the energyst

"Build offshore wind without subsidy? You are bonkers" *p13*

British Gas

3 reasons why great businesses rely on British Gas

1. **Fully fixed prices**, all-inclusive with 1-5 year options
2. **Full cost transparency** with no hidden charges or risk to the customer
3. **Trusted by around 400,000 businesses** to make energy buying simple

Our business energy specialists have the experience and expertise to help you think clearly about your energy needs – and buy wisely.

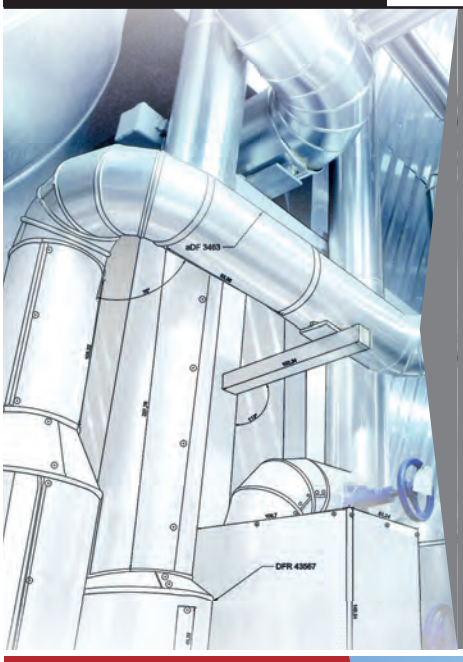
Call now for a fully fixed quote*

0845 070 3720

Or find out more search
britishgas.co.uk/large-business

* Mon-Fri 8am-5pm. Calls may be monitored or recorded to help improve our services to you. Fixed quotes include current system charges and levies. For half hourly businesses with agency services agreements in place (MOP, DA, DC), we can exclude these costs. Any concerns? Visit britishgas.co.uk/business/complaints for details of our procedure. For more information about the mix of fuels used to generate our electricity, visit britishgas.co.uk/business/about-us.

INSIDE THIS ISSUE



36 Heat

Tackling heat will be key to decarbonisation. So what are the options and how to get there? *The Energyst* asked experts for their views

42 Heat

Gateshead Council is providing cheaper heat and power to commercial and residential customers, and funding front line services. How did it do it?

34 Commercial buildings

A brighter, station and other lighting upgrades, plus optimised BMS savings, heating efficiency boost and more

16 The Energyst Event

Convergence of generation and consumption is happening now. What does that mean for energy managers and their businesses – and what's coming next?

52 Viewpoint

Amid talk of data scientists unlocking the new economy, Lisa Gingell argues data translators will be crucial.

26 Emerging Technologies

Atlantis boss Tim Cornelius believes tidal power could be deployed at scale in the UK and France for less cost than new nuclear Hinkley Point

> ***You're bonkers if you think we will build offshore wind subsidy-free***

13 Insight

Forthright views from energy company bosses at the Aurora Spring Forum

47 Storage

I&C firms banking on FFR revenues are 'gambling' says RedT boss Scott McGregor. He thinks businesses should instead seek to build longer-term storage business cases

14 Cover Story

GridBeyond claims a breakthrough in hybrid DSR and storage

The mañana energy strategy

Hearing many of the inspirational speakers at The Energyst Event in April disclosing how their energy management strategies are becoming integrated made me think that not only is this happening now, it is yielding effective results for those that have embraced the converging energy landscape. Stories about incorporating storage or onsite generation, avoiding peak tariffs, building energy efficiency cases beyond simple payback periods, innovative energy service and finance models, and decarbonising heat, are just a few of the projects changing the way organisations manage energy.

> ***The energy world is shifting from the more familiar delineated procurement and energy efficiency silos to a broader, converged, landscape***

These accounts from business and the public sector about making energy efficiency stick, incorporating procurement and flexibility into a single – coherent – approach, might make you think that end-users have it cracked and are data-savvy kings of this emerging, brave, new, smart energy world. Yet this does not by any means seem to be the rule, rather they are pioneers and exceptions to the rule. The average firm's attitude to energy is often ambivalent. How long can this remain the case?

Research by Centrica Business Solutions has found that businesses that have a sophisticated attitude to energy, invest in advanced energy solutions and measure and control energy efficiency, are twice as likely to outperform competitors on customer-centricity and brand leadership. Cost reductions from better energy management, yes, but further reasons accumulate making the case compelling.

The energy world is shifting from the more familiar – delineated – procurement and energy efficiency silos to a broader, converged, landscape. Energy efficiency is moving towards commoditisation that enables better finance backed by initiatives such as QualitEE (Quality Assurance Frameworks for Energy Efficiency Services) to increase investment in energy efficiency services and improve trust. Pay-as-you-save schemes and, more generally, energy-as-service are aiming to unlock the vast potential of improved efficiency. Add to these developing areas such as streamlined DSR schemes, the potential of batteries and, more broadly, energy – and for that matter heat storage and perhaps peer-to-peer trading via blockchain, big data and the internet of things with analysis aided by AI – and you have a significantly different picture than would have been the case even only a few years ago.

Some think the evolution of these new-fangled initiatives is something than can be considered tomorrow, if at all – mañana. Banister House Estate in London's Hackney has performed the UK's first peer-to-peer energy trade, using blockchain, from one resident to another based on onsite generation and storage. It is happening today. Teams across organisations need to dismantle internal barriers to effectively procure, reduce and shift energy consumption.

This is not an idea for the tomorrow because the future is already here.

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

Registered in England & Wales - 8667229
Registered at Stationers Hall - ISSN 0964 8321
Printed by Warners (Midlands) plc

Follow us for up-to-date news and information:

Specialists in Power Generation

Edina

YOUR ROUTE TO ENERGY EFFICIENCY

www.edina.eu/chp-cogeneration

We believe MWM engine technology offers market leading performance, reliability and sustainability.

This technology, alongside our 30 years' industry knowledge and technical expertise in delivering combined heat and power (CHP) and gas power generation solutions...

...help supports your business growth by reducing energy costs, carbon emissions and improving competitiveness.

So, if you're looking to improve your energy efficiency, you'll find all routes lead to Edina.

Constant Support. Consistent Value.

MWM
Energy. Efficiency. Environment.

Official distributor in the UK and Ireland

Environment Agency makes Triad u-turn

The Environment Agency has shelved plans that would effectively prevent unabated generators performing Triad avoidance.

Under the Medium Combustion Plant Directive (MCPD), generators that take on new balancing services agreements with National Grid, or new Capacity Market contracts, must comply with strict emissions limits by 1 January 2019. They are classified as 'Tranche B' generators. Those that do not take on new agreements are classified as 'Tranche A' generators and have until 2025 or 2030 to comply.

The EA had originally stated Triad avoidance would be classed as a balancing service, pushing Triad avoiding generators into 'Tranche B', and therefore required to meet new NOx emissions limits by 1 January 2019.

Industry was dismayed that Triad, a billing methodology applied retrospectively by National Grid to determine transmission charges, was being classified by the EA as a balancing service.

The proposal would have effectively ruled out unabated generators from taking part in Triad avoidance next winter, including back-up generators.

Winter peak avoidance: watch this space

While abatement can be fitted to generators, for many businesses the cost could outweigh any savings.

It appears the agency has listened to industry concerns. A briefing note from the Association for Decentralised Energy states: "It has now been agreed that, if a Tranche A generator participates in Triads from 2019, this will not change its status to Tranche B, because Triad is not a balancing service."

Asked by *The Energyst* to confirm the information, the Environment Agency said: "Yes this is correct – we will be consulting stakeholders on draft guidance in May."

Back-up: no rule change

Under the UK interpretation of the MCPD, back-up generators are exempt from controls, provided they run for back-up only. However, the EA has indicated that if they perform Triad avoidance from 2019 onwards they "may not continue to be an exempt generator if [they] carry out Triad operation in 2019 onwards, but will become a Tranche A or B generator".

That means back-up generators could still provide Triad avoidance, but would come under the scope of the rules as 'specified generators'. As a result, they would no longer be classified as 'back-up' generators, and as specified generators would need to comply with the relevant permitting and deadlines.

> ***So, if you are a back-up generator, can you become a 'specified generator' and Triad avoid, and then go back to being an emergency generator before the permitting deadline in 2025?***

More questions

Industry is now seeking clarity on whether participating in Triad avoidance next winter commits back-up generators to becoming Tranche A generators irreversibly.

"So, if you are a back-up generator, can you become a 'specified generator' and Triad avoid, and then go back to being an emergency generator before the permitting deadline in 2025?" asked Enernoc programme manager Shane Summers.

"If the answer is 'no', then businesses must consider carefully Triad behaviour this year, because then they are committed to Tranche A and may have to install selective catalytic reduction (SCR)," he added.

"Ideally we could have some clarity as soon as possible, because businesses need to make decisions now around Triad and whether to invest in SCR."

Grid confirms Triad dates

National Grid confirmed this winter's Triad periods at the end of March. The system operator said the three highest winter peaks, at least 10 days apart, upon which it bases transmission system charges for large firms, were on:

- 11 December for the half hour ending 17:30
- 5 Feb, for the half hour ending 18:00
- 26 Feb for the half hour ending 18:30

All three fell on a Monday and all three were below 50GW.

It was also the first time that two Triads have fallen in February.

Eon claimed it hit all three periods in 13 alerts to customers, three of which were 'high' alerts, six of which were 'medium'. Utilitywise claimed it hit all three periods in 16 alerts, nine of which were 'red' alerts.

Water giant now selling energy

Water Plus, the joint venture between Severn Trent and United Utilities, has started selling energy.

The company told *The Energyst* it is primarily targeting small firms, touting savings of "up to £400" if companies buy all of their utilities through it.

However, its website also states it has the expertise to handle supply to more complex multisite operations.

Polled ahead of water retail competition in April 2017, some 88% of *Energyst* readers suggested that they would buy energy and water from a single supplier if it saved them money.

Yet a year on, only a fraction of small firms have switched water supplier (see p9).

Water Plus said there was "increased demand" for a multi-utility offering from customers.

EVs boom no sweat, says National Grid

National Grid has said the power system could cope with an overnight boom in electric vehicles and that the extra generation capacity required to handle millions of vehicles is no big deal.

Nine million electric vehicles on UK roads might require 8GW of extra power generation capacity if people charge them when they like. But smart charging could cut that to 4GW, potentially less, according to National Grid's EV lead, Graeme Cooper.

Cooper was questioned alongside Ofgem and the Energy Networks Association (ENA) by the Business, Energy and Industrial Strategy Committee.

Cooper said the firm's modelling suggested "not a tremendous amount of new generation is needed" if energy companies can "marry up the challenge of the generation and the wires to get the generation in the right place".

National Grid says the power system can cope even with rapid uptake of EVs

Even if uptake of electric vehicles is more aggressive than National Grid's modelling suggests, Cooper said the system would be able to cope.

"People who lease a car tend to be on a three to four year cycle; people who buy private vehicles tend to be on an eight to nine year cycle. So while a change overnight could be more dramatic [it is unlikely to be] a cliff edge," he said.

While the UK's generation mix is changing relatively quickly, the system is "very robust" and is responding to that change, said Cooper. "So I think there is enough time even if we see sharper uptake, to respond in the right way."

Stewart Reid, who chairs the ENA's low carbon technologies working group, told the committee that EVs, if charged flexibly, would also help the system cope in the other extreme, when there is too much inflexible generation on the system.

"Flexible charging brings an opportunity to de-constrain wind. So flexibility is the key," he said. "It provides additional capacity and also enables us to get the maximum out of existing network assets."

Asked whether the UK government's target to phase out new petrol and diesel cars by 2040 should be brought forward to 2030, Cooper said he believed National Grid "would support a more ambitious target" and could "absolutely" cope in that scenario.

Vattenfall touts 1MW PPAs to fund South Kyle wind farm without subsidy

Vattenfall is touting power purchase agreements (PPAs) as small as 1MW or 3GWh per annum from its South Kyle Wind Farm in south-west Scotland.

That means the firm is effectively targeting mid-sized companies as well as corporates. It hopes to convince them to buy renewable power and lock in prices for between 10 and 20 years.

The utility is working with Mitie Energy on tenders to buy the power from the 165MW onshore wind farm, which Vattenfall expects will output 500GWh per annum. Bids to buy its output can be submitted until June.

In the absence of subsidies for onshore wind, which is currently ineligible to bid for contracts for difference (CfDs), corporate PPAs are seen as a route to market by developers.

Vattenfall was granted consent for the South Kyle Wind Farm last June. The company's UK originator, James Hunt, told *The Energyst* the company aimed to make a final investment decision on the project by the end of this year or first quarter 2019.

"Right now, there are no subsidies available, hence looking at [corporate PPAs] in order to bring South Kyle to financial close," said Hunt.

He added the company would also welcome any change in policy, given "there is a limit as to how many projects can go down the PPA route" and that domestic consumers are also unable to engage in the PPA market.

Hunt said market feedback suggests companies typically seek to lock in around 20% of their consumption via long-term PPAs, with procurement departments attempting to familiarise themselves with new approaches.

He said the tender should also shed light on what businesses are prepared to pay for long-term price certainty, given open market visibility is usually limited to two to three years.

Hunt said he expected the output would fetch "about current market rates" in real terms.

Firms buy 1.6TWh via corporate PPAs

About 1.6 terawatt hours (TWh) of power were consumed via power purchase agreements in the UK last year, according to estimates by Smartest Energy.

The Marubeni-owned firm, which buys and sells power produced by independent generators, said PPAs were a win-win, as they enable buyers to lock in prices and demonstrate sustainability, while enabling generators and developers to fund projects.

Smartest Energy's sixth annual *Energy Entrepreneurs Report* also details how much was spent on independent UK renewables projects in 2017 (more than £227m), and opportunities around battery storage co-location models. *Download the free report at: smartestenergy.com*

Ofgem chief relishes 'contentious, difficult' charging review, with proposals by autumn

Ofgem chief executive Dermot Nolan has warned that there will be losers from its overhaul of network charging arrangements.

The regulator intends to come up with a new set of rules regarding how people access and pay for the grid, due in part to the number of people now avoiding charges, leaving others to pay a higher tab.

Nolan told Aurora's Spring Forum in Oxford that the regulator will publish some charging proposals by late summer or early autumn.

"I expect those proposals to be regarded with interest by a large number of [market] participants, some of whom will like them, some will not," said Nolan.

He added that the review, "almost by nature, will be contentious".

Speaking on a panel alongside UK Power Reserve CEO Tim Emrich, a vocal critic of Ofgem's decision to slash Triad benefit, Nolan said the regulator had to make difficult decisions in the interest of consumers.

"Questions of fairness will come up [during the charging review]. They are unavoidable for a regulator in what almost by definition will be a contentious process, in which every different person is saying, 'no me, I'm the guy, I'm the innovator'.

"So we will have to make judgements that are extremely difficult," said Nolan, adding that the regulator was nevertheless "looking forward" to the process.

Not underpowered

Nolan also rejected claims by Emrich that Ofgem was underpowered and led by large market incumbents that he claimed "control" the industry code panels.

Nolan: says regulator has to make difficult decisions

"They don't give Dermot and his team a lot of options," Emrich suggested.

Nolan said he did "not feel the regulator is under-resourced on issues relating to charges at all" and was "dismayed at the view larger companies are doing our thinking for us."

He pointed to the recent challenge to its decision on transmission charging by SSE and EDF, which was dismissed by the Competition and Markets Authority, by way of example.

The panel had discussed fostering innovation within the energy industry but Nolan also warned that some who "perceive themselves as innovators will fail".

"Some will flourish, some will wither; we should expect that," said Nolan.

"The point is, do you have a rule book that is sufficiently flexible to allow those that are going to flourish to do so?"

Aurora's Spring Forum brought together energy company seniors as well as regulators and policymakers. See p12 for more of their views

Get cracking on decarbonising gas, National Grid urges government

National Grid has called for government to get to grips with decarbonising gas to enable decarbonisation of heat, transport and industry.

The gas and electricity system operator recommends appointing a lead official with responsibility for gas decarbonisation with a remit to set strategy and policy.

In a wide-ranging report on the future of gas, National Grid said whole system thinking will be crucial to deliver least-cost decarbonisation.

The firm said a silver bullet in terms of technologies is unlikely and reiterated the challenges associated with systems-wide electrification.

Pointing to huge winter peak requirements for heat alone (which would require about six times the winter electricity peak of 50-60GW), National Grid said gas, potentially hydrogen, would likely remain central to meeting energy needs.

Gas will likely remain central to meeting needs, says Grid

Using steam methane reforming to create hydrogen will require relatively unproven and financially challenging carbon capture and storage (CCS) or carbon capture, usage and storage (CCUS).

In the absence of policy clarity around hydrogen and CCS, National Grid said there were still least regrets actions that industry, government and the regulator could take.

However, it said much closer collaboration between power and gas companies, with a regulatory and policy framework that recognises the increasing interrelation between all parts of the energy system, is urgently required.

Energy minister: 'Bring on mine heat'

Energy minister Claire Perry has thrown her support behind projects to turn old mines into source of renewable heat.

It comes as several local authorities look at tapping a potentially abundant source of energy, with projects underway in Cornwall and Kilmarnock.

Perry said she is "really interested" in geothermal mine water projects.

"If there are groups out there that are interested in promoting this and suggesting what can be done in a cost-effective way, bring it on," she said.

"We have already dug the holes [the mines], lets see whether we can get some more benefit."

6MW tidal turbine starts commercial operations

Atlantis says its 6MW tidal turbine array in Pentland Firth in northern Scotland has completed all tests and entered its 25-year operations phase. The milestone caps more than a decade of work. The company will now turn its attention to scaling its operations and commercialising tidal stream technology.

The first phase of the 6MW MayGen project uses two different turbine designs, three AAH turbines and one of Atlantis' own design.

It qualifies for five renewables obligation certificates (Rocs) per MWh, reflecting the heavy lifting required from both public and private investors in bringing tidal technology to this stage. Atlantis says it has a 1GW pipeline with 392MW consented.

See p26 for further details

Indian government buys Edina

India's Ministry of Power has acquired UK combined heat and power firm Edina for £55m and plans to invest millions in the UK energy services market over the next two years.

The deal is structured via UK subsidiary EnergyPro Asset (EPA), which is a joint venture between Energy Efficiency Services (EES), a publicly owned energy services company overseen by India's Ministry of Power and EnergyPro, a UK-based energy advisory company headed by Steven Fawkes.

Edina has approximately a quarter of UK gas engine market share and turns over more than £100m.

EES plans both to grow the CHP market in India via 'as-a-service' models, and simultaneously tap into the UK energy services market.

The ministry said it has earmarked £150m to invest into energy services business opportunities in the UK, EU and North America between 2017 and 2019.

The deal sees EPA also acquire its first India-based trigeneration client. Edina has agreed to service Sterling & Wilson UK, subsidiary of Sterling & Wilson India, to develop Short Term Operational Reserve (Stor) by supplying gas generating units that will provide 26MW of electrical power.

Backbilling backstop

Energy suppliers will not be able to back bill micro businesses for more than a year from November after Ofgem introduced new rules covering gas and electricity. While some suppliers had already signed up to a voluntary arrangement, the licence condition formalises the requirement.

Water switching: SMEs in the dark

Research carried out by SES Business Water in conjunction with YouGov found just 6% of small firms with an office in England have switched water suppliers since the non-domestic market opened a year ago. Some six in 10 were not aware they could switch. SES called for an SME awareness campaign.

Half of UK's power from low carbon sources as renewables top 40GW

Low carbon sources accounted for 50.4% of power generated last year in the UK, according to latest government data, overtaking fossil fuels.

However, the UK's total energy consumption remains more than 80% reliant on fossil fuels, and transport consumption continues to rise.

Solar power stood at 12.8GW at the end of 2017, but delivered less than 2% of the mix in the fourth quarter

Generation

Total UK generation output in 2017 was 335.9 terawatt hours. Of the generation mix, gas dipped to 39.7%, nuclear fell slightly to 20.9%, while renewable generation increased to 29.4%.

Coal generation dropped by approximately a quarter year-on-year to 6.7% of the mix.

However, while use of coal-fired power stations declined through most of the year, large stations such as Fiddler's Ferry and Eggborough fired up again as part of the capacity mechanism, so that the use of coal in the fourth quarter of the year was little different to the previous year.

Renewable generation capacity stood at 40.5GW by the year end, with onshore wind overtaking solar to hold the largest share of that mix (12.9GW, compared to 12.8GW of solar).

However, in quarter four, solar delivered less than 2% of overall generation output as light levels reduced, whereas onshore wind delivered 10% as wind speeds picked up.

Demand and emissions

Across all sectors final energy consumption fell 1.1% annually.

Domestic sector consumption fell by 4% and the services sector fell by 1.8%.

However, industrial consumption increased 0.8% while transport consumption rose by 0.7%.

UK net carbon emissions fell 3.2% year-on-year.

The energy supply sector continues to decarbonise faster than any other, with emissions falling 8% year-on-year, now down 57% compared with 1990 levels.

Emissions from transport remained flat and have only declined 1% since 1990.

Northumbrian Water signs with Ørsted to go 100% renewable

Northumbrian Water will power all 1,858 of its sites using renewable electricity for the next four years after signing a deal with Ørsted.

Ørsted owns or has a stake in nine UK offshore wind farms (Barrow, Burbo Bank, Burbo Bank Extension, Gunfleet Sands, Lincs, London Array, Walney, West of Duddon Sands and Westermost Rough).

It also has another four projects under construction (Hornsea One, Hornsea Two, Race Bank and Walney Extension), which would take its offshore interests to 4.9GW, plus two in development (Hornsea Three and Isle of Man). If built, these would result in an 8GW portfolio

Northumbrian Water will power all of its sites with renewables

The firm said two years ago it would supply renewable power at brown power prices.

The deal will enable Northumbrian Water to save 125,000 tonnes of CO_2 each year, which equates to savings of £1.4m per annum at current EU ETS prices.

Northumbrian Water commercial director Graham Southall said: "Energy is an essential part of our business and our contract with Ørsted has enabled us to significantly reduce our carbon footprint, as well as driving down costs."

Ørsted Sales UK managing director Jeff Whittingham added: "Businesses should have access to renewable electricity supply without incurring additional cost."

Naturally, Whittingham was "delighted" Northumbrian Water had signed the deal, one of the biggest in the water company's history.

Google hits 100% renewables goal with 3GW in PPAs

Google has hit its target to use 100% renewable power. The firm said it now has contracts in place to purchase 3GW of output from renewable sources and plans to fund construction of more power plants.

Urs Hölzle, senior vice-president for Technical infrastructure, said Google's accounting for 2017 shows it bought more power from renewable sources over the year than it had consumed – all from wind or solar plants built specifically for Google.

The company said it will sign more power purchase agreements (PPAs) to develop further renewables projects.

Ex-Npower boss to head up blockchain firm Electron

Paul Massara is to take the CEO role at energy blockchain firm Electron.

The former Npower chief executive joined Electron as a non-executive director last year.

Electron founder and current CEO Paul Ellis will become company chairman.

Electron is expanding its team after securing both public and private funding, and in April announced further investment from Systemiq, an investment firm that backs potentially disruptive companies (it also recently invested in Upside Energy).

Electron believes its blockchain platform could provide a more efficient way of managing the energy system, and is working to develop an energy flexibility trading platform with energy industry majors.

New I&C sales head at Total

Total Gas & Power has hired former Npower sales, marketing and technical services director, Mark Rose *(pictured)*, to head up its sales operation to large businesses, including industrial and commercial firms.

Prior to joining Npower in 2014, Rose spent 10 years with EDF Energy, five of which were with British Energy.

Bristol Water takes FD from Bristol Energy

Bristol Water has hired Laura Flowerdew as its next chief financial officer.

Flowerdew, currently finance director for Bristol Energy, will replace Mick Axtell, who will leave the firm after financial statements for 2017/18 are approved by the board.

Flowerdew will start on 1 October. She held senior finance positions at Tribal Group, the De Beers Group and Anglo American prior to joining Bristol Energy. She is also a former director at Deloitte's energy infrastructure and utilities business.

RedT hires in bid for growth

Energy storage firm RedT has hired former Green Investment Bank managing director for finance Fraser Welham as chief financial officer. Aiming to scale operations, the flow-machine company has also hired Jean Louis Cols as technology director and promoted Dave Stewart to chief operating officer.

New Gemserv chief executive

Alex Goody will take over from David Thorne at energy and data services firm Gemserv this summer. Goody is Gemserv's director of busines development and consultancy, and will work with Thorne on handover before taking the reins in mid July. Thorne announced in January that he would step down.

Eon: Renewable power is done, now for heat and transport

Speaking at Aurora's Spring Forum, Eon's chief executive believes the firm's future growth lies in decarbonising heat and transport, where there is 'still a problem to be solved'

Eon CEO Michael Lewis believes the UK has largely cracked decarbonisation of power generation and must concentrate on heat and transport, which is where he said the energy company will concentrate its efforts.

Speaking at Aurora's Spring Forum, Lewis, who took the reins from Tony Cocker a year ago, applauded the policy stability of successive previous governments in delivering renewables.

"[Renewable generation] has been a huge success but, in many ways, that is already done," said Lewis. While there are "some issues around intermittency" to solve, "we have [achieved] renewable, low and zero carbon generation at a lower price than conventional generation. Now we need to turn to transport and heating – and that is where Eon wants to play a key role."

He said heat and transport are at a similar juncture to renewables "10 or 11 years ago" and pointed out that while the UK has succeeded in delivering some 40GW of renewables generation, "success was far from a forgone conclusion back then".

Lewis: "Eon wants to play a key role [in transport and heating]"

Lewis said in 2008 Eon had two offshore projects under construction, "both hugely over budget and late". The firm had another two in operation, both beset by technical difficulties. Meanwhile, the London Array project "came that close to not going ahead, and would not have gone ahead unless government had moved to two Rocs".

Giving offshore wind developers additional subsidy at that point, he suggested, was now bearing fruit in enabling the economies of scale that are leading to cost reductions.

"We were about to make an £800m investment decision and needed to know that the government stood behind us, which they did, and created a world class industry."

That foresight should now be applied to decarbonising heat and transport, said Lewis, which is where Eon will focus more fully.

"We believe our capabilities are better deployed where there is still a problem to be solved," he said, suggesting the starting point should be "making the existing system more efficient."

Under the proposed Eon-RWE deal, it has been announced that Eon will focus primarily on retail and networks, with RWE taking on generation.

Speaking at the same conference, SSE boss Alistair Phillips-Davies said he "saw the SSE-Npower merger going forward and being unaffected by the RWE-Eon deal". te

Vattenfall backs hydrogen to decarbonise heavy

Swedish power company Vattenfall believes hydrogen produced from renewable power could decarbonise heavy industries such as steel and cement production – and the firm wants to own the supply chain from generation to storage.

CEO and president Magnus Hall *(pictured)* told the Aurora Spring Forum that "fossil-free steel on a full scale will, I think, be deployable between 2030 and 2035".

While a "huge investment" and change for industry, Hall said Vattenfall was engaged with Sweden's major manufacturers around decarbonising processes.

He suggested while climate change has perhaps been sidelined by global political issues, it will "come back big time", with companies aware of the need to clean up. "I think in the future, if you are not sustainable as a company, you will be punished," said Hall.

Hydrogen sonata

Vattenfall is involved in a trial to replace coking coal in ore-based steel making with hydrogen and is building a test plant.

The firm has also struck a deal with pulp and paper firm Preem to use hydrogen to create biofuels from forestry bi-products.

Hall said Vattenfall also has designs on decarbonising the "huge" German chemicals industry.

Decarbonising heavy industry using renewables to create hydrogen via

‘You’re bonkers if you think we will build offshore wind subsidy-free’

Scottish Power chief executive Keith Anderson has questioned the apparent obsession with achieving subsidy-free renewables, warning it will not happen any time soon in the UK for technologies such as offshore wind.

Anderson took part in a panel debate around ‘post-subsidy’ renewables at Aurora’s Spring Conference.

Asked which markets are most attractive to parent company Iberdrola in terms of ‘subsidy-free’ development, Anderson replied that he “hates the expression”.

“I can’t understand why the renewables industry has become obsessed with talking about becoming ‘subsidy-free’. Right now, nothing in the UK energy industry is being built without some form of support, so why in god’s name is the renewables industry running around desperate to [be seen] as subsidy-free?” Anderson asked.

“Everything has some form of support. If you think we are going build a £2.5bn offshore wind farm in the UK at market risk, you’re bonkers.”

Keith Anderson does not believe subsidy-free offshore wind will happen any time soon

While power purchase agreements (PPAs) with large corporates are seen as a way of mitigating risk for developers, Anderson said the UK market for such deals is nowhere near mature.

“If the only thing out there is a corporate PPA, the market will slow down dramatically, because frankly, that market doesn’t really exist in UK [at the scale required],” he said. “That might change in 5-10 years, but it doesn’t exist right now.”

Anderson lauded the contracts for difference (CfD) support mechanism, which stabilises revenues for renewables and low carbon generators, as more successful than its predecessor, the Renewables Obligation.

“It has been fantastic at bringing real competition into auctions and driving down prices.”

The most recent CfD auction saw some offshore wind projects take a strike price of £57.5/MWh, approximately half the price of early offshore wind contracts. Anderson suggested prices would fall further due to supply chain investments, but reiterated his call for continued support.

“I caution against taking about subsidy-free world, or a world without a mechanism to underpin investment risk,” he said, pointing to the ongoing construction hiatus of unsubsidised large power stations.

“A gas plant is probably the easiest and quickest thing to build... but nobody is building those right now.”

Asked whether the Capacity Mechanism was viewed as a subsidy, Anderson replied that it was “meant to underpin investment risk”, but for large thermal plant such as combined cycle gas turbines, or CCGTs, “it is just not doing it”.

“So if you want that type of investment [CCGTs], you need to underpin that investment risk.”

Anderson added to calls from other renewables companies speaking at the conference to bring onshore wind into the CfD mechanism.

“If it is the cheapest form of generation, then underpin it with a market mechanism,” he said. “Why shouldn’t UK consumers get the benefit of that cheap energy?” te

industry and eyes supply chain ownership

electrolysis would require not just vast amounts of renewable power, but adjacent infrastructure.

Hall said Vattenfall intends to build the whole lot.

“We see Vattenfall doing the electricity production, the hydrogen splitting and storing the hydrogen – which is complex.”

While the costs of offshore wind are falling fast, Hall called for the continuation of market stabilising subsidies such as the contract for difference scheme (CfD), which guarantees returns for output.

He also said industry has a role to play, not only in terms of appetite to change processes, but to support renewables deployment through power purchase agreements (PPAs).

“We know how to handle merchant risk but to drive develop of renewables, we really need this big cooperation [between utilities, industry and government] to make the shift happen.” te

Vattenfall thinks hydrogen produced from renewables could decarbonise heavy industry

Beyond the grid: a hybrid battery and demand network

As technology dictates the pace at which we reach energy milestones and a shared energy economy, GridBeyond CEO and co-founder Michael Phelan announces the company's first hybrid battery and demand network, paving the way for widespread DSR participation and uncovering flexibility in onsite assets

If you have so much as hovered around the edges of the energy industry in the past you will know that the convergence of energy with technology has seen breakthrough after breakthrough. With the influx of storage opportunities, renewables and embedded generation, decarbonised heat innovations and EVs, it was only a matter of time before a substantive breakthrough was made in the demand-side response arena.

Michael Phelan, CEO and co-founder of GridBeyond, is certain his team have done just that with their hybrid battery and demand network.

GridBeyond's R&D team developed and tested the hybrid model in their smart grid lab over the course of years "having anticipated the direction of the market a while back".

Phelan comments: "Our platform was the first in the world to enable dynamic DSR to deliver 24 hours a day, on both high side and low side. This provides maximum possible benefit to both client sites and the Grid in the UK – combining onsite asset capabilities with behind-the-meter batteries. From our extensive research, we can't find another solution like ours anywhere in the world, and it was certainly the first to be tested and accepted by National Grid here in the UK."

Deploying behind-the-meter storage at industrial and commercial sites creates a level of flexibility greater than the sum of the parts. GridBeyond already had the expertise to identify the flexibility that resides in existing systems and is now able to balance that with batteries. Some sites on the network have seen an increase of more than 65% in flexibility from onsite assets when connected to the hybrid network, which translates into a 65% increase in available revenue and savings.

Ardagh Group, a sustainability pioneer in the manufacturing industry, was the first to install a behind-the-meter battery on the network at the end of 2017 and kick-start the evolution into the hybrid era.

Bishwa Giri, energy manager for glass Europe at Ardagh Group, explains: "The grid-optimising platform delivered by GridBeyond enables Ardagh Group to participate in National Grid's Dynamic Frequency Response programme. In practice, the battery reduces the plant's reliance on the grid, and

when there is no requirement for the excess energy that has been stored by the Tesla battery, it can be delivered back to the National Grid, thereby reducing the CO_2 impact of energy usage."

Phelan explains: "We found that a site doesn't need as much battery storage to implement dynamic frequency response, making a better business case for batteries."

Phelan adds how this affects those on the network without a battery on site: due to the controlled rotation and combination of assets within the portfolio, driven by the platform's AI and machine learning, the network enables those without a battery to also participate in dynamic DSR programmes requiring the most agile of responses, even though their site may not directly have the inherent flexibility.

So what is a hybrid battery and demand network?

A hybrid battery and demand network delivers the grid's long-term vision for a smarter and more flexible energy infrastructure, while merging with the reality and constraints of the I&C power users.

The solution contemplates all of the interdependent needs of the energy consumers as well as addressing a significant and growing problem for grid operators, which require an increased speed of response to enable the increased penetration of renewable generation.

A hybrid battery and demand network is a portfolio of commercial batteries, embedded generation and demand assets working in harmony to provide flexibility to the grid, while enabling inflexible sites access to the fastest responding (and most financially rewarding) balancing services.

While this does not sound too dissimilar to typical aggregation, the clever part is the tech behind it: having the ability to rapidly rotate, control and combine batteries, generation and assets across sites dotted all around the UK to meet the flexibility needs of the grid and align to each point of the required response curve – a solution that can only be achieved with high end technology and a wide range of behind-the-meter assets and batteries, with a variety of flexibility, for maximum benefit to all participants.

Working together for the bigger picture

"To be part of a pivotal sustainability achievement such as this makes Ardagh very proud,' comments Giri. "Sustainability and energy management are extremely important to Ardagh. As part of GridBeyond's hybrid battery and demand network, we are able to reduce our reliance on the Grid during peak times, and fundamentally help the UK to meet its renewable generation goals."

Annelene Fisser, group CSR and sustainability manager Ardagh Group, adds: "We are committed to environmental responsibility and sustainable manufacturing processes and had been exploring battery storage solutions to help us effectively meet these commitments. When GridBeyond approached us with its hybrid battery and DSR offering, we felt confident that this would provide the efficient and cost effective solution we were looking for, which it has now successfully delivered."

Giri makes clear why Ardagh originally chose to partner with GridBeyond over two years ago: "GridBeyond's technical expertise and drive to innovate are the reasons we chose to start working with them on initial demand side response projects. Their ability to drive energy technology forward, met with Ardagh's objective to use technology to pave the way in manufacturing sustainability, meant the partnership made perfect sense. They understood our assets and had full respect for the parameters. Our operational integrity has been at the core of every element, so we are delighted to achieve such positive results with no impact on our equipment or processes, and to now have the resilience of a battery on site too."

> *Our platform enables us to deliver dynamic DSR 24 hours a day, on both the high side and low side*

Battery investment for I&C firms

When asked by Energyst Media as part of its *Battery Storage Report* if it is too soon for I&C companies to invest, Phelan responded: "I can't see why. When working with experienced operators, there is a very strong business case, proof that it works and a very strong cash flow proposition. So all of a sudden sites are not looking at those long periods of risk."

Phelan has also said that some pure-play storage operators might find cause for regret should FFR prices erode, and that lessons should be learned from historical market fluctuations.

"Businesses borrowed money to invest in generators, and then STOR prices collapsed. Batteries on their own seem to be at a similar stage," he warns. For I&C businesses, he says a hybrid approach means a much lower capital outlay, delivery of greater system benefit, and therefore greater returns in terms of generated revenues and savings through peak avoidance. Part of the business' ethos is to develop a shared energy economy through technological advances, and this new phase makes strides towards this aspiration.

Beyond the grid, behind the meter

The electricity system needs to balance the intermittent nature of renewable generation. Nothing facilitates the integration of renewables more so than battery storage and fast frequency response programmes, which are made most accessible via GridBeyond's hybrid battery and demand network. Any asset or battery that participates via GridBeyond's network makes a difference in supporting the UK's renewable energy growth from behind-the-meter.

About GridBeyond

GridBeyond uses world-class technology to balance the electricity grid, enabling the integration of more renewables, and delivering enhanced benefits to large energy consumers.

- GridBeyond's award-winning platform enables access to the most rewarding demand response services, as part of the world's first hybrid battery and demand network.
- Unique analytics, benchmarking and reporting into energy activity and DSR participation are accessible via GridBeyond's advanced client portal.
- Absolute peace of mind: GridBeyond's asset-first approach, experience across all key industry sectors and technical expertise means they are trusted by hundreds of sites across the UK & Ireland.
- GridBeyond simplifies the complex energy market by bringing together balancing services, capacity, smart tariffs, energy trading, peak avoidance and energy optimisation into one unified platform.

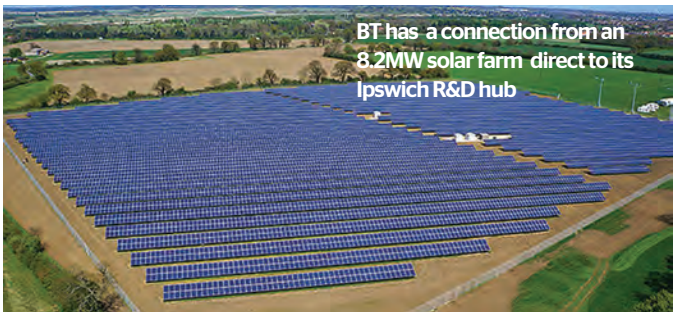
For more information:
tel: 01923 431 638
email: service@gridbeyond.com
web: gridbeyond.com

GridBeyond

Communicating convergence

Rob Williams, BT's head of procurement for property, FM, power & cooling and utilities, outlined the implications of energy convergence for UK plc at The Energyst Event. He said it is incumbent on energy managers to lead business through the transition. Brendan Coyne reports

Convergence of generation and consumption of energy is happening now and structural shifts within the energy system will start to have a more direct bearing on profit and loss. That requires businesses to break down internal silos to remain competitive in a rapidly changing landscape, according to Rob Williams, BT's head of procurement for property, FM, power & cooling and utilities.



BT has a connection from an 8.2MW solar farm direct to its Ipswich R&D hub

Rob Williams

Talk business, not energy

Williams believes energy managers will be pivotal in effecting change but must communicate business outcomes rather than talk about energy, which few executives fully understand, or care much about.

Williams' lengthy job title suggests BT has grasped the nettle. He told delegates at The Energyst Event that BT's departments have been collaborating, or converging, for a number of years to cut emissions and consumption, setting its first carbon target in 1992. He cited BT's Home Hub by way of example.

"We introduced 'spring out' feet on the Home Hub in 2014. The product R&D team initially didn't want to do that because it made the hub more expensive. But it meant we could package it in an envelope that fitted through letterboxes, which means delivering first time, first journey. That saves cost, carbon and time and improves customer service."

BT operates 80,000 meter points. Using their data to inform carbon targets, Williams said the company determined that 67% of its end-to-end emissions are actually within its supply chain, not its own operations.

Communicating such data, and its business implications throughout the company, is critical to reducing its footprint and driving commercial outcomes, said Williams. But there's the rub. "That is one of the real challenges of energy management, and all technical disciplines; to communicate to finance and the CEO what on earth are you actually talking about," said Williams.

"Talking in kilowatts and megawatts doesn't turn anybody on; doesn't create any investment plan. To really engage with finance, and drive collaboration and convergence, we have to talk simply as an industry," he said. "A problem clearly put is a problem half solved."

No more silos

Williams said he has been able to join the dots at BT due to broad experience within the energy sector, and now trains energy managers in technical disciplines via the Energy Institute's advanced energy manager course. But tutors also underline the importance of effective communication. "If you can't communicate with your CFO, I always tell attendees, then you are probably going to fail as an energy manager," said Williams

"My background is wind farm development, selling electricity to utilities via PPAs (power purchase agreements, where buyers agree a set price for power directly with a developer or generator)," Williams explained.

"Then I moved downstream to join one of the UK's largest energy consumers, first in operations department, in the energy management team, then into procurement."

The benefit of that experience, he said, has helped drive convergence and efficiencies within BT, which now buys around 400GWh per annum directly from wind farms, and has an 8.2MW solar farm connected directly to its Ipswich R&D hub.

That means the company can better manage electricity costs as well as reduce emissions.

Taking a joined-up approach across property, FM, power and cooling and utilities, is delivering further bottom line benefits, according to Williams.

Combining procurement across those areas "feels natural" in hindsight, he said. "But in big business, we act in silos. Getting people to act across those silos is really challenging. Convergence internally can be as difficult as the convergence externally, particularly when some parts [of the business] are outsourced," he said.

The first step was to combine utilities procurement with power and cooling. "That got the teams talking together" and resulted in a shift from procurement based on capital expenditure (capex, focusing on lowest upfront cost), to operational expenditure (opex, focusing more on whole life costs), said Williams.

"That sounds simple, but for many businesses, can be a massive change."

Williams gave an example of the capex to opex shift

at its data centres, where BT is investing in adiabatic cooling, which uses water and air to cool plant rather than refrigerant gases, so is more environmentally friendly and delivers lower running costs.

Next steps: IoT

Williams believes BT has one of the largest buildings management systems in the country, with 6,000 buildings connected to the system. The next step is to add further sensors and comms infrastructure throughout the estate to deliver greater efficiency through smarter controls.

But Williams suggested a unified approach to energy and property is as critical as the underpinning infrastructure.

"Looking at the business case for the internet of things (IoT), you are not just looking at energy, or power and cooling," he said. "You also have quotes in there where people are talking about 20% saving on cleaning – that is FM," he explained.

> *Convergence of generation and consumption is really happening, and it is critically important that businesses understand*

"We have brought property and FM under my management because of all the linkages between those areas. Lighting is traditionally an FM product, not a hard technical M&E prod. But IoT starts to naturally merge these things: [unlocking] 20% savings on cleaning; 10% savings on energy; 20% savings on M&E maintenance," said Williams. "One system covers all of those elements. So if you are buying an IoT system, you need to converge the thinking and the themes."

Communicate and collaborate

Communication is critical in delivering such ambitious change, Williams reiterated. "Energy managers need to help the business and finance communities understand their future energy costs and the drivers of those costs," he said. "Whether that is transmission and distribution costs, increasing Renewables Obligation or Feed-in Tariff costs, or future Contracts for Difference costs, as well as what is driving consumption.

"Convergence of generation and consumption is really happening, and it is critically important that businesses understand [the implications]."

Williams cited two examples of energy managers contributing to forward business planning, one internal and one external:

"We were running a [data] back-up at 5pm in one of our data centres. Somebody realised that was in a red band for DUoS charging [the most expensive period for distribution network charges]," said Williams. "Moving that to overnight saved £50,000 per year. That is a really simple example but lots of people still don't know what a DUoS red band is."

The second example related to a factory in the North East, which similarly sought to avoid peak network costs by shutting down at 4pm rather than consume power into the evening peak period.

"They worked with the HR team to come up with a bonus scheme for all the employees to change the shift patterns. All the workers were paid a bonus – and that paid back in 18 months," said Williams. "That is a great example of how HR, cost and energy can all come together to make business more efficient."

"That is convergence, and it is where energy managers need to be." te

Energy managers 'to become fleet managers as EVs rise'

Association for Decentralised Energy director Tim Rotheray outlined structural shifts and incoming challenges facing energy managers at The Energyst Event. Brendan Coyne reports

Predicted growth of electric vehicles means energy managers may also become fleet managers, according to Association for Decentralised Energy director Tim Rotheray.

Meanwhile, changes to grid charging structures mean firms that take a 'passive' approach to consumption will be less competitive than proactive rivals.

Speaking at The Energyst Event in Birmingham in April, Rotheray outlined increases in network charges and incoming regulatory change, as well as the implications of the Clean Growth Strategy for industrial and commercial businesses.

While meeting the UK's first four Carbon Budgets can largely be achieved by decarbonisation of power generation, the fifth budget (which covers 2028-2032) will require businesses to take an active approach to cutting emissions.

"All of the sections of the Clean Growth Strategy bar one relate to end users," said Rotheray. For businesses, he added, "that means the Clean Growth Strategy is going to start to bite".

Meeting the fifth budget will require significant decarbonisation of heat, which in buildings accounts for 32% of emissions, as well as transport.

How that will be achieved with heat is not yet clear, though government and the automotive industry appear to agree on decarbonising transport through electrification.

Rotheray said growth in electric vehicles could lead to energy managers also becoming fleet managers. "EVs will mean a whole bunch of additional power demand – and potentially, power demand you can return to the grid and provide vehicle-to-grid services," he said. "So, at some point, the energy manager is going to have a significant role in being the fleet manager."

Grid charges

Transmission and distribution charges make up about a quarter of business electricity bills, while policy costs, loaded onto electricity rather than gas, are also rising. By 2020, the wholesale electricity cost will only make up about a third of the bill, with the rest coming from non-commodity elements.

Meanwhile, the cost of running the transmission network, largely due to changes in generation mix, is rising rapidly. In 2010, it cost approximately £950m. By 2021 it is expected to hit £3.7bn.

Growth in behind-the-meter generation to avoid those charges mean higher costs for those that cannot avoid them. As such, Ofgem is undertaking a major review of how network costs are allocated.

That means "the world in which people could install onsite generation and take value from avoiding use of the grid is going away", said Rotheray.

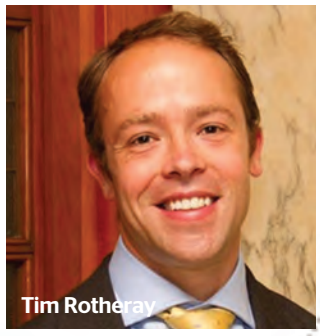
"In the future, the only way [businesses] will be rewarded will be based upon what they do in the short and medium term on the grid: are you helping balance the grid; are you helping to avoid reinforcement? And not just in a generic way, but much more precisely."

Rotheray urged businesses to educate themselves about what is coming down the track in terms of regulatory change.

"If you are an energy user, you need to be aware of what Ofgem is doing via the Charging Futures Forum and the Targeted Charging Review. They are going to happen, and they are going to happen really fast."

Rotheray said charging regime change and the fact government will require businesses to be "much more active participants in [decarbonising] heat and transport" to meet the fifth Carbon Budget, "means being a fully engaged energy user will really start to matter".

"If you are an engaged energy user, you have an opportunity. If you are a passive energy user, my expectation is your bill will rise significantly," said Rotheray. "You are going to start to become less and less competitive." te



Tim Rotheray

Optimize your Energy Efficiency with the CHAUVIN ARNOUX PEL103

Qualified for Energy Technology List

Claim Back 100% First-Year Capital Allowance

FEATURES & BENEFITS

- Single, Split & Three-Phase Installations
- No Mains Supply Interruption
- Harmonic Analysis up to 50th
- Bluetooth, Ethernet & USB
- Auto Sensor Detection
- Records to SD Card
- Real-time PC Analysis

CHAUVIN® ARNOUX
CHAUVIN ARNOUX GROUP

SIMPLY PASSIONATE ABOUT TEST & MEASUREMENT | 120 YEARS IN BUSINESS | 30 YEARS IN THE UK

Chauvin Arnoux UK Ltd | Nelson Court | 1 Flagship Square | Shaw Cross Business Park | Dewsbury WF12 7TH | T: 01924 460494 | E: info@chauvin-arnoux.co.uk

---

The future of power monitoring is inside

PUB 1100013

Measurement, monitoring and energy management system

Introducing the first customizable technology solution

Today with Socomec, access the power monitoring of tomorrow.

Select and combine our new products and software solution including **Virtual**Monitor, **Auto**Correct and **Preci**Sense technologies, to meet all your needs.

Create your own solution now on **www.meter-selector.com**

AutoCorrect VirtualMonitor PreciSense

socomec
Innovative Power Solutions

Seminar snapshots

Unlocking energy finance, incoming network charging changes, subsidy-free solar and robot TPIs were just some of the topics discussed at the inaugural Energyst Event in April

Unlocking energy finance

Steven Fawkes of consultancy EnergyPro outlined the barriers sitting between energy efficiency projects and vast pools of institutional capital "looking for a good home".

To scale up investment in energy efficiency requires industry and investors to "assemble the jigsaw" of energy efficiency finance. Principal pieces, said Fawkes, are: providing finance; developing a pipeline; standardisation and; building capacity.

"Whenever you see stuff happening at scale, it is because these four issues have been addressed. Very often people say money is the problem [in scaling energy efficiency]. But money isn't the problem, because you can't make money flow at scale unless you solve these other issues: standardisation, development and capacity."

Fawkes said pieces of the puzzle are coming together "but you need absolutely all of those things to come together in one place, in one sector in one situation, otherwise money doesn't flow".

Is tomorrow's TPI a robot?

Not as far as a panel of TPIs is concerned. "Technology cannot replace human relationships," said Energi Mine COO Hannah Drake. "But automation saves someone spending all day on data entry. Yes artificial intelligence (AI) will play a role in this sector but first of all we need to automate what we can."

At some point in the future will AI do more than the admin work? Should people be worried about 'robots taking their jobs?'

"I think it will, eventually," said Chris Maclean, CEO of Open Energy Market. "But [the TPI sector] has not showered itself in praise in terms of technological progression. Other markets will be way ahead, and we will probably be one of the last [to feel the effects]. I understand they are trialing AI on the trading floor of a city bank, but that is some way away for the TPI market.

Drake added: "If people are worried about 'robots taking their jobs' we can upskill them, so I don't think it is anything people should be worried about.

Green Energy Consulting compliance director Kevin Lumley said: "Automation is the key. AI is reliant on data. The knowledge and experience that you get as a broker and the ability to use your imagination to deliver creative solutions – AI can't do that, unless it has actually learned to how do so through machine learning."

Can automation and intelligence help 'clean up' the unregulated broker market?

"Absolutely," said Maclean. "Technology can bring transparency but also control to the energy buyer. In the past, it has been opaque, handing over responsibility to a consultant. Technology enables you to follow the process all the way through and start to feel confident in what you are doing."

EV revenues and subsidy free solar

Nottingham City Council is working on what will be "Europe's largest vehicle-to-grid project," according to Luke Raddon Jackson, energy projects manager within the council's Energy Projects Service business unit.

The project, at the council's Eastcroft depot, will help power "hundreds of electric commercial vehicles that we will roll out over the next couple of years," Jackson told The Energyst Event.

The Energy Projects Service, which develops and owns onsite generation and energy projects for the council as well as other public and private clients, is "having a big push on solar car ports" more broadly in a bid to create income for frontline services.

"We own a lot of car parks that generate a lot of revenue," said Jackson. "Solar car parks are going to generate a whole new revenue stream and help push us even closer to breaking even as a council."

Jackson told the conference the council has also "developed a subsidy free solar model for our commercial buildings and ground mount [installations], which we are delivering more and more of".

Network charging changes

Georgina Penfold, CEO of the Electricity Storage Network, covered the 'known knowns' of incoming network charging changes. She outlined the current regime's 23 itemised elements and concluded: "The only thing we know for certain is that to reduce non commodity costs, we have to be flexible. You really need to be engaged, otherwise costs

are only going one way."

Steve Edwards, head of flex and demand-side response at metals processing group Liberty House, voiced an energy intensive user's concerns about the potential speed of network charging change – and fears of a 'broadbrush' approach. He said the outcome of Ofgem's targeted charging review may influence whether the global firm invests in UK operations.

"We understand the system is changing and that charging structures going forward should be reflective. Our main concern is how quickly this might affect us and how significant that effect could be," said Edwards.

"Calculating around some of the numbers, it could be very hard for us to mitigate the scale of the impact [of mooted changes]. A 25% increase in our input cost is possible. That would force us to consider where we put operations."

Accumulating absurdity

Franck Latrémolière, a network charging expert and partner of Reckon LLP, gave his opinion of the challenges Ofgem finds itself trying to fix, and where it may end up.

He said the current transmission charging system fails to recognise the services performed by the transmission system operator to large decentralised power stations.

Latrémolière argued that large power stations "need the ability of the transmission network to take over when they fail". As such, he suggested, they should bear more of the cost of individual services, such as frequency response, performed for their benefit by the system operator when they fail, rather than smearing charges based on demand across all users, as is the current practice.

Latrémolière described the status quo as "absurd" and suggested Ofgem "thinks harder" about transmission charging should it lose the embedded benefits court case, under way as *The Energyst* went to press. Charging specific parties, ie large generators, for the value of services they receive from the transmission system would be more reflective, he argued.

"The only way we will get out of the current absurdity is to rethink what those services are, and therefore probably to step on some incumbent toes. What are the chances that the Charging Futures group, set up by a bunch of incumbents sitting in an incumbent room, thinks very hard about something like that? Absolute zero," Latrémolière suggested.

"So the Charging Futures thing will be a damp squib. And the absurdity will accumulate until it is too big, and it breaks," he concluded.

A poll of the audience, largely public and private sector end user organisations, suggested very few, if any, feel they have a full handle on network charging changes, or sufficient representation in the change process. te

More than 900 visitors attended the inaugural Energyst Event. Thanks to all attendees, exhibitors and sponsors for making it happen.

Energy firms eyeing 'tokenisation' models

Energi Mine CEO Omar Rahim claims tokenisation underpinned by blockchain will effect lasting behavourial change. He also says energy firms are planning to 'tokenise' parts of their business, and that ultimately "everything will be tokenised". Brendan Coyne reports

Energi Mine, the energy consultancy developing a blockchain-based energy efficiency rewards platform, is in discussions with half a dozen energy companies about 'tokenising' parts of the energy chain.

CEO Omar Rahim says most of those discussions revolve around "energy and carbon trading", though he believes that ultimately, "everything will be tokenised".

In simple terms, 'tokenising' means taking real world assets, or the rights to them, and putting them onto a blockchain. The asset owner gets a token in return. They can trade or redeem that token, making it a digital currency.

Energi Mine sold $15m (£10.6m) of tokens in its initial fundraising round earlier this year. Rahim says the lion's share of the money will be spent on platform development and striking global partnerships. A beta version is due for release shortly with a full release of the first version set for "June or July".

Reducing global demand

According to Rahim, the firm's ultimate aim is to reduce global energy demand by incentivising behaviour change. Its initial model is to target I&C firms and local authorities to trial its platform to see if they can achieve energy reduction targets by rewarding staff.

"For example, a factory spending £10m a year on energy might set a reward on a target to save 10% via behaviour change, which is what the token incentivises."

Rahim says perhaps half of the savings could then be offered to staff, who can redeem tokens for goods, services, or cash.

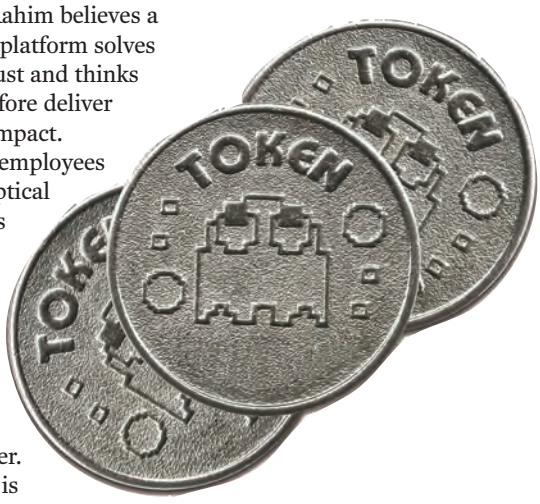
"Our aim to reduce global energy demand. It doesn't matter whether users share that goal, they might just care about financial side," said Rahim. "But the result is the same; they reduce their energy footprint."

While incentivising behaviour change is not a new idea, Rahim believes a blockchain platform solves issues of trust and thinks it can therefore deliver sustained impact.

"Factory employees may be sceptical that savings will be passed on. But smart contracts mean you don't have to trust the line manager. Everything is linked into meters and tokens are deployed automatically when triggers are hit, so there is no gaming of the system," he says.

"Yes, there are other technologies. But attempts to reward behaviour change have previously failed due to issues of verification and trust. Blockchain is the only technology that can do both," he suggests.

> ***Attempts to reward behaviour change have previously failed due to issues of verification and trust. Blockchain is the only technology that can do both***



The company has launched a trial with Network Rail and Rahim says Energi Mine will announce further trials "with global corporates in the coming weeks".

It is looking for more firms and local authorities to trial the platform and says all trials will be "fully funded".

'Everything will be tokenised'

While there is much hype around blockchain, regulators around the world have lately voiced concern about initial coin offerings or token sales. But Rahim believes that "in the future, everything will be tokenised".

"The concept of ownership is dying," he says. "Blockchain has the potential to change the economic system in a way that we have never seen before. With the connected world, change, tokenisation, will happen a lot quicker than people think – and the energy market is no different from that."

While few firms are talking publicly about tokenising energy assets, Rahim believes they soon will.

"It is inevitable. It is a fantastic way to fund projects," he says. te

Emerging technologies: the answer to decarbonising heat?

Many bright minds are trying to harness renewable and lower carbon heat to deliver broader system benefits. Brendan Coyne outlines a handful of projects at varying stages of maturity

Chris Sansom is Associate Professor in Concentrating Solar Power at Cranfield University. His UK research focuses on novel materials for seasonal heat storage, most notably phase change (PCM) and thermo-chemical materials.

Interviewed for *The Energyst*'s 2016 Heat Report, Sansom outlined his belief that magnesium sulphate heptahydrate, or Epsom salts, could be a viable material for seasonal heat storage. The idea is that adding water to the salts causes a reaction that creates heat at around 80°C, which is viable for space heating and hot water.

Two years on, Sansom says the Epsom salts research has moved forward but remains some way off commercialisation.

However, Cranfield University's energy and facilities management department has tasked Sansom with assessing whether he can deliver heat storage for the university's growing campus, where heat demand is now more than its CHP system and biomass boiler can deliver.

20MWh: five-year payback

The project is to develop a 20MWh heat store that can store excess heat from the biomass boiler over the weekend, ready for the demand pick-up on Monday morning.

Because the system requires a specific temperature of 90°C, Sansom will use a slightly different form of salt, magnesium nitrate hexahydrate.

Sansom's students have designed the storage tank – roughly a five-meter cube – and the initial assessment is that the system delivers a five-year payback. The next step is to take a more detailed proposal to the board. Sansom thinks it will go ahead, though potentially at a smaller scale.

"It kills two birds with one stone for the university, not only improving energy efficiency, but supporting their own research and students as well," says Sansom.

"So I think it will go ahead in one form or another, and hopefully become a good demonstrator that heat storage can be achieved economically."

Corrupted by power?

Asked why progress on decarbonising heat appears minimal, Sansom says it "isn't necessarily a policy issue, more that we have just become so fixated by electricity that heat has been left out".

He believes solar thermal, heat storage, heat recovery and heat networks sectors should "promote and market" the opportunities for renewable heat more aggressively – and may find the market more receptive now that the PV sector "is in a lull".

Turning wind into heat

Physicist Alex Voigt agrees there has been too much focus on electricity. He is trying to couple heat and power through a wind-powered CHP his firm Lumenion is working to commercialise.

The system uses excess wind to create and store CO_2-free heat. The company claims the insulated heat store can then either provide process heat at 300-500°C for industrial and commercial applications,

Fuel cells?

Fuel cells were supposed to be the next big thing in the mid-Noughties, but are taking some time to mature. However, West Sussex-based Ceres Power, backed by FTSE 250 firm IP Group, believes its technology, when operated as a CHP plant, could help decarbonise both heat and power.

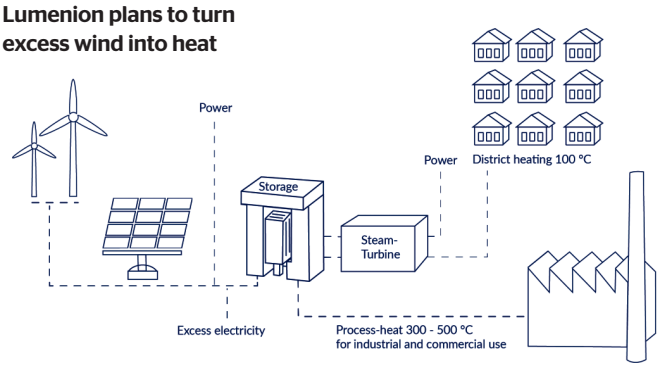
The company completed a one-year small scale residential trial in September 2017, involving five houses in London and the South East. Ceres said the units provided most of the houses' power (80% on average) and all of their hot water. It claimed the units save up to 2 tonnes of CO_2 per household, with "near zero" NOx and SOx emissions. The fuel cells were connected to existing natural gas infrastructure, but can also take biogas or hydrogen where available, which would further reduce emissions.

The firm has joint development agreements with Nissan, Honda and Cummins for its solid oxide fuel cell technology.

Caerau Colliery: plans for renewable heat

Pic credit: Walt Jabsco/Flikr

Lumenion plans to turn excess wind into heat



lower temperature heat for district heating, or convert heat back to electricity to smooth peaks via a steam turbine.

Speaking at Aurora's Spring Forum in March, Voigt told the conference that decarbonising process heat is a significant opportunity – 100TWh in Germany alone.

Hot rocks

Siemens Gamesa is also looking to deploy wind-powered heat storage, and says it will commission a 30MWh system based on 1000 tonnes of insulated 'hot rocks' at an aluminium smelter in Hamburg by spring 2019.

However, the firm plans to convert the heat back into electricity, with the government-supported project aiming to demonstrate renewable power can be stored more economically than traditional storage and be harnessed to provide power over a 24-hour period.

Mine water

Energy minister Claire Perry recently threw her weight behind projects to turn old mines into sources of renewable heat.

Speaking at a Westminster debate in March on energy efficiency and the Clean Growth Strategy, Perry said she is "really interested" in geothermal mine water technologies and offered encouragement to developers.

"If there are groups out there that are interested in promoting this and suggesting what can be done in a cost-effective way, bring it on," said Perry. "We have already dug the holes [the mines], lets see whether we can get some more benefit for those communities."

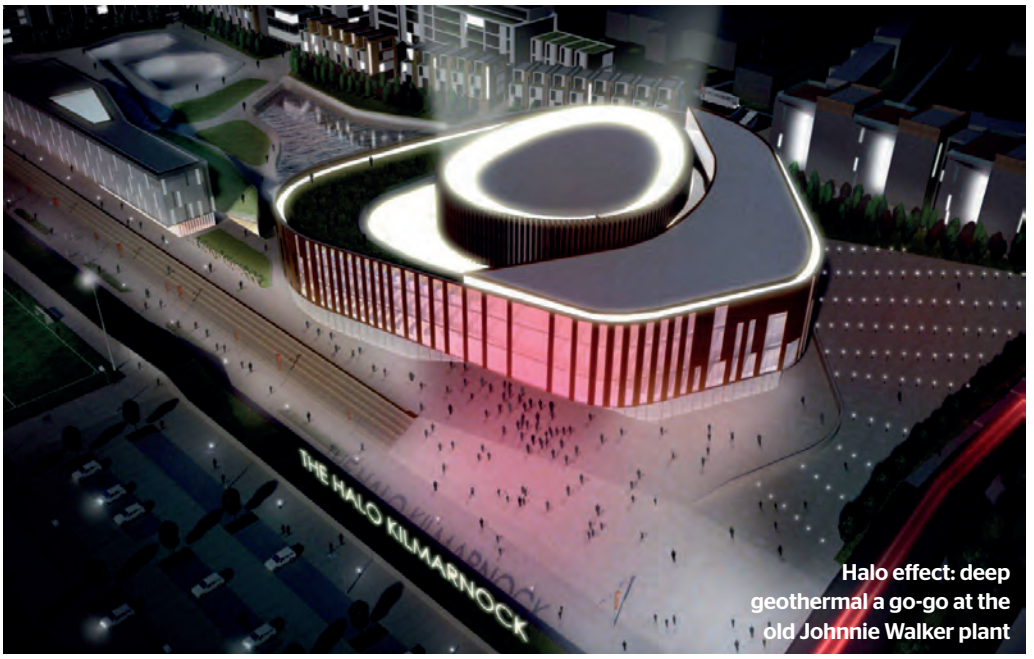
It comes as local authorities in old mining areas start to look at whether the pits can still provide community value. Bridgend County Borough Council has secured European funding to turn the old Caerau colliery into a source of renewable heat, while Nottingham City Council says it is starting to examine the potential of mine water.

Deep geothermal

Deep geothermal projects are also under way in the UK. They involve drilling deeper than traditional geothermal projects to extract higher temperature heat.

Geothermal Engineering is currently involved in projects in Cornwall and Scotland. The United Downs project in Redruth, Cornwall, plans to drill down to 4.5km in order to extract water at around 190°C. That would enable power generation as well as heat storage. Drilling is scheduled to commence in May.

The GE project in Scotland, in partnership with Arup, gained planning permission in March and is set to commence drilling to a depth of 2km. The hot water extracted will be used to deliver heat to a network at the old Johnnie Walker bottling plant in Kilmarnock, which is being turned into a mixed-use development, called The Halo. te



Halo effect: deep geothermal a go-go at the old Johnnie Walker plant

Think big to make tidal power 'cheaper than Hinkley C'

Tidal power is approaching commercialisation. Tim Cornelius, CEO of Atlantis Resources, believes gigawatts could be deployed in UK waters before Hinkley C is cooking its first turkey – and if the French government backs its plans – for less money. Brendan Coyne reports

Atlantis Resources' 6MW tidal array entered its 25-year operational phase in April, a major milestone for the Pentland Firth MayGen project.

To date, it has clocked up more than 6GWh and is breaking world records for tidal generation. The baseline may be low but CEO Tim Cornelius channels Canute with his belief in the inexorable rise of tidal power.

The only question in his mind is whether it is developed in the UK or overseas, though the answer need not be binary.

France is preparing for a commercial tender in the waters off Normandy and Brittany. Atlantis has submitted proposals to the French government, suggesting that 1GW could be delivered by 2025 "at a blended price that would be competitive with offshore wind tenders", according to Cornelius.

That sounds optimistic, given the company bid £150/MWh in the contracts for difference (CfD) auction last September but Cornelius begs to differ. "It is aggressive but not particularly optimistic. It is halving last year's CfD bid through relatively simple things," he says.

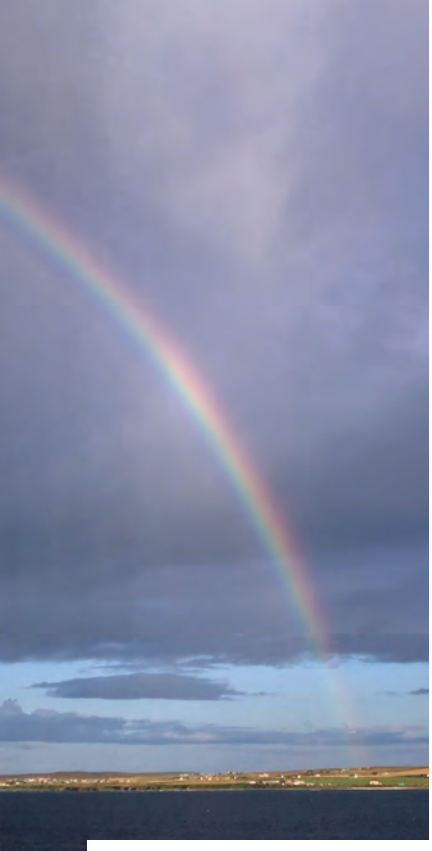
Cost curve

"Going to multiple turbines per export cable materially reduces construction time and cost. Bigger turbines [the company aims to double the turbine size to 3MW] means greater output impact, because water is 800 times denser than air.

"We are also moving towards more synchronous generation, so won't need as much power conversion equipment," says Cornelius. "So there are a multiple elements that lead to cost reduction."

Crucially, he says tidal power can "ride the coat-tails" of the offshore wind sector, which is rapidly cutting supply chain costs, with gains in foundations, cabling and construction vessels all applicable to tidal power.

Moreover, Cornelius believes the pivot away from fossil fuels has begun in earnest. "I would challenge you to find a large



> *I would argue it is not that challenging an environment. The challenge is more about bringing down the price so that tidal power can compete with thermal generation*

utility anywhere in Europe that is not making noises about becoming more renewable than hydrocarbon focused," he says.

"But more important is oil and gas. They are talking about making colossal investments in the things they understand, which is the offshore environment."

That expertise will be key to unlocking marine power, says Cornelius, countering arguments that the seabed is simply too harsh an environment for power generation.

"We would argue to the contrary. [UK] offshore oil and gas is only 50 years old, yet it is now considered mature. We are borrowing oil and gas knowhow. We broke the record for installing a turbine in under 60 minutes. So I would argue it is not that challenging an environment. The challenge is more about bringing down the price so that tidal power can compete with thermal generation," says Cornelius. "If we were the same price as CCGTs, right now there would be 5GW installed, simple as that."

Mutual benefits?

Tidal power is nowhere near cost comparable to large thermal plant. Yet UK power market economics are such that even CCGT developers are unwilling to build a mature, relatively straightforward form of generation at present without government support.

However, Cornelius says if the French government backs its proposals, both the UK and France will benefit from lower tidal power costs. "It would give us the economies of scale to bid into the [UK] CfD auction much more aggressively," said Cornelius.

How aggressively?

"Somewhere between the clearing price of the last one, £57.50, and Hinkley C [£92.50 plus inflation]. "

How confident is Atlantis that the French government will back its plans?

"We have to be careful in what we say, but are very confident that they are supportive of what we are doing. They are sitting on a fabulous asset and have a strong history in supporting tidal power. The prime minister [Édouard Philippe] is a former mayor of Le Havre and it would be hugely positive economically for that area, where we receive unbelievable support from local government," says Cornelius.

"So we are quietly confident that we will get good support."

UK plans

In the UK, Cornelius says Atlantis has "392MW consented [via MayGen] that could be done tomorrow with a CfD", and believes with additional permitting the company could potentially develop up to 1.5GW.

Cornelius says MayGen is "fully consented to participate in the 2019 CfD auction" and "understands the need to be competitive", though believes it is "slightly unfair to have to compete against offshore wind".

Alongside the auction, the company continues to push for a bilateral CfD, or similar construct, "just some basic inventive to stimulate build up," says Cornelius. "It would be a shame to see the pipeline built out entirely overseas when it has been developed in the UK."

The government of 2013 awarded a bilateral CfD to enable EDF to make a final investment decision on Hinkley C. Could tidal power reach gigawatt scale before new nuclear is commissioned?

"With a very modest amount of support, the answer is yes," says Cornelius.

Wyre power, firepower

Other tidal developers are also lobbying hard for subsidies, with the firm behind the Swansea tidal lagoon warning it will lay off staff if support is not soon forthcoming.

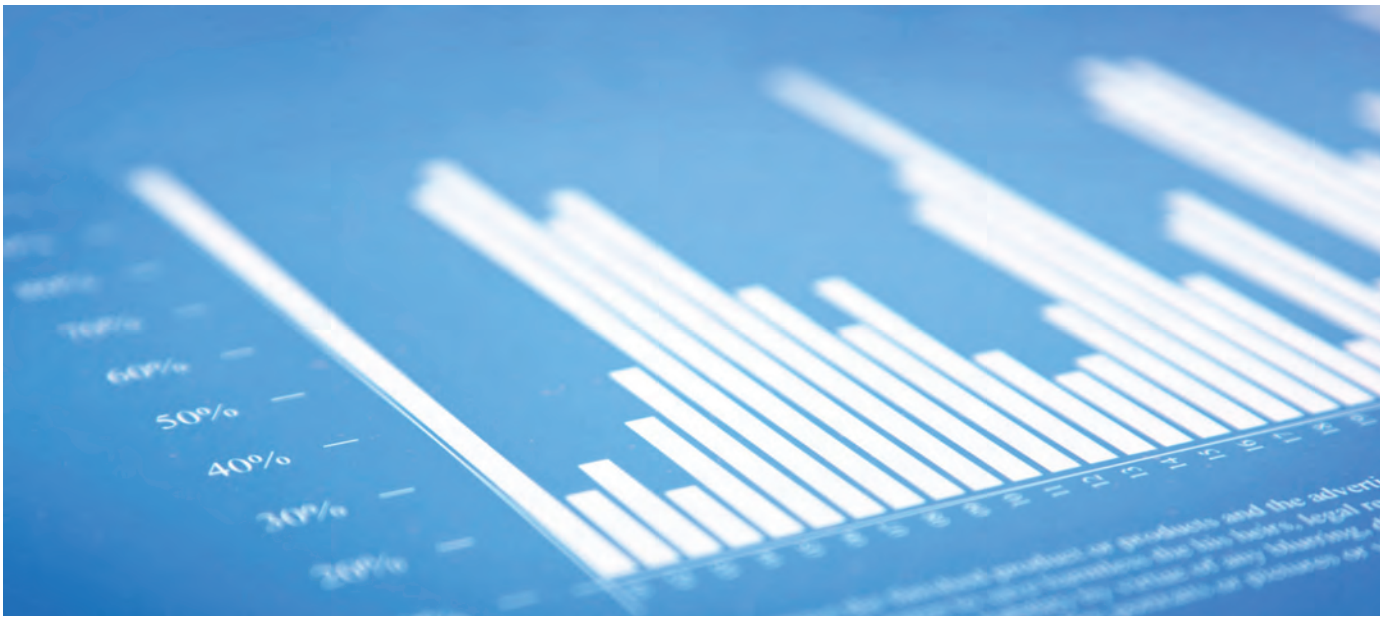
Atlantis owner Simec has an interest in the Swansea project but Atlantis has outlined its own plans for a tidal barrage, a 160MW project in the Wyre estuary, which it touts as "the pathfinder to bigger projects".

Cornelius says it is a "very sensible" project that would cost "a couple of hundred million" in capital expenditure. He is convinced – while stressing it is a personal view and not necessarily the opinion of the company's board or management – that the Wyre project will go ahead.

Moreover, the company's recent reverse takeover by Simec, part of the GFG Alliance owned by Sanjeev Gupta, means it has a "big brother coming in – a billionaire partner with balance sheet, gravitas and firepower," says Cornelius. "The last six months of accelerated success is very much due to their involvement."

By aligning that firepower with the clean growth plans of both the UK and French governments, plus others around the world, Cornelius suggests the tide will turn.

"If governments are willing, industry is ready to deliver." te



Better use of BMS lowers bills

Aimteq's maintenance and monitoring of the BMS at the UK facility of KBR has contributed to energy consumption savings of nearly £22,000 during 2017, shaving almost 8% off the bill

The maintenance and monitoring of the building management system by Aimteq at KBR's UK facility has contributed to the site saving nearly £22,000 in energy consumption during 2017. It has also helped cut carbon emissions.

KBR has operations in 40 countries and approximately 34,000 employees worldwide. Its core business streams include the full life cycle of defence, space, aviation and other government programmes and missions.

The UK headquarters, in Leatherhead, Surrey, had a phased upgrade of the BMS system to a Siemens Desigo Insight prior to the commencement of Aimteq's maintenance contract.

According to Steve Bennett from KBR's real estate services, the company did not really have any issues with the operation of our BMS, it just felt it was not making full use of its capabilities and thought a fresh pair of eyes could make new suggestions for improvements.

Also one of the drivers for changing suppliers was the potential to achieve reductions in energy consumption and carbon emissions.

Aimteq worked up a proposal that set out how KBR could achieve and maintain its environmental objectives, reduce energy consumption, and proactively analyse performance data to avoid systems failures and reduce overall operating costs.

Average monthly saving on UK site's energy bills

> ***We were not making full use of its [BMS] capabilities and thought a fresh pair of eyes could make new suggestions for improvements***

"Aimteq proved both flexible to our specific requirements and competitive on cost, so we had no hesitation in appointing them to the project," says Bennett.

Many happy returns

One year after Aimteq was appointed, the KBR says the BMS is providing impressive returns. The site, which comprises two main buildings, has reduced its energy consumption by 243,953kWh, equating to a financial savings of £21,955.81 and a reduction in carbon emissions of 100.5kg CO_2e. On average, the site is saving 7.68% on its energy bills every month.

As a point of note, because only the main meters can be monitored at KBR, it is impossible to say categorically that the savings are 100% attributable to the new BMS. However, KBR suspects that the majority of the savings could be attributed to Aimteq's activities in the previous 12 months.

Aimteq's Remote Operations Centre (ROC) saves energy and prevents costly site visits. Reports can range from pump/motor efficiency, occupancy profiling, sequencing strategies and start-stop planning, through to energy-saving strategies, operational status monitoring, sensor calibration and sub-metering.

"We particularly like the site analysis report, PPM service sheet, remedial works sheet and Aimteq's energy-efficiency recommendations," concludes Bennett. te

Flowmeter facilitates tenant management

E2 Services, a provider of demand-side energy management and energy cost reduction programmes, has installed a Micronics U1000 flowmeter in a multi-let office space in Portsmouth to enable its client to accurately recharge their tenants for energy.

Mike Stafford, E2's energy services director, had used Micronics flowmeters on a previous occasion to help a real estate investment advisor and property management company appropriately apportion costs for gas use on a former IBM site in Portsmouth, so knew that it could be relied on to perform effectively.

The U1000 flowmeters are configured for pipe size so only nominal configuration on site is required, reducing the need for intervention – essential in such a client-orientated business.

The easy-to-follow menu made it a cost-effective alternative to a traditional in-line meters. Furthermore, dry servicing is possible so that downtime is kept to a minimum, which is allowing E2 Services to minimise disruption to tenants.

Stafford said of the U1000: "Installing the meter has meant that E2 can offer more robust tenant recharging for our client."

No flickering, lower maintenance costs

Tamlite Lighting was chosen to complete an extensive upgrade of Thyssenkrupp's site in Milton Keynes, which delivers products for the aerospace industry.

"In the narrow stock aisles the lighting was insufficient, and there were also replacement and maintenance issues stemming from the older fluorescent health and safety and facilities manager fittings," explains Thyssenkrupp's Nathan Blanks.

"We also wanted to reduce our environmental impact and benefit from the energy savings that would result from switching to the latest generation LEDs."

In addition to providing LED lighting, Tamlite's design team recommended the installation of sensors to minimise unnecessary illumination. The Tamlite MODLED LG PRO fittings supplied for the office areas have recessed panels and are fitted with I-Tech low glare diffuser optics and produce up to 125lm/W.BEG

"There had been issues with some, such as flickering," says Blanks. "We knew shifting to LED would eliminate this inconsistency as well as lowering maintenance costs."

Efficient and controllable

Energy efficiency was a key factor in Trox air handling units being chosen for the award-winning university of Huddersfield Oastler building

Sustainability was a key priority for the University of Huddersfield's £28m Oastler Building. The high-efficiency TROX air handling units at the heart of the HVAC system are contributing to the energy efficiency of the building, which has achieved a BREEAM Excellent rating.

Designed by AHR, the building's levels of environmental performance secured its place in the 2017 Local Authority Building Control Grand Finals, following its triumph in the regional competition.

Featuring a curved frontage facing out onto Huddersfield's ring-road, the architectural design of the different zones created a significant air management challenge.

Air handing and ventilation demands vary from dynamic social spaces and lecture rooms, to long, tall corridors and individual study booths for language students requiring sound attenuation.

TROX X-CUBE's built-in control technology avoids the need for complex or expensive bespoke programming

The energy efficiency of the TROX X-CUBE air handling unit was a key factor in its selection for this project.

The integral variable flow control technology facilitates room-by-room air management, adjusting automatically to requirements. Designed to connect seamlessly to a centralised BMS (via Modbus TCP, Ethernet or BACnet), the X-CUBE's built-in control technology, available as standard, avoids the need for complex or expensive bespoke programming of the BMS.

Estates management professionals and building services engineers can interface with the air handling unit via touchscreen, remote control or web browser, and the AHU's control capabilities make integration easy throughout the air distribution system, monitoring and controlling dampers, duct sensors, volume flow controllers and fire dampers with a greater degree of precision and immediacy than is typically possible using BMS control alone.

The X-CUBE enclosure incorporates a number of features to ensure low leakage and optimised heat recovery.

In addition, the attenuators, with aerodynamically profiled frames achieve 30% less pressure drop than conventional silencers. Distance pieces in variable widths can be used to individually adjust the distance between the splitters. Efficient IE4 motors also contribute to its energy performance. te

Leeds gallery puts the spotlight on the art

Leeds Art Gallery has undergone a £4.m refurbishment, during which the lighting throughout the gallery was upgraded and the cladding from the central gallery removed to reveal a stunning double-height original barrel-vaulted ceiling.

Now fully restored, the glass roof is providing the gallery with increased natural daylight and works in harmony with the ambient lighting offered by Concord Beacon Muse spotlights.

The team at Leeds Art Gallery worked closely with Concord to select the luminaires that best met their requirements, and selected a combination of the Concord Beacon XL Muse and the Beacon Muse II luminaires installed on the Lytebeam track.

Sarah Brown, principal keeper at Leeds Art Gallery, explains why the Concord spotlights were chosen: "We can now create wall washing effects and have tight spot lighting to highlight our exhibits and enhance our visitors' experience. We can also control the lighting easily and adjust the scheme when we need to."

The spotlight's beam angle can be adjusted from 10° to 70° and has a dimmable range of between 5-100%. In addition to this, the position of the spotlight can also be physically adjusted, with a rotation of 355° providing a near full rotation from a fixed position.

The Concord Beacon XL Muse can also incorporate a multitude of customisable aspects, with options for Sylsmart wireless dimming available through App Control. When paired with a smartphone via a free application, scenarios can be set up with single or multiple luminaires, and light levels can be set according to the needs of the end user. te

Concord

SYLSMART

Lighting that pays for itself… now that's smart lighting

SylSmart enabled Concord Officelyte LED luminaires communicate wirelessly with their neighbours, enabling automatic adjustment of light output based on localised occupancy and ambient light conditions. SylSmart delivers a completely integrated control system offering the highest energy savings in the industry with many key benefits:

- Addresses one of the biggest energy consumers in your building – save up to 68% reduction in energy costs vs. non-controlled situations
- Commissioning free installation
- Fully retrofittable – no control cabling required
- Upgraded luminaire efficiency up to 148 lumens per watt

Contact us today to see how we can help you to start saving tomorrow!

www.concord-lighting.com Tel: 0800 440 2478

by **FEILO SYLVANIA**

Seeing the light

BEG helps electrical solutions business switch on to energy efficiency

BEG has delivered an integrated lighting control strategy to a major UK electrical engineering company in Oxfordshire and helped it become energy efficient in the process.

Darke & Taylor, a multi-award-winning electrical solutions business, required a lighting control solution for its new office space in Blenheim Office Park in Long Hanborough that would reduce its operating costs.

BEG provided a number of the master-type Luxomat PD9-M-1C-FC occupancy sensors for the main office. This was because the area was open-plan and the sensor is designed for rooms where there is continuous daylight evaluation. The PD9 is also favoured by many clients because of its design and the its size, about the same as a £1 coin.

In the offices where Darke & Taylor's designers worked, BEG supplied the Luxomat PD2-M-DALI/DSI-FC sensor. This detector is a master-type recessed DALI dimming sensor designed for daylight control of rooms where there are only minor movements. Luminaires are controlled and adjusted with daylight brightness.

The Luxomat PD3N-1C-FC, a normal switch-in sensor for fast traffic areas, was installed in the lobby, stairs and bathroom areas. BEG also supplied its IR-RC adapter, which means all the sensors could be controlled by the Darke & Taylor facilities management team via the BEG Smartphone App.

Simon Newton, Darke & Taylor commercial director, said: "The BEG Luxomat lighting sensors are an integral part of the energy efficient approach we took to lighting the new office space, and work excellently in conjunction with the entire range of LED luminaires we installed." te

Condensing unit for commercial refrigeration

Panasonic, which has more than 10 years' experience in developing technologies using CO_2 as a natural refrigerant, has announced the natural CO_2 4kW/2HP condensing unit for commercial refrigeration.

The units offer a stable and reliable system that helps to maximise energy efficiency.

Furthermore, the units can be set to run at low and medium temperatures with four initial settings, which can be modified by turning a simple and user friendly rotary switch to further enhance energy savings.

For installation, Panasonic is offering a one box solution that includes the condensing unit, a panel pre-programmed controller, expansion valve and sensors.

The units are designed to fit into smaller spaces with dimensions of (HWD) 930mm x 800mm x 350mm and weight of 67kg.

G360™

BRILLIANT LIGHT ALL ROUND

Silence is Silver

The brightest LED SON replacement lamp
is now also the quietest.

SILENT DRIVE MAGLEV COOLING SYSTEM

Other LED SON replacements run very hot and rely on noisy cooling fans to prevent lamp failure.

Our revolutionary new cooling chamber and heat sink are cooled by a practically silent MagLev fan. This advanced cooling allows us to run our chips up to 30% brighter!

BRIGHTNESS LEVELS

+30%

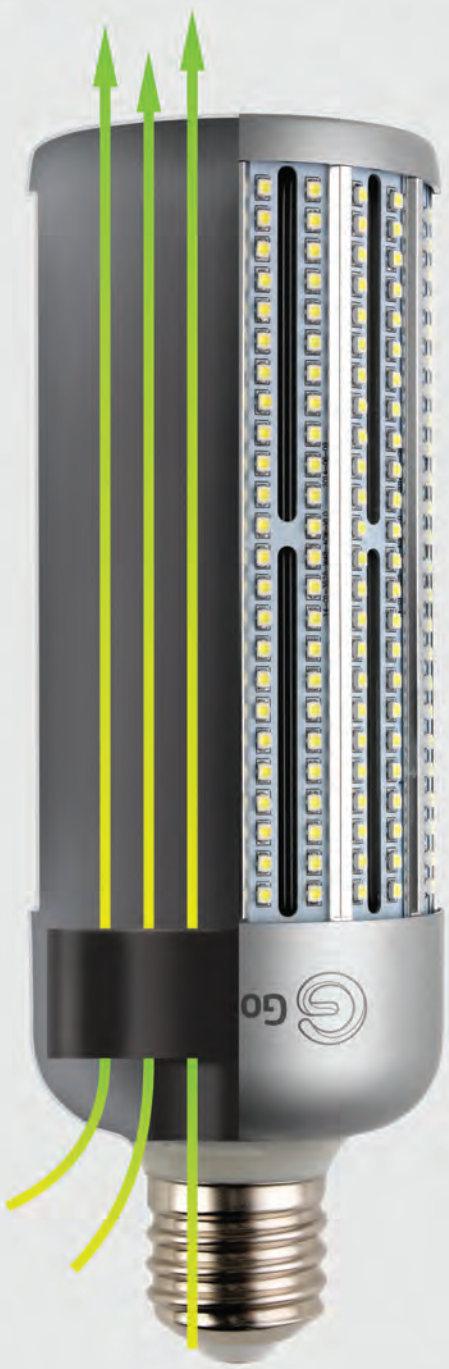
LAMP EFFICACY

140Lm/W

AUDIO LEVELS

<0.5dB

Approved by
Transport for London



RADICAL NEW DESIGN

We have put a lot of thought into the design, to improve the reliability, consistency and performance.

- New vent ducts create maximum airflow around the lamp.
- A distinctive LED configuration delivering an even light spread with no shadowing.

ULTIMATE BRIGHTNESS

The G360™ range of lamps are the brightest LED SON Lamp replacements available on the market, reaching a staggering 140 Lm/W.

These are the ideal retrofit solution for:

LARGE WAREHOUSING
INDUSTRIAL
EXTERIOR SPACES
STREET LIGHTING

WATCH THE VIDEO

goodlight.co.uk/g360

5 YEAR GUARANTEE
ON LAMPS + LUMINAIRES

Goodlight™ T 01276 691 230 F 01276 686 945 www.goodlight.co.uk sales@goodlight.co.uk Goodlight Goodlight_LED

More light for less

Liverpool Street Station is cutting electricity and carbon savings after an LED lighting upgrade predicted to pay back in 12-18 months

Network Rail has fitted its Goodlight LED lighting from LED Eco Lights into all 18 platforms and the concourse at London's Liverpool Street Station.

Liverpool Street, Britain's third-busiest station with more than 66 million passengers annually, is seeing a significant saving in electricity costs and a reduction in its carbon footprint in addition to better quality lighting.

Adam Thackeray, works delivery manager for Network Rail, comments: "We decided to move to LED lighting to reduce our carbon output, reduce costs in terms of power consumption and to improve the lighting level and quality in public areas of the station. The opportunity to reduce costs for lamp replacement by moving from a two-year to a five-year cycle was also a significant consideration. LED lighting will also increase the efficiency of emergency lighting, reducing the load on the battery/generators and reduce the temperature signatures of lighting and heat related failures."

The Goodlight LED lamps can easily be retro-fitted into the existing fittings, allowing the relamping to proceed with little disruption. More than 3,500 lights were replaced by two teams of two operatives. They worked from two scissor lifts on a permanent night shift during the five-hour window offered by station closing hours over a period of six months.

Some commuters shared Tweets about the improvement and many of the staff that work at the station expressed appreciation for the improved station environment.

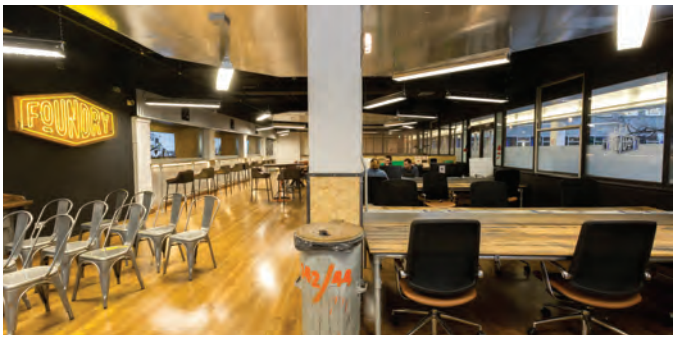
Liverpool Street Station is seeing both an increase in light levels and a reduction in energy demand following the relamping. The station has measured an increase in Lux levels on the platforms and concourse, from approximately 75 Lux to 210 Lux with Goodlight. At the same time there has been a temperature drop of approximately 40°C at the exterior of the globe fixtures, which should improve reliability as well as efficiency.

The energy saving from the new lights is over 800,000kWh per year from the platform globe fixtures alone. Thackeray estimates that the new LED lighting uses about half the energy of the old lights and will pay for itself in just 12-18 months. te

The light is right for Bristol's Foundry tech hub

High-efficiency LED lighting and sensors have been installed throughout The Foundry – a new learning space and hub facility for enterprise and technological innovation in Bristol.

Described as an "industry-facing enterprise zone", the new facilities were developed in line with UWE Bristol's stated emphasis on the continual improvement of its environmental performance. It follows that energy-efficiency was a primary objective for the lighting system, prompting UWE



Bristol architectural designer James Gray to put in an enquiry to Connected Light.

The overall aesthetics were a key driver in conjunction with the environmental considerations. The lighting had to be conducive to what might be termed an 'industrial theme' present in The Foundry while making it possible for a uniformity of luminance to be maintained commented the CL team.

The resulting installation uses Glamox Luxo GIR LED industrial linear, fittings as well as daylight and occupancy sensors, ensuring that light is only delivered when and where it is required. The work was completed to time and to expectation.

"We are very impressed by the quality and consistency of illumination that it has delivered to what is an extremely important addition to the UWE Bristol's facilities. The lighting really had to be 'right' for such a flagship project – and it is," concludes Gray. te

Warm words won't work

Decarbonising the UK economy is the challenge of our times. What are the options? The Energyst asked industry experts for their views

The power sector is delivering on decarbonisation. Low carbon sources accounted for 50.4% of power generated last year, according to latest government data, overtaking fossil fuels. Emissions from the energy supply sector have fallen 57% since 1990.

By contrast, transport emissions have fallen 1% since 1990. However, global vehicle manufacturers are mobilising, with governments around the world committing to phase out petrol and diesel engines. There is a plan and where there is certainty, results inevitably follow. The plan for heat is not yet clear.

Scale of the task

Progress in decarbonising power is the result of relatively stable long-term policy. Yet the UK's total energy consumption remains more than 80% reliant on fossil fuels and about half of consumption is heat-related.

To meet the Climate Change Act's 2050 target of an 80% reduction on 1990 emissions levels, the Committee on Climate Change (CCC) says heat must be virtually zero carbon, to make up for other sectors that cannot fully decarbonise. In its last report, the CCC said only around 4% of heat in buildings came from low carbon sources in 2016.

David Gill, head of customer energy solutions at Northern Gas Networks, puts the scale of the task into context.

"Reducing emissions 80% by 2050 is the biggest energy challenge facing the world today," he says. "It is like having to rebuild your house, from scratch, by Friday."

So what are the options: hydrogen; electrification; heat networks; biogas; hybrids? Most people interviewed or surveyed believe the solutions encompass a combination of technologies and fuel sources. But all said greater energy efficiency is critical.

Prioritise demand reduction

"The UK has some of worst quality housing stock in Europe," says Richard Lowes, a researcher at the University of Exeter, specialising in heat policy and governance.

"People almost expect their houses to be a bit mouldy. Single-glazed windows are still a thing. There is so much basic stuff that could take place to cut carbon and improve people's lives. Energy efficiency must be a policy priority."

Tim Rotheray, director of the Association for Decentralised Energy, agrees. "Energy efficiency has to come first, yet we have seen a real reduction in work on energy efficiency. That is where I would start."

Tighter building standards in both domestic and non-domestic sectors would be useful, noted Rotheray, while Exeter's Lowes believes Passive House should be the de facto housing standard.

Incentivising businesses

While domestic heat is by far the larger challenge in consumption terms, *The Energyst*'s readership is largely industrial, commercial and public sector organisations.

National Grid: Incentivise energy efficiency and heat pumps to hit 2050 targets

National Grid's most recent Future Energy Scenarios states that: "In order to achieve the [2050] carbon reduction targets, there will need to be high levels of thermal retention in homes and growth in heat pumps. For this to happen incentives will be needed to; make homes more thermally efficient, quickly retire gas boilers and encourage the adoption of heat pumps."

National Grid's 'Two Degrees' scenario is the only one in which the UK meets its 2050 carbon targets. It would require heat pumps becoming the main alternative to gas boilers. It also assumes the UK makes 30% energy efficiency gains by 2030.

What might compel them to invest in low carbon or renewable heat solutions?

Those surveyed for this report offered mixed views on the Renewable Heat Incentive (RHI). Roughly half said it has been effective, roughly half said it was not, citing complexity, bureaucracy and bias towards biomass. Some said it had encouraged 'gaming' or profiteering and the programme had not been applied fairly.

Conversely, others suggested guaranteeing that the RHI will continue would result in the strongest signals and uptake of renewable heat technologies.

The RHI is schedule to close in three years' time, and it is not currently clear whether a modified heat support scheme will replace it.

However, survey respondents suggested other levers, such as business rates and tax breaks could incentivise both energy efficiency and lower carbon heat.

Lesley Rudd, chief executive of the Sustainable Energy Association, agrees. "Those levers are at government's disposal, but would require a joined-up approach from Beis, Treasury and Housing, Communities and Local Government."

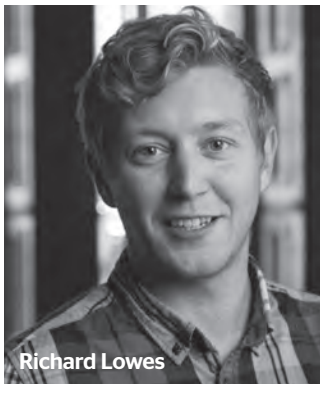
Rudd says the scale of the challenge posed by decarbonisation requires removal of departmental silos: "We are talking about whole economy planning. Decarbonisation is bigger than energy, which in itself is a hugely important issue."

Collaboration and whole system thinking

Bringing the old energy and climate change department into business, energy and industrial strategy (Beis) is positive in that sense, adds Rudd. Meanwhile, energy companies recognise they must collaborate more closely, with regulation and policy starting to recognise the need for 'whole systems' frameworks.

Aligning heat and power more closely can solve issues created by growing penetration of renewables, according to the ADE's Rotheray, while renewables companies are working on ways to use excess renewable generation to create and store heat.

Tim Rotheray



Richard Lowes

"We are only just starting to scratch the surface of the convergence of heat and power," says Rotheray.

"One way to deal with [intermittency] is to provide flexibility through heat. Heat is inherently storable; it is very easy to store in hot water and other materials and is a cost effective way of disconnecting energy generation and final energy consumption," he added.

"If you have a thermal store, you can produce heat at times of low electricity or negative prices and use the store to supply at a different time. In that way you can provide not only balancing services but also reduce investment in the power network. Exploiting those synergies is central to cost efficiency of the energy system," says Rotheray.

"If we don't, we will have to build unnecessary infrastructure, and all of that will end up with the customer and their bills. So the primary opportunity is to exploit the synergies that are arising to end up with best value energy system."

Further integration

While Ofgem is consulting on how to bring more third parties into innovation allowances, Ian Lock, business development director at Baxi Heating, believes there is scope for regulators to create more integrated frameworks that enable better collaboration between manufacturers.

"If you were given the brief to decarbonise a housing development, for example, it would be worth looking at cross-fertilisation of key central services: heat, light and water," says Lock. "There is an interlink between those manufacturers, but no support to explore those links."

"That Ofgem is consulting is great, but how to we get from concept to deliverable opportunity? The clock is ticking."

Supply and demand

Setting a clear policy framework would better incentivise heating appliance manufacturers to move away from traditional products, although Exeter's Richard Lowes believes manufacturers must also be more flexible.

"There is a role for manufacturers to take the lead," he suggests. "Most of the big players also produce heat pumps as well as gas appliances, but some are quite protectionist and anti-heat pump."

However, if demand was created, Lowes believes any manufacturer would deliver. "It is not that capital intensive for them to put up a new manufacturing line if they had demand. So it needs a powerful drive from government [to make that happen] and a lot of these firms would jump in."

Hydrogen?

While heat pumps are the most cited technology under consideration by survey respondents, installations to date are well below the run rate required to hit carbon targets.

Some stakeholders believe the cost, disruption and behavior change required by »

Climate Change Committee on low-carbon heat

The Committee's most recent report to government made some key recommendations on heat:

"Deployment of low-carbon heat cannot wait until the 2030s. Low-regret opportunities exist for heat pumps to be installed in homes that are off the gas grid, to install low carbon heat networks in heat-dense areas (e.g. cities) and to increase volumes of biomethane injection into the gas grid.

"These opportunities can be started within funding that has been agreed to 2020, although this could be better targeted. Further support beyond 2020 will need to be agreed by 2019.

"Beyond these low-regret measures, key strategic decisions will be needed on low-carbon heat for properties on the gas grid, especially those outside heat-dense areas.

'The main options for reducing emissions from heating in these buildings are electrification using heat pumps and repurposing of gas networks to hydrogen. It is important that active preparations are made so that the Government is well placed to make decisions in the early 2020s, including undertaking hydrogen pilots of sufficient scale and diversity.

"As large-scale hydrogen deployment would require use of carbon capture and storage (CCS), a strategy for CCS deployment remains an urgent priority."

a wholesale switch to heat pumps are significant barriers. Gas networks are keen to pursue a hydrogen approach.

While high levels of hydrogen would require new appliances, gas firms believe it is a less costly and less disruptive approach than electrification, although it hinges on simultaneously developing and deploying carbon capture and storage, which is by no means a given.

However, others believe there is a danger of putting too much faith in hydrogen.

"You would need an awful lot of hydrogen [to deliver UK space and water heating needs]," says Andrew Haslett, chief engineer at the Energy Technologies Institute. He points out that other areas of the economy are "very difficult" to decarbonise without hydrogen, for example, "parts of industry and transport, which would take it away from buildings", he says.

"Can you make enough hydrogen quickly enough and cheaply enough? It is not clear that you can. So ... it is not a silver bullet. There is a danger of hydrogen running away as 'the answer', when it is not yet clear it is a practical answer."

Haslett says policymakers and industry must therefore "be cautious not to drop everything that might be part of the solution".

The UK's total energy consumption remains more than 80% reliant on fossil fuels

Ian Lock

Andrew Haslett

Biogas and energy from waste

Biogas production is increasing steadily and may represent part of the solution.

Major energy suppliers are starting to offer 'green' gas backed by Renewable Guarantees of Origin and there is demand from businesses that wish to buy renewable energy, not just renewable power.

According to Energy Networks Association head of gas Matt Hindle, there are now "90 plants across the country connected to the gas distribution networks injecting gas [enabling cleaner heat] without any change to consumer behavior".

Hindle points to research by gas network Cadent that suggests green gas now contributes around 1% of demand.

"Cadent's work suggests [green gas] could be taken to around 30% with the right policy and technology development; there is potentially ability to synthesise gas from a wider range of feedstocks, for example," says Hindle.

Cadent is a backer of a gasification plant in Swindon that will this year start to produce synthetic gas, or bio-SNG, from household waste for grid injection. The company claims bio-SNG and anaerobic digestion have the potential to deliver 100TWh of low carbon gas per annum, enough to meet roughly a third of domestic heat demand.

Energy from waste is a divisive issue, with concerns from host communities usually strongly evident in planning decisions. But it is a significant source of heat and power in continental Europe. In the UK, energy from waste powers heat networks in Sheffield and Nottingham, and from next year, will do so in Leeds.

Waste heat: coalition of the willing?

Less politically sensitive than heat from waste is wasted heat. »

Big bills cost votes

"Basically, all of the options are expensive and will be disruptive in one way or another," says Richard Howard *(pictured)*, head of energy research at Aurora.

Two years ago, while at think tank Policy Exchange, Howard wrote a report on heat that suggested electrification of 80% of homes would require capex of £300bn.

While less certain of its estimates, the report suggested a hydrogen approach might cost £200bn. "Even the more switched on politicians... basically acknowledge that decarbonising domestic heating is going to be really hard and something that is difficult to sell to voters and consumers."

And that's the smart ones.

"So it really is in the difficult box. Decarbonising power is relatively straightforward. For electric vehicles, the clue is in the name. But heat... nobody is clamouring to put their own money into it, so it becomes very hard. That's not a positive message but that is where I've got to."

But there is one obvious way to reduce peak heat demand, and therefore the cost of decarbonising it, says Howard. "Energy efficiency is the one easy answer and there is definitely not enough being done on that."

Penthouse power, box room footprint

1MW OUTPUT
1m² FOOTPRINT

upton | OUR SMALLEST FOOTPRINT, HIGH OUTPUT CONDENSING GAS BOILER

The very best in design and components delivering maximum power while saving valuable space.

- Precision-engineered **aluminium heat exchanger** designed for reliability and optimum efficiency
- **Low NOx** (<40mg/kWh) and up to **97% gross seasonal efficiency**
- **Identical gas and water connections** on all models simplify design and pipework

How much space could you save?

01202 662500 | upton@hamworthy-heating.com
hamworthy-heating.com/upton | @heatingatwork

PART OF GROUPE ATLANTIC UK & ROI DIVISION

SUPPORT BRITISH MANUFACTURING

Hamworthy
Heating *at work.*


Anna Livesey


Matt Hindle

Baxi Heating's Ian Lock suggests central and local governments could help coordinate a push to match waste heat with local demand across the industrial and commercial sector. He believes most industrial estates across the country could be co-opted into heat matching programmes with the right incentive framework.

Anna Livesey, senior consultant at Ecuity, thinks that concept is worth further exploration.

"There is certainly an awareness issue [around waste heat]. But I expect there could also be regulatory or risk issues. It is complex: Who would you get to drive it and how do you make it appealing to businesses?" asks Livesey.

"Tying it to business rates could be appealing and Ecuity would be interested in modeling that approach; whether it could be linked to other incentives and what would concentrate people's minds on utilising waste heat. Analysing and demonstrating [whether waste heat and local demand] could be coordinated would be really valuable."

Keep options open

While government must set out frameworks for businesses and investors to decarbonise heat, it must do so without picking winners, while being sufficiently decisive and ambitious. Not an enviable task.

"Whatever we do in heat – whether, electricity, biogas, hydrogen, heat networks - whatever route and whatever combination, there will need to be leadership and boldness on part of government in setting that out," says the ADE's Tim Rotheray.

"But industry cannot and should not seek to put this all on government. We do need to move, and government has a clear role in setting the vision and the structure. But industry has a role in saying 'this is what we can deliver'.

"I'm confident that it is achievable, but it takes determination on both sides to make it work," says Rotheray.

"The biggest risk is a reluctance to undertake the of scale of change that we need. Government is rightly proud of the results being delivered in wind and solar; that is what happens when industry and government work together with clear leadership from both sides," he says.

"That now needs to happen in heat." te

This feature is taken from *The Energyst*'s 2018 Heat Report, sponsored by Baxi Heating. The report contains expert views on decarbonising heat and a survey of readers on their attitudes to heat and the technologies they are considering.
Download it free of charge at: thenergyst.com

Eon: Power's done, now focus on heat and transport

Eon CEO Michael Lewis *(pictured)* believes the UK must fully concentrate on heat and transport, with power decarbonisation now in hand.

Speaking at Aurora's Spring Forum, Lewis applauded the policy stability of successive previous governments in delivering renewables.

"[Renewable generation] has been a huge success, but in many ways, that is already done," says Lewis. While there are "some issues around intermittency" to solve, "we have [achieved] renewable, low and zero carbon generation at a lower price than conventional generation. Now we need to turn to transport and heating – and that is where Eon wants to play a key role."

He says heat and transport are at a similar juncture to renewables "10 or 11 years ago" and points out that while the UK has succeeded in delivering almost 40GW of renewable generation, "success was far from a forgone conclusion back then".

Lewis says in 2008, Eon had two offshore projects under construction, "both hugely over budget and late". The firm had another two in operation, both beset by technical difficulties. Meanwhile, the London Array project "came that close to not going ahead, and would not have gone ahead unless government had moved to two Rocs".

Giving offshore wind developers additional subsidy at that point, he suggests, was now bearing fruit in enabling the economies of scale that are leading to cost reductions.

"We were about to make an £800m investment decision and needed to know that the government stood behind us, which they did, and created a world class industry."

That foresight should now be applied to decarbonising heat and transport, says Lewis, which is where Eon will focus more fully. "We believe our capabilities are better deployed where there is still a problem to be solved," he said, suggesting the starting point should be "making the existing system more efficient".

Northern heat and powerhouse

At The Energyst Event, Marissa Granath, Gateshead Council's energy business development officer, outlined how the local authority is providing cheaper heat and power to commercial and residential customers, and funding front line services. Brendan Coyne reports

Gateshead Council started thinking about a town centre heat network in 2010. Today it has the heat network but also provides power to local businesses via a private wire, and earns grid balancing revenues via a 3MW battery.

As such, the energy centre is delivering benefits greater than the sum of its parts – and the council will apply the learnings to its next district energy schemes, which are already in planning.

For other local authorities mulling similar projects, Granath offered succinct advice: focus on customers and benefits over pipes, wires or technologies.

Moving target

The Gateshead project evolved over time, explained Granath.

"For us, none of the individual elements stacked up by themselves. Not the heat network, not the private wire, not the battery storage. But bringing them together made the business case viable," she said.

"Because we have neither a huge heat load nor a huge heat source, we didn't have a viable district heating network. But adding the private wire enables us to sell electricity [from the centre's twin CHPs] to our customers rather than back to the grid. We make more money as a result and our customers get a cheaper price, creating a win-win situation," Granath explained.

"The private wire makes it lot more complicated but it is what made the business case viable."

The council then took the decision to add battery storage, "which made the economics even better", said Granath. "We earn revenue from grid services at the moment, but in future we have some large developments coming on to the network. So [the batteries] mean we can manage that peak demand and get the most out of the asset."

Which is why Granath says focusing on customer benefits and outcomes rather than technologies is crucial.

"Schemes like this are not without their challenges. Communication and internal buy-in is key to getting it over the line. For a local authority, that is senior leadership but also political leadership."

Talking about outcomes rather than technologies, and attaining buy in means "when new opportunities come along, such as battery storage, you can get them approved quite quickly because you can tell the story of how it will deliver benefits", said Granath.

What's under the hood

The Gateshead scheme includes 2.5km of district heating network, 5.5km of high-voltage private wire network and 3MW of battery storage. The energy centre houses 2 x 2MW CHP engines, 15MW worth of back up boilers, plus 250,000 litres of hot water storage housed in the pink containers that make the scheme instantly recognisable.

Granath: 'A win-win situation'

Benefits and returns

The district heating network investment was £25m over a 40-year lifespan, with the council currently forecasting a return in years 16/17, said Granath.

It provides lower cost, lower carbon heat to 12 customers, mainly public and commercial buildings, plus 350 social housing customers. Via the private wire, the council currently supplies 10 customers with electricity.

"But it is not just about the numbers," added Granath. "We are delivering low-cost heat to some of the most vulnerable people in Gateshead; reducing energy costs for the council; improving the viability of local businesses by reducing their energy costs; and attracting development to the town centre by providing connection-ready access to a lower carbon, lower cost source of heat and power."

Moreover, she said: "We have got this really cool building, which is contributing to the redevelopment of the town centre and helping to put Gateshead on the map."

Risk management

Granath said becoming an energy supplier "is really hard" and that the council must also think carefully about managing risk.

For example, it gives greater discounts to customers that take longer-term contracts. "But there are things you can't foresee," she said. The 'Beast from the East', for example, created "insane" gas prices.

"In some ways, the good thing about being a local authority is that you can take a longer view. But the further out you look, the more risk is inherently 'baked in' to your business case. So it is not easy."

However, Granath said the council is "more than happy" to share learnings and urged anyone planning similarly integrated heat projects to get in touch. te

Answering the works manager's prayers

A new heating system at St Paul's Cathedral has cut gas consumption by almost 40% while respecting stringent rules governing Grade 1 buildings

The boilers at St Paul's Cathedral were failing. The challenge facing those tasked with replacing them was that the cathedral is Grade I listed, prohibiting alterations without special permissions. But Hamworthy's modular boiler system and two high performance calorifiers have delivered despite constraints, and the cathedral has subsequently reduced its gas consumption by close to 40%.

The previous heating system consisted of three steel shell boilers fitted in the 1960s, which received a burner upgrade in the 1980s. Problems with the equipment occurred and were fixed until the boilers finally started leaking and could not be repaired. At this point, Robin Bunton from Bunton M&E Services advised replacement boilers were necessary.

The cathedral sought reliable and energy efficient boilers to meet its high heating and hot water demand while keeping running costs down. To avoid changing the flues, the cathedral initially planned to replace the older system with pressure jet steel shell boilers. Buntan, however, recommended Hamworthy's Wessex ModuMax mk3 condensing modular boilers.

"We have used the Wessex boilers since they were introduced and we know they are very reliable. They are space saving, great in refurbishment projects and buildings where you can't change the building fabric, such as St Paul's," says Buntan.

Tom Fletcher, works manager at St Paul's Cathedral, adds that the boilers were also chosen for their efficiency, as the team had been set a target of reducing gas usage by 10% in line with sustainability ambitions.

Six months prior to the installation of the boilers, two MagnaClean filters were installed to clear the heating system from sludge and debris, followed by a system flush. To create hydraulically separate systems from the new boilers to the existing radiator system, a plate heat exchanger was installed. This divides the primary and secondary circuits and ensures a highly efficient heat transfer with minimal losses between the two. It also stops any dirt and debris from the secondary circuit entering the new boilers and pumps.

> ***Previously it would take a week to heat the cathedral up from cold but now it only takes one day***

The complete plant room was fabricated and built off-site at Bunton M&E Services' workshop, dismantled and delivered to site reducing the total installation time on-site to just four weeks.

For the boiler installation, two Wessex ModuMax mk3 WM254/508V modular condensing boilers were chosen. This combination consists of two stacks with two boiler modules in each, delivering a total output of up to 1,016kW and a turndown ratio of 20:1. The turndown ratio refers to the ratio of maximum capacity to minimum capacity. In St Paul's case, the boilers can deliver any output from 50.8kW up to 1,016kW. This ensures the load is matched to warm the building up, and in periods of low heat demand, the boilers are not constantly cycling and wasting energy. The modules can easily be stacked on top of each other and side by side to offer a variety of installation options – and, crucially, they fit through a standard doorway.

The cathedral has already felt a significant change from the time prior to the installation of the new boilers. According to Robin Buntan: "The speed of heat up has greatly improved. Previously it would take a week to heat the cathedral up from cold, but now it only takes one day; the heating runs 24/7 on weather compensation."

Weather compensation means a small outdoor sensor is fitted to adjust heating controls according to outside temperature changes to ensure more efficient operation of the heating system.

Fletcher says the efficiency savings have beaten expectations. "Since the installation, we have found that we have managed to reduce gas consumption by close to 40%. This means that we have not only reduced our carbon footprint but have also benefited from significant savings on our gas bill, well above our initial project target." te

MORE INSIGHT

MORE CONTROL

DISCOVER THE FUTURE OF ENERGY MANAGEMENT AND PROCUREMENT

RUN YOUR BESPOKE FORECAST AT OPENENERGYMARKET.COM >

Your commitment-free report is waiting. Open Energy Market helps you accurately forecast today, so you can count the savings tomorrow.

- See the value of your gas or power contract at today's prices
- Unlock automated reporting to budget up to three years in the future
- Receive our recommendations for better energy management
- Visualise your contract and start preparing for your renewal now

Find out how we help companies open up their portfolio reporting at **info.openener.gy/forecasting**

Complete your insight with our full range of **Market Intelligence**

open ENERGY MARKET

The Award-Winning Energy Consultant of Tomorrow

You only live twice

Used EV batteries as storage systems, which can be cycled intensively, could enable firms to earn more than with new systems, claims Connected Energy CEO, Matthew Lumsden

Second life electric vehicle batteries could play a major role in balancing the grid – and potentially help companies earn more money than via new storage systems that are bound by warranty constraints, believes Matthew Lumsden, CEO of energy storage solutions provider Connected Energy.

Others share his conviction. Engie and Macquarie recently invested £3m in his company, which takes second-hand battery packs from Renault electric vehicles, to create storage systems ranging from 60kWs to megawatts.

These systems can be used more intensively than some warranties for new batteries allow. That means owners can maximise cycling to take a larger share of the spoils currently available.

Speaking at The Energyst Event, Lumsden cited Bloomberg projections of a global non-automotive storage market of about 300GW a year by 2030, with second life batteries representing somewhere between 40GWh and 340GWh a year at that point. That creates a significant liability for car manufacturers, said Lumsden, but an equally significant opportunity to harness proven technology. He said the systems can be used for providing flexibility services, renewables optimisation, peak shaving and arbitrage while boosting resilience.

Lumsden added that a "surprising" number of enquiries are also based around sustainability.

While he said Connected Energy has yet to fully quantify the sustainability of a second life system versus a new battery storage system, "if you look at the embedded energy, carbon and natural resources in the battery, we are getting batter value from them, perhaps doubling their lifespan."

Go hard, make more

Asked how the system compares with a new storage system on whole life cost, Lumsden said the key comparator is whole life revenue. "If we use the batteries as productively as we can to maximise revenue, it might mean faster degredation," he said.

"The trade off is higher lifetime costs but more revenue. Or you can use them less intensively: the batteries degrade more slowly, and therefore you have lower lifetime costs, but that approach does not optimise revenue," said Lumsden.

"So it's quid pro quo. We can operate to customers' requirements whether to maximise revenue or longevity," he said. "But once you have the power electronics, the balance of system, they are second life batteries; they are lower cost, so replacing the battery packs can be cost effective."

Lumsden: Use the batteries to capture the opportunity

Lumsden said the batteries Connected Energy uses are typically seven years old and about 25% degraded. As such, the footprint of its systems is "around 50% bigger" than a new system. Lumsden said the company is not attempting to make them as small as possible, more "on creating robust, low cost, versatile systems".

While Connected Energy promotes opportunities around intensive use, Lumsden said its second life batteries are inherently safe.

"We use the battery packs exactly as they are provided by manufacturer. So they benefit from all the OEM's investment in terms of controls and safety mechanisms," he said.

"The system is super safe. The batteries have all of the metal housing they had when in the vehicle, all of the vehicle manufacturers' safety mechanisms, then our box with its own safety mechanisms as well," added Lumsden. "So it's a metal box within a metal box."

Connected Energy's power control module "talks to batteries in their own language" via the CAN protocol, so that the battery is controlled in the same way as it is in the vehicle. In effect, it does not 'know' it is not still in a car.

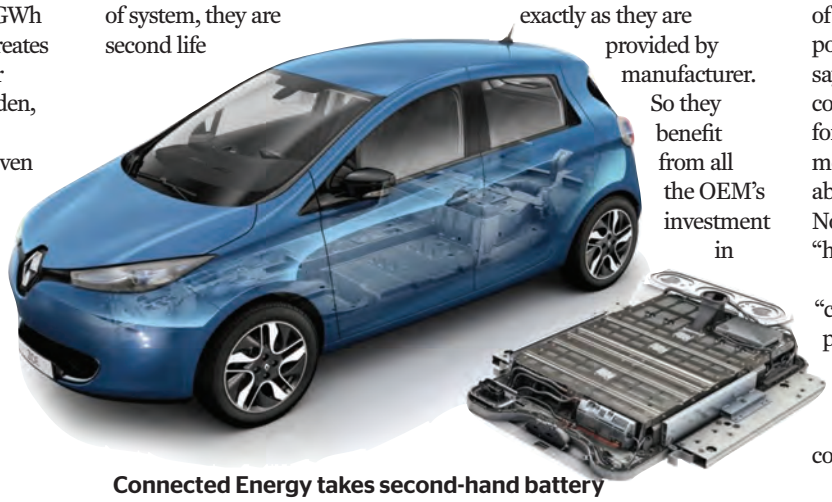
"So providing frequency services, for example – short, sharp peaks of charge and discharge – is very similar to somebody putting their foot on the accelerator and the breaking cycle of an electric car," said Lumsden.

Where next?

The company is talking to both public and private sector end users. Dundee City Council will use one of its boxes as part of a solar-battery EV charging port. Meanwhile, Lumsden says industrial and commercial companies are interested for all the usual behind-the-meter applications, with firms able to visit the company's Norfolk R&D centre to see "how it works in the flesh".

Lumsden said aggregators, "certainly those with larger portfolios", are also interested in adding high-cycling assets to their portfolios "to run as often as is commercially sensible".

"We have a huge diversity of enquiries," said Lumsden. "The key is to pick right one." te



Connected Energy takes second-hand battery packs from Renault EVs and creates storage systems ranging from 60kWs to megawatts

I&C firms banking on FFR are 'gambling'

RedT boss Scott McGregor says firms need to focus long-term on cutting energy bills with storage, not chase frequency response cash

Industrial and commercial businesses making investments in energy storage in the hope of making returns from frequency response are "gambling", according to RedT chief executive Scott McGregor.

McGregor's firm makes flow storage devices. In simple terms, these provide longer-duration energy output rather than the short duration power bursts that are delivered by the likes of lithium ion or lead acid batteries.

The company is trying to scale its UK operation and McGregor believes successful behind-the-meter I&C energy storage will predominantly be that linked to solar.

Speaking at The Energyst Event, McGregor said he aimed to dispel "misconceptions" about storage as the great white hope of the energy industry. "There's some interesting information bandied around the [storage] industry, but I would say 80% is probably rubbish," said McGregor.

Input and output

"You don't just buy an energy storage container and make money out of it. It is all about what you put in and take out. Solar going in the top is what makes us money," he said.

"The second aspect is power price models: in the UK, wholesale prices have been going down over last 10 years and will continue to do so. What will go up is power price volatility."

While grid services are "a nice upside" they cannot be relied upon over the medium term, said McGregor.

"A lot of people have invested in arbitrage and frequency response, which are risky revenues. Those revenues are not locked in so you are at the whim of the market," he said. "To be honest, I call it gambling."

Instead, McGregor believes I&C firms should invest in energy infrastructure that reduces their bills and makes use of existing assets, such as solar.

"You want to wipe out all of your peak costs ... and use the asset as much as you can to reduce your energy bill. It is about energy: cheap generation, storing it and using it when you need it " he said. "That should give you 80% of your return [on investment]," said McGregor.

"The only guarantee is that policy will be ineffective, create unintended consequences and the market will keep changing," McGregor added.

"So we have to build assets that are flexible and infrastructure-based. Then there will be additional opportunities along the way if you have the right assets."

McGregor: Banking on frequency response is risky

Co-location with wind?

McGregor was asked at the conference whether in front of meter storage co-located with wind farms is currently viable.

He suggested wind "is not a perfect [co-location] asset, because the wind doesn't blow all the time and you want to be able to use your storage asset as much as possible". However, he said "where you put storage centrally across a number of wind assets, I believe that model works".

Meanwhile, McGregor suggested co-located solar and storage would start to quickly ramp up once solar farms come to the end of their initial PPAs and "excessive" early subsidies.

Hybrid grid-scale storage

McGregor said the company is also modelling grid-scale storage using flow storage and lithium-ion in tandem. He believes these hybrids, delivering up to 50MW, will enable both capacity-driven services (which require longer duration output) as well as power burst applications, while "extending the life of the battery".

McGregor later told *The Energyst* that he believes RedT will "deliver at least one such project in the UK next year", which will likely be in the region of 10MW.

At a smaller scale, McGregor said "keeping things simple" with flow storage will better suit industrial and commercial applications behind the meter.

"That does not mean that in the future we will not bring out a product that has a rocket-fuelled lithium [element], or a super capacitor [alongside the flow machine]," he said. "If somebody is interested, yes, we will do it. But the question is, are you going to get the return from the additional complexity?" te

Should Ofgem consider derating DSR plus storage?

Scottish Power wants Ofgem to derate DSR plus storage in the capacity mechanism, suggesting it could create a risk of capacity shortfalls. Aggregators question the logic. Brendan Coyne reports

Ofgem is mulling a proposal by Scottish Power to further derate demand-side response (DSR) within the Capacity Market (CM) where it uses behind-the-meter storage – and possibly to derate DSR more broadly.

Aggregators are not keen.

The big six firm submitted the proposal too late for the latest round of rule changes that Ofgem plans to take forward, pulished late March.

However, the regulator said it would think about the suggestion with a view to indicating its decision in 2019.

Scottish Power wants DSR that uses batteries behind-the-meter to be subject to the same deratings for batteries classified as generating units within the CM.

Those batteries, following an earlier proposal from Scottish Power, receive a percentage of the full auction outturn depending on how long they can produce power: A battery that can produce for 30 minutes receives around a fifth of the full amount while a battery that can delivery for four hours receives 96%.

Scottish Power would like the same rules to apply to DSR that uses batteries. It believes leaving things as they stand creates a risk of capacity shortfalls and increased cost to consumers.

Scottish Power suggests creating new "DSR technology classes, in particular, storage DSR," which it says "would obligate the EMR Delivery Body to consult on the derating factor to apply to the new Classes".

> ***When it comes to figuring out the right classification of embedded plant, a vertically integrated big six player is absolutely the wrong company***
>
> **Alastair Martin, Flexitricity**

Ultimately, Scottish Power says that as "some other forms of DSR may have duration limits ... in due course derating and appropriate testing should be extended to all applicable DSR technologies".

Aggregators have questioned the logic of the proposal, particularly extending it across DSR.

Wrong company

"There is always value in having different ways of classifying technologies but when it comes to figuring out the right classification of embedded plant, a vertically integrated big six player is absolutely the wrong company to figure out what that should be," said Alastair Martin, chief strategy officer at Flexitricity.

Martin suggested any firm pushing such a line might have a hard time justifying extending derating to all applicable DSR technologies to some of its customers, particularly a supplier that was trying to enter the DSR market.

He also highlighted that the reason a lot of DSR providers deliver for 30-minute durations is "because they are under a contract that specifies exactly 30 minutes. So if they are delivering for that duration, it is because National Grid has asked them to do that," he said.

"But there is huge variety within DSR and most forms can actually deliver for quite a long time."

Odd discussion

Graham Oakes, chief scientist at Upside Energy, said the derating discussion was "kind of odd".

"Scottish Power's proposal itself contains the fundamental problem — it tries to maintain the 'CM policy of technology neutrality' by creating yet another technology class. You can't create a technology neutral market by subdividing it into a bunch of technology classes each with different rules — technology moves too fast for that, with new options that span boundaries constantly emerging," said Oakes. "You end up playing whack-a-mole."

He said the energy system is not particularly good at specifying requirements.

"It tends to look at what technology can currently do and

> ***You can't create a technology neutral market by subdividing it into a bunch of technology classes each with different rules***
>
> **Graham Oakes, Upside Energy**

base its specifications on that. Hence the capacity market, and much else, is driven largely by what traditional, large generation can do. People try to overlay elements of new technologies onto this, but the underlying bias remains and you end up constantly playing catch up."

Oakes believes a better solution would be "to define requirements based purely on the ability to shift power levels against a defined baseline and then pay in proportion to power shift and length of time you can shift it for, regardless of technology type".

He said the problem, however, is that defining a baseline for DSR would be complex, as it would require some forecasting of what demand would have been had there not been an event.

"But let's address this problem head on, rather than try to fudge it via derating factors," said Oakes.

"Once we've done this, behind-the-meter DSR will compete very favourably, especially large numbers of small assets, as they can be configured to trade off power shift versus length of response very flexibly.

"DSR should be rewarded for this flexibility," he said. "But the focus on derating factors is causing us to lose sight of this value."

"Any new CM rules must recognise the different characteristics and capabilities of these assets

Sebastian Blake, Open Energi

Sebastian Blake, commercial manager at Open Energi, said any broader derating decision must be made with a proper understanding of distributed demand-side response.

"Applying the correct derating factor is important, but one of the strengths of DSR is it encompasses a broad range of distributed assets," he said.

"Any new CM rules must recognise the different characteristics and capabilities of these assets."

Misguided

Paul Troughton, senior director of regulatory affairs at Enernoc, suggested that while the original proposal to derate standalone battery storage had "merit", this latest idea is misguided.

"Scottish Power seems to be concerned that battery project developers might switch to building batteries behind-the-meter so as to avoid the harsh derating applied to standalone batteries," he said.

"There was merit in tackling standalone batteries because of the potential for huge numbers of them to be built and financed by 15-year Capacity Market contracts. But there's no potential for a sudden influx of behind-the-meter batteries, because a one-year Capacity Market contract is no help whatsoever in financing them. So this is neither a major nor urgent issue."

Troughton said the proposal also "ignores the fact that behind-the-meter batteries are complementary, not standalone, to flexible demand".

"Derating short-duration standalone batteries made sense; they can only discharge at their derated output for a limited time after which point they cannot contribute to alleviating system stress. On the other hand, a behind-the-meter battery shouldn't be subject to a harsher derating factor if it is combined with flexible loads to form a reliable aggregated resource," said Troughton.

"What matters is the performance of the aggregated resource."

Troughton agreed with Flexitricity's Alastair Martin that perceiving DSR as a time-limited resource is misguided.

"Turn-down DSR is very different to battery storage. There is no hard cut-off time for an aggregated DSR resource to stop responding. Some customers have limits, but very few of those are hard limits. Rather, it's that their opportunity cost will rise steeply if dispatches are too long or frequent," said Troughton.

"It's the aggregator's job to assemble a portfolio which allows them to deliver reliable response when the system needs it, while minimising costs." te

"Turn-down DSR is very different to battery storage. There is no hard cut-off time for an aggregated DSR resource to stop responding

Paul Troughton, Enernoc

Storage costs pulled down

Suited to grid balancing and rapid frequency response services, a report by analysts at Imperial College London shows that a Gravitricity's gravity-fed energy storage system's levelised cost of storage (LCOS) is lower than all alternatives, including Lithium-ion

A report by independent analysts at Imperial College London predicts that Gravitricity's gravity-fed energy storage system may offer a better long-term cost of energy storage than batteries or other alternatives – particularly in grid balancing and rapid frequency response services.

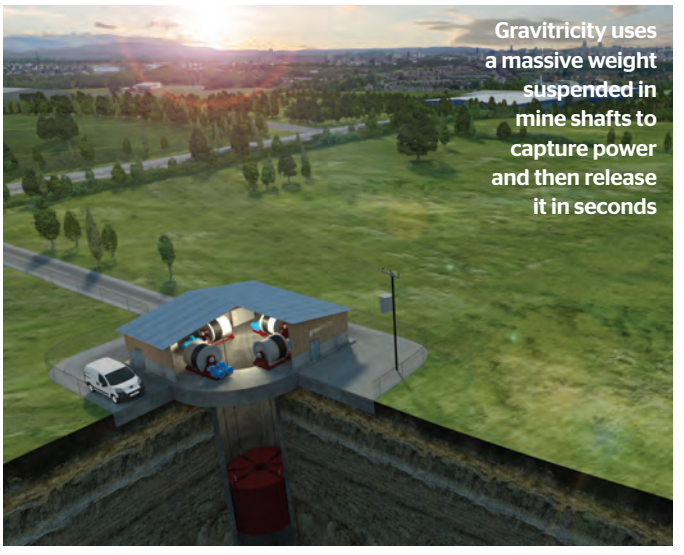
Gravitricity uses a massive weight suspended in mine shafts to capture power and then release it in seconds.

In February, Gravitricity received a £650,000 grant from Innovate UK, the UK government's innovation agency, to build its prototype. Since then the Edinburgh start-up has signed a R&D agreement with Dutch lifting multinational Huisman to develop a 250kW concept demonstrator and test it in the Netherlands and Scotland early next year.

The report, which is available on request, suggests Gravitricity technology will be well suited to provide grid balancing and rapid frequency response services to grid operators – where the requirement for multiple short cycles and high power availability play to Gravitricity's strengths.

The detailed study factors in all relevant cost and performance factors including capex, operating costs, discount rate, depth of discharge and degradation over a 25-year lifespan to arrive at an annualised power levelised cost of energy storage (LCOS), quoted in US$/kWyear.

In a frequency response scenario – requiring 700 cycles per year and a duration of 15 minutes at a power output of 4MW – Gravitricity has a predicted LCOS of US$141/kWyear, outperforming all alternatives.



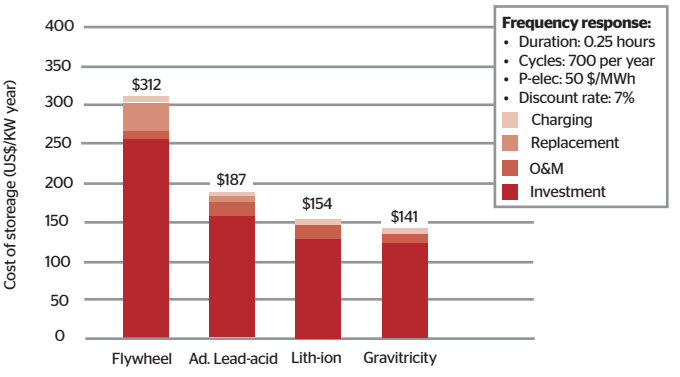


Figure 1: Levelised cost of storage in a frequency response scenario

Commenting on the report, Gravitricity managing director Charlie Blair says: "This report clearly shows that Gravitricity can be a very strong competitor in the frequency response market, where its low specific power cost and high cyclability sets it apart from other technologies. Lithium batteries are just beginning to be a major provider of frequency response services around the world and we expect early Gravitricity projects to take an increasing proportion of this market.

"The report also validates our belief that in the medium term, energy storage projects will need to stack multiple revenues to be cost effective. Mechanical systems such as ours are very good at this, as we can cycle several times per day with no degradation."

The report was authored by Oliver Schmidt, a specialist in predicting battery storage cost reductions. He has published recently in Nature Energy and is currently on secondment to the International Energy Agency in Paris.

He says:"The study has been rigorous in comparing all technologies on a level playing field. We have investigated a number of sensitivities, including discount rate, project duration and expected cost reductions using industry-specific learning rates.

"Gravitricty has high upfront capex but a 50-year design life. It is therefore sensitive to the discount rate and the modelled lifespan of 25 years. If we model a shorter response duration, a lower discount rate or a longer project life, then Gravitricity looks more competitive. I don't expect Gravitricity to displace all lithium batteries on grids, but it certainly looks like a compelling proposition." te

For a copy of the report please email charlie@gravitricity.com

Gravitricity key findings

- Low specific power cost and high cyclability represent the key advantage of Gravitricity
- Suited to frequency response market and any application with multiple daily cycles
- The higher initial opex is offset by very long lifespan (up to 50 years), high power availability, 100% depth of discharge and 0% degradation

INSPIRED ENERGY

Esos Phase 2 – are you ready?

The Energy Savings Opportunity Scheme (Esos) is a mandatory energy assessment and energy saving identification scheme. Esos is in four-yearly phases and requires the organisation to measure its total energy consumption, including within buildings and transport usage, conduct energy audits to identify cost-effective energy saving recommendations, and report compliance to the Environment Agency.

Non-compliances, such as failure to submit the compliance assessments on time, can incur a variety of penalties from the EA for the non-compliant company. These can range from publication of non-compliance on the EA's website, to a £50,000 fixed penalty plus £500 per day.

Phase 2

Esos Phase 2 offers a number of benefits including a fresh look at site energy demands and the continuation of an energy reduction strategy.

The reference period for the Phase 2 window began January 2018, so it is time to act now.

Compliance with the second phase of the scheme must be completed and reported to the EA by 5 December 2019.

Inspired Energy is now actively managing Esos Phase 2 auditing, reporting and implementation.

The Inspired Energy Group identified savings of over 14 million for its ESOS Phase 1 customers.

Does my organisation qualify for Esos?

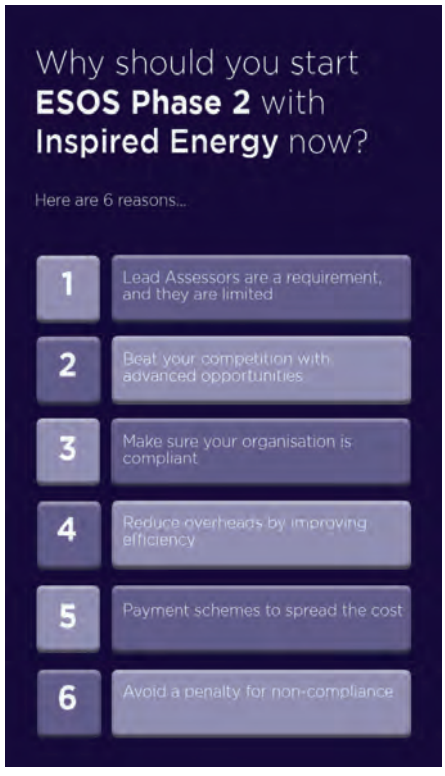
Esos applies to UK organisations and their corporate groups that are large enough to meet the qualification criteria. The qualification thresholds are any UK company that either:

- Employs 250 or more people, or
- Has an annual turnover in excess of €50m (£39m) and an annual balance sheet total in excess of €43m (£33.5m).
- An overseas company with a UK registered establishment which has 250 or more UK employees (paying income tax in the UK).

How can Inspired Energy help?

Inspired Energy provide a compliance service that encompasses all required aspects of the Esos Assessment. These include:

- Provision of a qualified Esos Lead Assessor to complete, oversee or review any Energy Audits, to ensure they meet the requirements of Esos, and to sign off on the overall Esos compliance submission.
- Collation of annual energy consumption, ensuring that this overlaps with the qualification date as required by Esos.
- The identification of the 'areas of significant energy consumption', ensuring that these cover the minimum of 90% of total energy consumption.
- Advice on the best compliance method for each area of significant consumption.
- Site visits as required to conduct Esos Compliant Energy Audits.
- Provision of full site energy reports detailing all energy efficiency improvements available, and where they would be applicable to a larger portfolio, if required.
- Full energy consumption profiling, made available in a variety of formats and reports from Inspired's advanced energy reporting system.
- Creation and maintenance of a comprehensive Evidence Pack to store all relevant documents and information relevant to the organisation's compliance activities.



To find out more contact our Esos team directly: optimisation.services@inspiredenergy.co.uk
or visit our website: inspiredenergy.co.uk

Don't get lost in translatation

Amid much talk of businesses requiring data scientists, Lisa Gingell, founder of 3-Eight Communications, says data translators are key to the growth of the digitised energy market

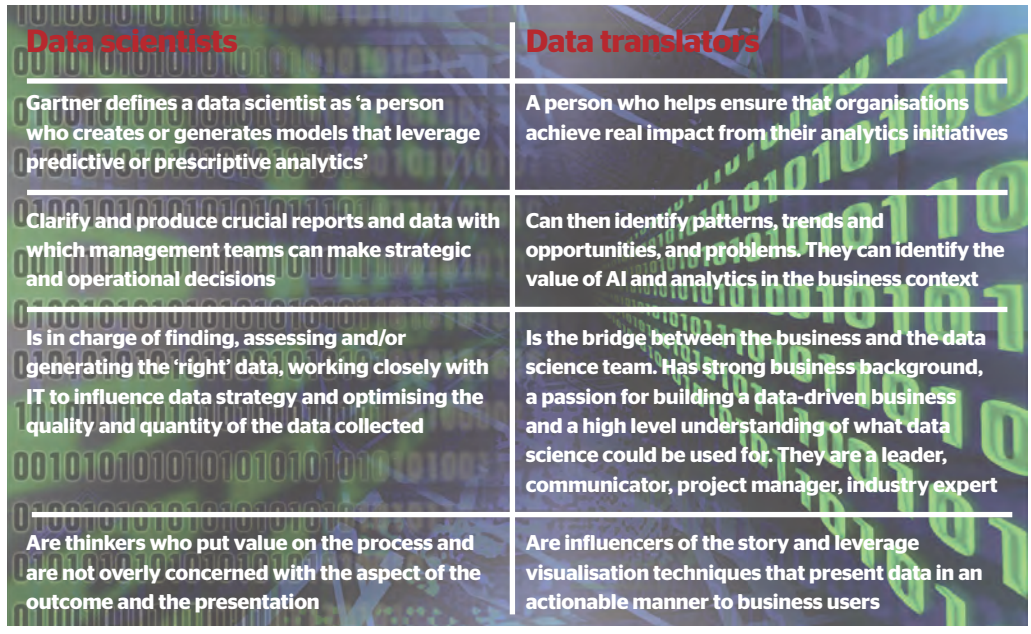
We are entering a data economy, where the world's most valuable resource is no longer oil but data.

The energy industry, in particular, is decentralising and digitising rapidly, throwing up vast data sets, or 'big data' and becoming increasingly connected.

As such, there is much talk of businesses needing to hire 'data scientists' to help companies extract the signal from the noise and create new, more compelling customer services.

But, arguably, there is just as much need for those that can act as the bridge between business and science to create new business models and solve both internal and external challenges.

This is where the data translator comes in.



The data translator

The data translator bridges the technical expertise of data scientists with the operational expertise of marketing, supply chain, manufacturing, risk and other frontline managers. They draw on their knowledge of their business or their customer's business needs, for example, to help identify the problems and then use their working knowledge of AI and analytics to convey these business goals to the data scientists who in turn create the algorithms and solutions.

The data translator facilitates the ability to articulate the customer and business needs that, in turn, create the digitised services and solutions the business will work to develop. They ensure that the solution produces insights the business/customer can interpret and execute on, and, ultimately, communicate the benefits of these insights to business users to drive adoption.

Energy industry context

Switching utility providers has become easier and consumer understanding of energy consumption and its growing cost is creating a desire to change how they operate buildings and systems.

> *The energy industry has a data science opportunity. But a true digital customer experience requires a data translator*

Within the energy industry, suppliers, brokers and energy management systems providers have an opportunity to collect a vast array of data – from consumption patterns and time of use, to building and equipment operational hours and maintenance and fault statistics, as well as from human behaviours and actions and their interaction with buildings and systems.

The energy industry has an opportunity to collect, store, computationally analyse the data (data scientists) but for a true digital customer experience, it requires the addition of a data translator who understands the industry, the business and customer needs; someone that can articulate how data can be interpreted into tangible, workable solutions.

The translator influences the services and solutions that create operational efficiencies across production, distribution and pricing, solutions for forecasting and demand response activities, visualisation for digital interfaces that use, for example, cluster algorithms to highlight opportunities or inefficiencies and they influence the story for the smart-home/building/factory.

Better service

The translator ensures for a better customer experience that uses digital interfaces to drive engagement and longevity of use.

Put simply, data translators help make better products and services for customers based on actual data and insight, in turn driving revenue for their business. te

As co-founder of t-mac technologies, which was sold to Utilitywise in 2015, Lisa Gingell has a background in energy data and technology

Data scientists and specialist support: the future of energy

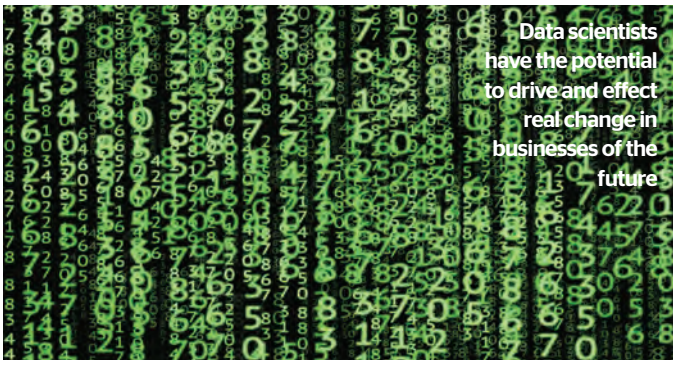
Inenco chief technology officer Jon Bauer discusses how the future roles of the energy manager will change in the fast-changing world of business energy

Few roles can have transformed more than the business energy manager, evolving constantly to adapt to an ever-changing horizon. Speaking on a panel at The Energyst Event, we were asked whether data scientists would become the future of energy management. The answer was a resounding yes – and it will happen soon.

The three Cs of cost, consumption and compliance have long shaped the role of the energy manager but the role is already changing: the increasing compliance burden has resulted in a shift in responsibilities. Energy buying is increasingly handled by finance and procurement with input from the energy manager, replaced by a focus on managing energy behaviours, applied data analysis, ensuring compliance and keeping an eye on emerging technologies and investments, from EVs to artificial intelligence.

Role of data

The growing role of data and technology is well documented in business energy: a fifth of respondents taking part in Inenco's Future Utilities Manager research commented on a substantial increase during the past five years, with data already driving decision making and reporting. Respondents unanimously agreed that the trend of data-driven decision making is set to continue as a much higher level of automation and access to real-time data will enable more in-depth energy monitoring. In readiness for a data-driven future, 14% of today's energy managers are already investing in better data systems and analysis functions.



Data scientists have the potential to drive and effect real change in businesses of the future

The research report predicted technological processes and energy becoming a board-level concern for all businesses; the energy manager will have evolved into a senior-level data scientist by 2030. That makes sense: the 'data scientist' element of the role will mean a broadening remit to understand and manage data on energy, water, waste and transport activities, particularly once electrical vehicle take-up surges as predicted.

> ***Consultants must invest heavily in technology to create the best-in-class platforms, data analytics and interfaces***

Such a broad remit will undoubtedly mean the data scientist will take a more strategic role, making larger investment decisions and providing input to all business departments as the breadth of subject matter that he or she must be familiar with expands.

They are likely to be supported by a team of digitally able professionals coming from both inside and outside of the business, outsourcing activity to specialists wherever necessary. As a result, their dependency on external parties to provide data insight and specialist support will increase.

Strategic decisions

Consultants must be prepared to advise on strategic decisions as well as assisting with the sourcing and structuring of new technology so that businesses can optimise their plant operations, energy supply, storage and EV use.

By its very nature, the role of the energy consultant has changed too – from a transactional TPI simply providing procurement support of the past to a collaborative partner that provides insight and access to energy solutions and helps to identify, choose and deliver energy management solutions.

In the same way that businesses must support their energy managers to transition towards these new requirements through training, internal systems investment and enabling greater collaboration between departments, consultants must also invest and adapt to be ready to help create sustainable, future-proof energy strategies.

While industry expertise and impartiality will always be required and expected, consultants must invest heavily in technology to create the best-in-class platforms, data analytics and interfaces that will secure a competitive advantage for businesses – something we have committed to doing in our recent business reorganisation, ready to help shape the future of business energy.

Businesses have always required consultancies to be knowledgeable, proactive partners. As the role of the energy manager adapts and evolves once again, consultants must also evolve and change to be best placed to predict and meet the challenges and demands in our customers' changing worlds.

Data scientists have the potential to drive and effect real change in businesses of the future – our role will be to provide them with the tools, platforms and support to achieve this. te

Energy manager or soothsayer?

The modern energy manager has to have a wide range of highly developed skills and tools to hand to perform in an ever complex environment. As UKAEE member committee Andy Clarke discusses, perhaps one of those skills needed is reading a crystal ball

Energy managers need to be numerate both to handle the financial elements and the vast amount of consumption data they can now have available from advanced metering: they need to be a salesman to persuade others to take steps to improve performance, they often need to be a people manager, they need presentation skills, they need to be literate – the list goes on and on.

Well we can add another difficult skill; they need to be able to foretell the future.

Now some elements of that requirement can be handled relatively easily. Verification of the likely future performance of energy conservation measures can be measured with more confidence by using skills such as those developed in the AEE Certified Measurement and Verification Professional (CMVP) course/qualification. Ongoing energy consumption performance can be tracked using more advanced monitoring and targeting approaches accounting for weather conditions or production rates but other aspects are less easy.

We are often asked to predict energy cost sometimes just for a financial year (or the remainder of one) but sometimes we need to predict further ahead. One example of this is whole life costing (see Figure 1) where we are expected to determine charges for the entire lifetime of the equipment. To predict that we need to understand a lot of things that are definitely not under our control such as inflation, legislation, world markets and labour rates. The problem is that many 'experts' are paid a great deal to make those predictions by big business and governments and they have a reputation for often getting it wrong.

The simple rule of thumb was always to assume that energy unit costs, standing charges etc, would increase significantly across time and that capital costs would decrease in real terms because of improving technology. Taxation could also be expected to become more expensive and complicated.

The trouble is that experience tells us that does not work all of the time – from the early 1990s through to the turn of the century the UK experienced a massive apparent decrease in gas and electricity prices (we will ignore questions of deferred investment) but new taxes like CCL, ROC's (and administrative challenges like CRC Energy Efficiency Scheme and Esos) have managed to increase the complexity and confusion.

> ***So, do energy managers need a crystal ball or maybe a coin to toss? Either might have a better outcome than expert opinion***

And some more fundamental changes have occurred which we could not expect. Intelligent energy managers have for many years advised the use of mains (natural)

gas as the 'least worst option' because of its competitive (low) pricing, effective utilisation and the lowest carbon footprint of any fossil fuel. The last option included mains electricity because the majority of generation was by the combustion of fossil fuels (including natural gas) and it was thereby one of the fuels with the largest carbon emissions per kWh.

So many of us specified – and even wrote into policy documents – that electricity was not to be used for space heating and thereby reduced carbon emissions significantly. The trouble is very soon we will be wrong. Because of the unprecedented (and surprising for many) growth of renewable energy generation in the UK electricity mix, it is fast approaching a rate of carbon dioxide emissions per kWh BELOW that of natural gas – and it will get even better as coal and other fossil fuels are phased out to decarbonise the network. There are issues about peak load still requiring high carbon dioxide emitting plant being employed but that will be for a limited period each year.

Now we were right to act as we did and will have saved a massive amount of carbon dioxide from entering the atmosphere and adding to climate change but much of that plant will continue to emit more carbon than an alternative for years to come. The question is: "Could we have foreseen the change?"

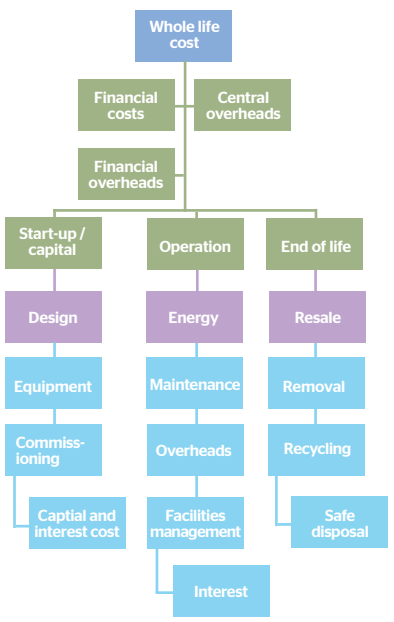


Figure 1: Whole life cycle costing flow chart – typically the costs of the start up/ capital column are a fraction of those in the operation column, often around 3%

A few years ago some of us became excited by the first generation of micro-wind turbines – at around 2kW at most they were designed to be fitted to new and existing buildings and provide a supplement to their electricity supply. Comparatively cheap – what could go wrong? Well they didn't work as effectively because no one fully understood the impacts of turbulence around buildings in an urban setting.

At the moment one of the exciting technologies being considered is electricity storage but we've already heard stories of poor installations without an economic outcome (and many more which seem to work well). So should we be installing this technology – or another one?

So, do energy managers need a crystal ball or maybe a coin to toss?

Either might have a better outcome than expert opinion (especially if you could hire Nostradamus's press agent) but responsibly we can only listen to the opinions of 'experts' where we can find them and extrapolate what 'facts' we can identify using the best estimation of apparent trends. But then of course the UK voted for Brexit and Donald Trump was elected US President – events which were not predicted by the experts. Both those events also add to the difficulty of predicting the future.

Good luck and expect to be proved wrong sometimes. te

The UKAEE is the UK chapter of the global energy management organisation, the Association of Energy Engineers (AEE), with its HQ in the US. It covers a range of expertise in the energy management and energy efficiency sectors. It delivers a range of technically focussed seminars and offers excellent networking opportunities for energy and sustainability professionals.

UKAEE offers Continued Professional Development opportunities for AEE certifications such as Certified Energy Manager, Certified Measurement and Verification Professional and Certified Energy Auditor.

Membership is currently free. For more information on UKAEE or how to join, please visit **ukaee.org.uk**

Solar power farm installed at Cranfield University

Work has started on the installation of a new field of solar panels at Cranfield University in Bedford in support of its carbon-saving target.

Funded by the university, the PV panels will generate 5% of the annual electricity at the campus and also provide a new renewable energy research facility to be used by students attending energy courses.

Feargal Brennan, Cranfield's director of energy and power, said: "Cranfield has a reputation for providing students with the opportunity to use industrial-scale facilities for education and training support. The solar farm will not only provide a new facility which can be used by students but also a sustainable, reliable and affordable energy supply to the campus."

Installed by RenEnergy, the PV panels will be sited on the eastern side of the airport, covering a 2ha field (about 4 acres). A total of 3508 solar panels will be fitted covering a 5,858sq m generator surface area. They should produce 1GWh per year of power, which is about the equivalent of the energy consumed by 300 houses each year.

RenEnergy managing director Damian Baker said: "We are delighted to have been appointed as the solar PV contractor for such a prestigious institution.

"Solar integrates well into the existing infrastructure to provide a clean, cost-effective long-term power solution, as is the case at Cranfield, where our solar array will interact with the combined heat and power (CHP) plant onsite to provide energy without exporting to the grid."

Gareth Ellis, energy and environment manager at Cranfield, said: "Cranfield already has a CHP on site producing 60% of its electricity. We have made significant reductions in carbon emissions in recent years and are well on our way to achieving our target of a 50% reduction by 2020 against our 2005 figures."

Gazprom Energy launches Eco Gas product in UK

Gazprom Energy has launched its Eco Gas product, designed to help medium- to large-sized businesses meet growing environmental targets and fulfil CSR goals.

Days after the launch, Gazprom signed its first major Eco Gas customer – a multibillion-euro global cosmetics company – valued at more than £200,000 over two years.

It is estimated that global companies in the Fortune Global 500 spend collectively about £13.2bn on CSR activities. Gazprom says its Eco Gas product provides an additional way for organisations to reduce their carbon footprint, while still accessing the essential energy supply they need in order to operate effectively.

The company will sell Eco Gas to any UK firm with a gas usage of more than 732,000kWh per annum, on both fixed and flexible purchasing contracts. The product is available via TPIs and direct.

Raise a glass to compressed air and nitrogen for craft beer

A newly installed compressed air and onsite nitrogen generation system from Atlas Copco is providing a key driver in the independent craft brewery Outstanding Brewing Company's ongoing commitment to enhance its product quality, productivity and growth.

In keeping with the brewery industry at large, the Outstanding Brewing Company has to rely on a continuous supply of compressed air and nitrogen as a critical element at every stage of the production process: right from purging kegs and tanks, oxygenating beer to promote fermentation, right through to filling, bottling, labelling and packaging the final product.

It became evident to the company that its existing rented equipment would be unable to cope reliably with required new volume

targets. As a result, it turned to Atlas Copco to install units that would not only meet its process needs but also provide opportunities to realise operational cost savings, in terms of energy requirement and a comparatively short-term payback on capital costs.

Atlas Copco installed a system comprising a tank-mounted 5.5 kW GX5 rotary screw compressor with integral refrigerant dryer, which delivers 10 bar air at a rate of 10 l/s (36 m^3/h), together with a two stage UD+ coalescing filter, PDp+ particulate filter and activated carbon QDT filter for hydrocarbon and odour removal.

The energy-efficient compressor's dry air output feeds a plug-and-play NGP8+ nitrogen generator and buffer tank, then a separate storage receiver for nitrogen at the required purity. The NGP+ generator's is based on pressure swing absorption technology. Carbon molecular sieves isolate nitrogen molecules from the compressed air while oxygen, CO_2, water vapour and other gases are adsorbed. The result is a guaranteed and continuous supply of nitrogen at the highest purity levels of up to 99.999%.

Unlock flexibility
Maximise returns

Headline Partner

nationalgrid

DSR Event 2018

Demand-Side Response

Thursday 13th September / The Banking Hall, London

100 free places available to end users

Register your place today at dsrevent.uk

Partners

EDF ENERGY · E.ON · ENERNOC · npower Business Solutions · REstore · SCOTTISHPOWER

Media Partners

the energyst · MISSION CRITICAL POWER

Organised By

energyst media

James Summerbell

Ecova's new director on bad drivers, discovering 'the truth' about Jack the Ripper and being one with the Force

Who would you least like to share a lift with? Someone like Katie Hopkins. I can't stand people who go straight for the most controversial, incendiary approach, seemingly for the sole purpose of drawing attention to themselves.

If you could travel back in time to a period in history, what would it be and why? Not that far – I'd go back to the 1960s. It was a period of immense cultural change which still permeates today. On top of that, everyone I know who was around then tells me it was a truly fantastic time, and I'm sure it was.

Who or what are you enjoying listening to? Unlike many of my peers, I really like modern music. My daughter loves the playlists I have on my car stereo – I pretend they're hers, but they are mine really. I don't have it at full blast with the windows down these days, though.

What unsolved mystery would you like the answers? I'd love to know who Jack the Ripper was. It is a story that keeps returning. Every few years someone claims to have indisputable evidence of his identity but the case is never quite watertight. It has been 130 years but it is still a fascinating case.

What would you take to a desert island and why? I love to cook, so I'd have to take my set of special knives – essential tools for any chef.

What's your favourite film and why? It has got to be *Star Wars*. It was the first film I ever saw at the cinema and I've loved it ever since. Why? It's *Star Wars*, of course!

What would your super power be and why? Staying on the *Star Wars* theme – definitely the ability to use 'The Force' – especially the ability to move objects around without touching them. That said, I'd probably only use it grab the TV remote control from across the room, so it would probably be wasted on me.

If you could perpetuate a myth about yourself, what would it be? I used to swim competitively when I was young, so I think I'd probably promote the myth that I was an Olympic swimmer. It wouldn't be too convincing to anyone seeing me thrash about in the pool now, though!

What would you do with a million pounds? I'd set aside enough to be comfortable but I'd want to put most of it towards a really worthwhile project to help people – taking people off the streets and giving them a new chance.

> *I'd go back to the 1960s... everyone I know who was around then tells me it was a truly fantastic time*

What's your greatest extravagance? I spend far too much money on Lego – I've been a fanatic since I was knee-high. My latest purchase was the largest set they've ever produced – I won't tell you how much it cost.

If you were blessed with any talent, what would your dream job be and why? I imagine it would be great to be a rock star – getting up on stage and performing in front of thousands of people must be an incredible experience. Sadly, with my singing voice, this was never an option.

What is the best piece of advice you've ever been given? The hardest step is the first one – if you don't start, you will never get anywhere.

What irritates you the most in life? Bad driving. I do quite a few miles on the motorway and the number of people who don't indicate, hog the middle lane or just drive with no consideration for anyone else just drives me round the bend.

What should energy users be doing to help itself in the current climate? Take another look at innovations and opportunities which you might have dismissed as 'bleeding edge' only a couple of years ago – there were formerly out-of-reach technologies which are now accessible and affordable which could make a real difference to energy management in your business.

What's the best thing – work wise – that you did recently? I've only recently joined Ecova but I am really enjoying the process of positioning the business for the future – helping to take our clients' aspirations for energy and carbon to the next level. te

Published 2018

The Heat Report

Energyst readers' views on lower carbon heat technologies, opportunities and constraints, as well as expert views from industry about the pathways ahead.

Download your copy now at theenergyst.com

Produced by

the energyst

Supported by

remeha · ANDREWS WATER HEATERS · POTTERTON COMMERCIAL · PACKAGED PLANT SOLUTIONS

COMMERCIAL SOLUTIONS FROM **BAXI HEATING**

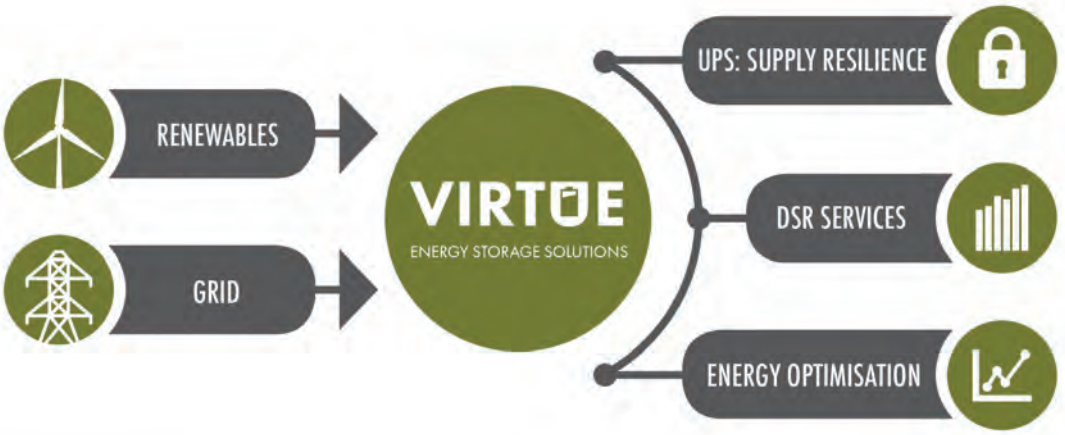
VIRTUE

ENERGY STORAGE SOLUTIONS

CELEBRATING OVER 15 YEARS OF SUCCESS

VIRTUE is Powerstar's innovative, award-winning and market leading* energy storage solution that can provide a complete solution for behind-the-meter (BtM) applications. It has the ability to offer supply resilience through its full Uninterruptible Power Supply (UPS) capabilities, which is imperative given increasing supply issues on the current electricity grid and reports that energy related failures can cost a company up to 17% of its revenues.

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



Secure the supply with full UPS capabilities

Leading edge, engineering-led, bespoke solutions

Available through flexible funding packages with no up-front costs

Partake in grid contracts for additional revenue

01142 050 770 | www.powerstar.com/virtue | info@powerstar.com

powerstar®