certifications such as Certified Energy Manager, Certified Measurement and Verification Professional, Certified Energy Auditor along with a range of technically focussed seminars and networking opportunities. Membership to the UKAEE is currently free, for more information please visit ukaee.org.uk

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MISSION CRITICAL POWER

Street lights 'to save council £8m'

Lamping replacement project on North Tyneside set for significant carbon and financial savings

Thorn Lighting is refurbishing 7,300 street lamps on North Tyneside with energy efficient LED street lights.

So far almost 4,000 lamps have been replaced with Thorn's Civiteq LED lighting in a partnership between North Tyneside Council and SSE Enterprise.

It is estimated that the scheme, which is due for completion in June this year, will generate savings of £7.9m over the next 17 years and will slash carbon emissions by more than a million tonnes a year, which represents a 7% reduction in the council's carbon footprint.

The council-funded £1.95m project upgrade will save approximately £465,000 annually and will have paid for itself within five years.

LED lights on North Tyneside are more cost-effective and efficient than traditional lamps

Reduction in North Tyneside council's carbon footprint

SSE Enterprise, which specified Thorn luminaires for the scheme, manages street lighting in North Tyneside on behalf of the council.

The Civiteq's R-PEC optic delivers 12 precise light distributions, while its Bi-Power switch can be used to activate or deactivate dimming on site.

Councillor John Stirling, cabinet member for the environment, said: "The new LED lights are more cost-effective and efficient than traditional lamps in every way. They're longer-lasting, cheaper to maintain, and they help the council to reduce its carbon footprint while also reducing light pollution.

"I think this is an excellent example of the council investing to save." te

Helvar shows sensitive side with PIR motion sensor

Helvar has introduced the 321 Multisensor, a compact device for reliable motion sensitivity using passive infrared (PIR) technology.

The firm claims the 321 Multisensor is easy to install and maximises personal comfort and productivity in lighting applications where regular movements may be minimal or slow – such as classrooms and office spaces – but where daylight harvesting, energy saving and automated lighting control are priorities.

Helvar's 321 Multisensor is a dual-function sensor that combines PIR presence detection with an integrated photocell to maintain a 'constant' light level in a room or corridor.

This capability to detect the movement of a heat-emitting body through its field of vision is an increasingly important energy-saving requirement in DALI lighting control systems.

Fully automated operation is achieved by the Multisensor's photocell measuring the reflected light from the surfaces below it, and then using this data intelligently to adjust luminaire light output in line with the available daylight. It enables the sensor to automatically turn the lights on when a room is occupied, maintain light levels during use, and then switch off when the space is unoccupied.

Pietari Tuomisto, product owner, embedded products at Helvar, said: "Daylight harvesting and energy efficiency are right at the top of the agenda for electrical designers, contractors and their clients."

He claimed the 321 Multisensor embraces Helvar's design know-how with an understanding of real-world lighting applications to deliver "a product for the market that meets these challenges head on."

By balancing accuracy, sensitivity and reliability, Helvar claims the Multisensor's design means fewer sensors are required to cover a target area, extending for 8m×6m at 2.5m installation height. It says this makes product specification easier and more cost-effective, without compromising on performance, while the product is designed to be discreetly housed on the ceiling.

According to the company it can be installed within a standard 50mm-diameter hole and is easily integrated into a DALI system. The sensor requires minimal programming, and all settings can be easily adjusted using Helvar's Designer or Toolbox software. te

KLM checks in online for best deal

KLM UK Engineering has implemented Nedap's Luxon light management platform, allowing it to manage its new hangar lighting online. The use of connected LED lighting will result in significant energy savings, in line with the company's sustainability goals.

Peter Mahoney, finance director of KLM UK, said: "Luxon gives us complete control over our lighting. It offers the flexibility to easily tailor the lighting to various activities in the hangars. For example, if there is only one aircraft in a hangar we dim the other bay. Nedap's Luxon platform ensures that our people can work even more efficiently and safely."

KLM UK Engineering is aiming to reduce its environmental footprint by optimising business processes where possible. Nedap's light management platform reduces the energy consumption of LED by half.

Mahoney said: "Using this intelligent system can result in significant energy savings, now and in the future, which also gives us a significant financial benefit."

Freight services company senses efficiency savings

BEG helps firm to 'push home it's green credentials' at new facility

BEG has helped Southampton Freight Services (SFS), a freight forward and logistics company, become more energy efficient following its move to a new purpose-built facility.

BEG was tasked with meeting SFS managing director Ross Negus's "desire to push home energy efficiency, carbon friendliness and the company's overall green credentials".

BEG used Luxomat PD2 sensors in the main office areas and meeting rooms as these environments required an occupancy detector that could measure the constant light changes. The BEG sensor is designed to give a constant daylight appraisal.

BEG business development manager Keith Martindale said: "We positioned the BEG sensors near the desk areas so as to utilise the seated figure – the 'pick-up range'

where the detector is at its most sensitive – which allows it to detect small movements such as when a person is sitting at a computer terminal.

"The switching control of the groups of luminaires had to be considered – the window area would be brighter than the back of the room and during the day would be subject to more daylight influence – so we used BEG sensors that can switch-off the group of luminaires near the window if the light level goes above the threshold selected."

In the bathroom areas, stairwells and general workspaces, BEG fitted surface-mounted and flush-mounted sensors BEG Luxomat PD3s as a motion detector was suitable for these types of areas where there was no need for continuous daylight appraisal.

In the main warehouse and racking areas, BEG used its Luxomat PD4 range. Martindale explained: "We used PD4s in the area under the mezzanine area as this particular detector has a 24m diameter range as opposed to the PD3 being 10m diameter range. A bigger area needed to be covered in the general area of the warehouse so we used a different type of PD4 because these motion detectors can be mounted at approximately eight to 10 metres."

Ross Negus, SFS managing director, said: "The result of LED lighting throughout the warehouses and a mixture of low energy and subtle lighting solutions throughout the rest of the building work perfectly. te

University 'cuts lighting bill by 57%'

A UK university could cut its lighting bill by 57% after trialling a new technology called LightFi, according to the technology's developers, three physicists out of Imperial College.

According to Dr Hemmel Amrania, the occupancy sensor is more advanced than motion sensor models yet is easy to install and use.

He said that eliminates disruption that can dissuade operators from undertaking upgrades even when they understand how much energy they are wasting.

Amrania says the university cannot be named, due to confidentiality agreements, but the Imperial College scientist claims the results were initially based on trials in lecture theatres.

"LightFi monitors room occupancy by looking for mobile devices that are connected to the WiFi network. It's totally unobtrusive and totally secure – LightFi looks at connections to the network but doesn't connect itself. So there's no hacking potential," he says. "It doesn't even need to be setup with a WiFi password."

Amrania said this network use becomes the room usage data and is sent to the LightFi module attached to the BEMS for the room to make adjustments accordingly. The connection is a simple attachment available for DALI-based systems, he says, with the "whole set up done by a single person in under five minutes."

The university is now trialling the system for HVAC applications, anticipating up to 40% bill savings.

Amrania claims LightFi delivers return on investment within 20 months.

Smart energy efficiency and consumer choice

The government's roll-out of smart meters is currently falling short, believes Esta's Tony Taylor

One of the enduring challenges of maximising energy efficiency has always been how to successfully engage with smaller non-domestic consumers. With close to two million of them in the UK they can't be ignored – and yet selling them the idea of energy efficiency has proven a tough nut to crack.

Admittedly, those organisations that fall into this category but with multiple sites have largely been engaged with the successful roll-out of advanced meters, data analysis systems and energy management initiatives. It is those consumers with a single or only a few sites that are harder to engage; sometimes because they perceive there will be insufficient benefit from energy efficiency, sometimes because those providing an energy advisory service perceive better successes (and returns) from larger organisations.

An old boss of mine used to say, "measure twice, cut once", and no-one would argue that energy profile data is a basic foundation to energy efficiency. The idea that widespread availability of such data should promote innovation is a sound one. So where is the problem?

Who's in control?

If innovation best springs out of opening up the opportunities to the widest possible marketplace, then the GB smart meter roll-out is currently falling short. Progress to date has virtually all been based on meters that often lose their 'smartness' when the consumer changes energy supplier – interrupting any flow of profile data.

> *Give the consumer the choice, which will at least widen the possibilities for successfully managing their energy use*

The next-generation meters (known as Smets2) are only just becoming available for installation but even with these there are significant hurdles for any third-party innovators in trying to gain widespread access to energy profile data on behalf of their customers.

So much development work has gone into these next-generation meters that one may be forgiven in thinking that they are a world apart from what has been before. For the non-domestic consumer who wants accurate bills and easy profile data then there is, in reality, little difference between Smets2 meters and the advanced meters, which have successfully played an active role in the energy industry for many years. Even in the smaller non-domestic market, the latest government statistics (November 2017) show that of the 940,000 currently operating smart and advanced meters, 95% of them are advanced – only 5% are smart (or Smets).

We want to put the consumer first, we want energy efficiency to succeed and we want innovation in this area.

Esta will continue to lobby the government to allow smaller non-domestic consumers to choose to install and use advanced meters rather than hit them with a deadline (July 2018) after which they can only use Smets2 smart meters.

The advanced meter solution allows consumers or their chosen energy management agents to arrange their profile energy data independently of their energy suppliers, ensuring such data keeps flowing even when the consumer changes energy supplier. With the consumer's permission, the data can also be provided to third party innovators of choice rather than restricted to the energy supplier and their chosen agents.

We are not saying that smart meters, Smets2 or otherwise, do not have a place in the smaller non-domestic market. What we are saying is give the consumer the choice, which will at least widen the possibilities for successfully managing their energy use.

Engaging with government

This challenge is recognised by government and we have seen greater focused activity and engagement with Esta in the past few years on this issue. There is clearly a hope from government that the roll-out of smart meters into the smaller non-domestic sector will provide a launchpad for energy efficiency innovation and we will continue to engage and pursue demand side energy efficiency interests. te

Tony Taylor is chair of Esta's automatic monitoring and targeting group

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Jo Butlin

MD of EnergyBridge (UK) on diswasher mysteries, an extra day of the week dedicated to food and wine, and being a film director

Who would you least like to share a lift with? The trio of Donald Trump, Harvey Weinstein and Kim Jong-un. Their self-inflated egos, lack of tolerance and abuse of power sum up the worst characteristics of humankind.

You're God for the day. What's the first thing you do? Add a day to the week – when you're not allowed to do anything other than relax, eat and drink wine.

If you could travel back in time to a period in history, what would it be and why? The roaring twenties... parties, flapper dresses and dancing.

Who or what are you enjoying listening to? All sorts – comedy slot, *Desert Island Discs* and *Kitchen Confidential* on Radio 4 – with high brow from Radio 3 and low brow from Radio 2, topped up with random Spotify playlists... nearly always when I'm in the car.

What unsolved mystery would you like the answers? Why do teenagers put their dirty plates on top of the dishwasher rather than in it?

What would you take to a desert island and why? My cello – once I got bored of playing, I'd use the spike to spear fish and the case as a boat to escape in.

What's your favourite film and why? *Truly Madly Deeply* – Alan Rickman playing the cello. Say no more!

If you could perpetuate a myth about yourself, what would it be? I was a professional musician before I discovered energy.

What would your super power be and why? The ability to teleport – I spend far too much time sat in traffic jams and on trains that are not moving.

What would you do with a million pounds? Half to good causes... and the other half spent exploring the ends of the earth at leisure.

> *Their self-inflated egos, lack of tolerance and abuse of power sum up the worst characteristics of humankind*

What's your greatest extravagance? Good food and wine... on a regular basis!

If you were blessed with any talent, what would your dream job be and why? Film director – limitless creativity, big budgets, power to make it happen and a legacy end product.

Alan Rickman playing the cello in *Truly Madly Deeply*

What is the best piece of advice you've ever been given? We are all ultimately human and no one is better than anyone else.

What irritates you the most in life? People who spend their lives commentating on what is wrong rather than doing something to make it better.

What should energy users be doing to help itself in the current climate? Shop around, focus on using less and respond to all the great innovations coming down the track.

What's the best thing – work wise – that you did recently? I led a business through a strategy review which resulted in a real change of direction and full buy in of the leadership team – the knowledge that my skills and experience make a real difference is hugely rewarding. te

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