the energyst

“Climate change is not interested in the size of the deficit or any other arbitrary self-imposed metric. It operates in the real world” – p12

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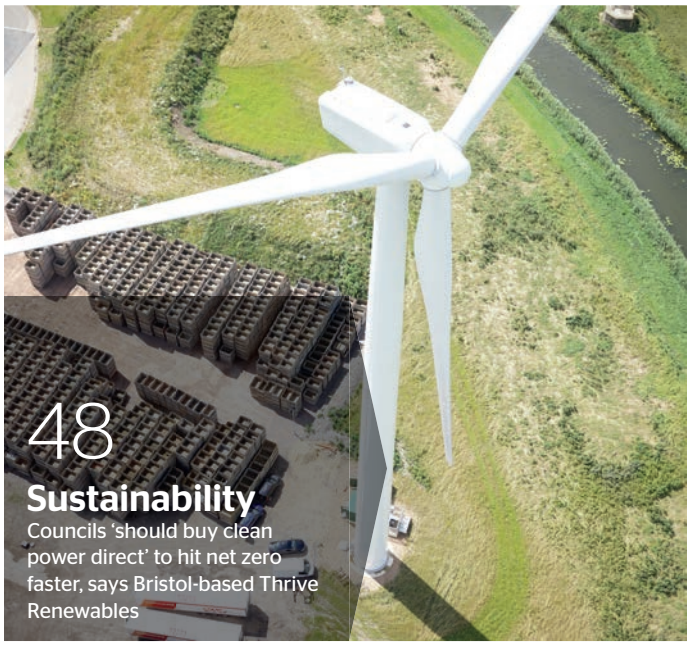
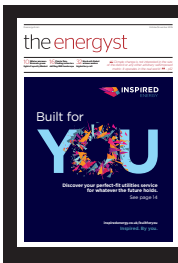


> ***Even if you can't actively support local authorities to do the right thing, please stop making it harder...***



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Energy and mobility converge

With legislation in place to make the UK a net zero emissions economy, one rapid change is the convergence of energy and mobility. Harnessing this in ways that maximise their benefits environmentally, create greater efficiencies and economic growth is the challenge.

The changes in managing energy, such as the rise of active consumer participation within the energy market through onsite generation, operational flexibility and more powerful data management capabilities, have been profound. Decarbonising energy systems has made them increasingly decentralised, with local generation, storage and distribution. More energy-using products, certainly in the shorter term, are becoming electrified, with mobility being a critical one of these. This, however, is happening at a time when the energy market is technologically primed to take advantage of these developments. Hydrogen has a role to play in transport, particularly

> ***The convergence of energy and mobility present new challenges for businesses***

with heavy goods and shipping, but more immediately it is electric vehicles that will lead the charge, so to speak, impacting local energy infrastructure hugely.

EVs as decentralised, mobile energy storage gives drivers and fleet operators an opportunity that is not process or site specific to engage in flexible supply and consumption strategies using their vehicles and smart chargers. Vehicle-to-grid services will create opportunities for revenue sharing between the vehicle owners and the energy suppliers that would reduce the total cost of ownership of EVs and accelerate their market penetration. The EV Event, alongside the EV Report, was launched this year, to reflect that transport is becoming increasingly an energy issue. EVs, associated infrastructure and its effect on businesses is now at the forefront of many energy managers' minds when planning future energy strategies.

To mirror this integration of energy and transport, next year's EV Event has been expanded and will run together with The Energyst Event on 22-23 April at Silverstone. The larger EV Event features EVolution – a track day that gives delegates the opportunity to take a low-emission vehicle for a spin around the International Circuit at the home of British motorsport.

Net zero emissions will be achieved by the control of heat, power and transport. The addition of the EV Event to The Energyst Event offers delegates an opportunity to see the full picture and better understand what needs to be done to decarbonise their operations.

The convergence of energy and mobility presents new challenges for businesses. To adapt smoothly to these changes, taking advantage of opportunities arising from this, requires a strategic shift in thinking – not just from business but also from the energy, mobility and policy sectors – if we are to maximise the benefits.

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Ofgem chases Robin Hood and others for overdue payments

Robin Hood has been ordered to pay £9.4m by Ofgem

Ofgem has ordered Nottingham City Council-owned Robin Hood Energy to pay £9.4m in overdue Renewables Obligation payments before the end of the month.

The regulator is also chasing three other small suppliers for money. Toto Energy owes £4,555,880, Gnergy owes £637,876, Delta Gas and Power owes £91,937.

Ofgem said it believes the four are "likely to breach their obligations". The regulator said others owe money too, but it thinks they will pay.

Under the Renewables Obligation, energy suppliers are obliged to buy a certain amount of power from renewable sources. If they do not, they pay into a buyout fund.

The cost of the RO is added to the customer bill and the suppliers then pay into the fund at the end of the year.

Many of the small suppliers that have gone bust in the past two years failed to pay into the Renewables Obligation buyout fund. Struggling to stay afloat, some spent the money instead of putting it aside.

Over two years, consultants have estimated the missing RO money totals £100m, which other suppliers, and their customers, will have to pick up.

Citizens Advice research suggested the tab from 10 failed domestic energy suppliers stood at some £172m in unpaid industry bills.

Robin Hood Energy's accounts are two months late. Accountants have questioned whether it can remain a going concern.

Toto Energy must also find a significant amount in the next 30 days.

It has been ranking poorly in customer satisfaction surveys, which Citizens Advice has warned is often a proxy for a struggling company.

Gnergy, run by a community of former Gurkhas, has admitted it is battling to keep the business afloat.

The three, along with Delta Gas and Power, could have licences revoked if they do not pay.

After the last round of failed suppliers, Ofgem moved to tighten market entry rules. Citizens Advice said it should collect Renewables Obligation payments more regularly to limit damage when suppliers go bust.

Ørsted exits mid-market to focus on large users

Ørsted will no longer pursue SME and mid-market customers, focusing its energy supply business instead on large industrial and commercial businesses that use at least 30GWh of power per annum.

The company will still sell through brokers and third party intermediaries but aims to offload more of its offshore wind power through corporate PPAs, as well as green gas.

It will continue to serve existing mid-market customers but will not renew contracts when they expire.

"For quite some time, we have been looking into how we can align our Danish and UK SME customers – customers with an annual consumption below 30GWh – and our energy consulting business with Ørsted's global strategy," said Morten Buchgreitz, Ørsted executive vice president of markets and bioenergy.

"The conclusion is that these businesses are not compatible with the course we have set for Ørsted, despite the fact that our talented employees have succeeded in transforming and digitising the business in recent years, ensuring highly satisfied customers and achieving stable growth."

> ***The conclusion is that these businesses are not compatible with the course we have set for Ørsted***

In February, Ørsted struck its first UK offshore wind PPA with Northumbrian Water. The water company will take about 100GWh a year, a third of its gross consumption from Ørsted, for 10 years.

Speaking at the Energyst Event, earlier this year, Northumbrian Water energy development manager Anthony Browne said the fact that Ørsted could provide green power 'direct', rather than relying on REGOs (renewable energy guarantees of origin), played a role in its decision to sign the deal.

EDF chief: networks need massive investment in resilience and flexibility

Energy networks will require major investment in resilience and flexibility to hit net zero, according to EDF president and CEO Jean-Bernard Lévy.

"Creating a carbon-free world is a sizeable challenge requiring the mobilisation of human inventiveness," Lévy told the InnoEnergy TBB conference.

He said EDF's strategy is based on "three levers: decarbonising energy use; generation; and adapting electricity networks to enable these changes".

On networks, Lévy said the electrical system will play "an increasingly central role" in decarbonisation and that the "future will be more and more electrical".

Jean-Bernard Lévy: 'Creating a carbon-free world is a sizeable challenge'

That means networks "must become more and more resilient ... and to better accommodate fluctuations in supply and demand."

As well as voluntary curtailment of large customers, Lévy added that future flexibility will come from "modulation of electric vehicle charging and increasing stationary storage."

Lévy said EDF aims to create 10GW of additional storage capability by 2035, including from electric vehicles via its commitment to rollout bi-directional chargers across Europe. He added that aggregation of flexibility across Europe "is a major interest for a company like ours".

Lévy also said that floating wind farms and small nuclear reactors "appear very promising" and flagged plans to create hydrogen locally via electrolysis as "one of the levers to decarbonise industry and transport".

Eon to resolve NPower future

Eon will move "quickly" to clarify the future of Npower after its asset swap with Innogy was cleared by competition authorities. Chairman Johannes Teyssen described Innogy's loss-making UK retail operation as "an open wound that is bleeding profusely". He added that the board is likely to make a statement before the end of the year. Innogy said earlier this year that all options remained on the table for Npower, including selling off the customer book and winding down the operation. Now under Eon's control, Teyssen said its data department would be able to access "tangible figures" relating to Npower and "assess the situation".

Earning a first: UK universities sign £50m aggregated power purchase agreement

UK universities have earned what is believed to be a UK-first: an aggregated renewable power purchase agreement (PPA) across 20 education establishments worth £50m.

The deal, which includes Newcastle, Exeter and Aberystwyth universities, was brokered by not-for-profit buying group The Energy Consortium. It is sleeved through EDF Energy, TEC's framework supplier, with renewable onshore wind power provided by Statkraft and Squeaky Energy, which claims to have "productised" PPAs, acting as the distribution provider.

The corporate PPA market has long been touted as a means for larger organisations to procure renewable power and enable subsidy-free development.

But to date, it has largely been the preserve of very large companies, requiring substantial commitments from buyers. Contractual complexity has also limited PPA uptake, particularly among risk-averse sectors.

However, TEC said its most recent OEUJ framework enables universities to minimise risk and maximise flexibility via PPAs. It is understood that universities will commit to buying a chunk of renewable power via the contract for 10 years. TEC's managing director, Richard Murphy, said that allows universities to protect budget while giving them flexibility, "because they are not committing 100% of annual baseload volume to the agreement."

Universities will commit to buying a chunk of renewable power via the contract for 10 years

He added: "For example, by committing to 20% of baseload via the PPA, if a university subsequently outsources part of its campus, such as student accommodation and volume falls, or they add self-generation energy assets, they have headroom to allow for future developments."

Squeaky Clean Energy has been developing this type of structure for some years. Founder Chris Bowden last year told *The Energyst* it was working to "productise" PPAs, aiming to offer them "right down to a megawatt", enabling small and mid-sized companies "to buy power like Google", while cutting contracts down from around 120 pages to 15 pages. Bowden said the framework will "open the floodgates" to many more PPAs being struck in the mid-market.

Shadow energy minister: '2030 net zero infeasible'

Decarbonising the UK economy within the next decade is neither official Labour party policy nor likely to happen, according to shadow energy minister Alan Whitehead.

The Labour party conference approved a motion to move "towards a path to net zero carbon emissions by 2030". Speaking at Aurora's battery storage conference, Whitehead outlined the party's intentions.

"It is an aspiration ... but it is a long way from a firm, researched and finally decided ... corpus of policy," said Whitehead.

But Labour "clearly wants to move to net zero well before 2050", he added, "and we are fully committed to getting to it earlier than 2050".

Asked if he thought net zero by 2030 is attainable, Whitehead replied that it is "feasible, by the early 2030s, that we will have in place a very low carbon economy and have those things in place that ensure net zero thereafter".

Extinction Rebellion protestors are piling on pressure

Whitehead was speaking as Extinction Rebellion protesters demonstrated in central London. He was asked if their calls for total decarbonisation by 2025 are grounded in reality.

Extinction Rebellion, he said, represents "a tremendous weapon of conscience" that piles pressure onto policymakers and industry.

However, Whitehead commented that even putting policies in place to ensure a long-term, sustainable commitment to a decarbonised economy in the timetable mooted by protesters was not possible.

"You can't do that by 2025 ... but you can end the sale of new petrol and diesel vehicles by about 2030, that is within the sales, ownership and scrappage cycle of a number of vehicles," he suggested.

"2025 is not, so we have to work out how to get these processes in place."

A 2030 ICE ban, 10 years earlier than the current government's ambition, could save around 100 megatonnes of CO_2, suggested Whitehead, "which is the difference between achieving and not achieving the fifth carbon budget".

The minister also moved to quell fears that Labour's plans to renationalise utilities will restrict private finance from making a return on decarbonising the economy.

He pointed out that much of the UK's offshore wind sector is already state-funded, albeit by the taxpayers of Denmark (Ørsted), Norway (Statkraft) and Sweden (Vattenfall), all of whom are enjoying good returns.

Unilever hits renewables target 'at no extra cost'

Global consumer packaged goods giant Unilever says its factories, offices, R&D facilities, data centres, warehouses and distribution centres across five continents are now powered by 100% renewable electricity.

Some 38% of its consumption is via power purchase agreements (PPAs), whereby firms contract directly with generators. For the remainder, Unilever said it had opted for renewable energy certificates – traded instruments linked to renewable power generation (though some of these instruments have been criticised by industry participants as 'a fudge').

Unilever aims to become carbon neutral by 2030. The company continues to demonstrate that sustainability can be a profitable exercise: its sustainable products now deliver the three quarters of its top line growth.

Unilever demonstrates that it is possible to be sustainable and profitable

"We have worked hard to secure renewable energy contracts for our sites across five continents, accelerating the delivery of our 100% renewable energy targets," said chief supply chain officer, Marc Engel. Of course, there is more work to do, but we hope that our announcement will inspire further action elsewhere... Renewable is doable."

Unilever said energy efficiency programmes had enabled it to achieve its goal early, adding that the firm had cut energy consumption by 28% and halved carbon emissions since 2008. Onsite solar has also contributed.

The company said it has achieved 100% renewable grid electricity 'at no net on-costs'.

Bristol seeks backer for net zero plans

Bristol City Council is seeking an institutional investor to fund the first tranche of its energy transformation as it bids to decarbonise the city.

The City Leap Project plans to deliver a broad range of energy projects. It includes district heating, domestic and commercial energy efficiency and renewable generation.

Bristol also hopes to create a city-wide smart grid that combines demand-side response, storage, electric vehicles and vehicle-to-grid, networked heat pumps and smart appliances.

Out to 2050, the total investment required may be £5bn.

"Any backer will have to be in it for the long-term and share the journey," said Councillor Kye Dudd, cabinet member for Energy and Transport.

"We accept they need to make a return; there must be some margin in it for them. But we need a partner that is willing to commit long-term to Bristol."

Underneath the investment framework, delivery work is open to all parties, said Dudd. "SMEs, local businesses, communities: We want the widest possible involvement."

The council's procurement process will run "for several months". Anyone interested in bidding should visit: energyservicebristol.co.uk

Renewables take off at Bristol Airport

Bristol Airport has switched to 100% renewable electricity supply via Ørsted.

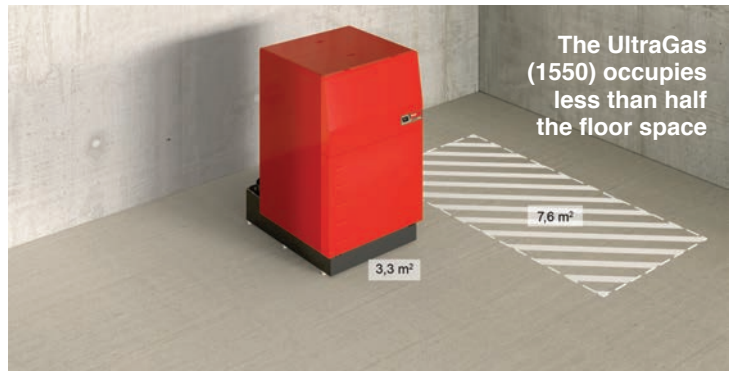
The airport aims for its terminal and site operations to become carbon neutral by 2025. Electricity represents its largest contributor of on-site emissions. Under the three-year contract, Bristol Airport will take 17GWh per annum from Ørsted, which has amassed significant wind resource.

The airport said some of its aircraft stands are also powered electrically, reducing use of diesel engines. In all, the contract should enable around 14,000 tonnes of carbon reduction.

"This is a significant step on our journey to carbon neutrality," said Simon Earles, planning and sustainability director at Bristol Airport "There is more to do, but this is a clear statement of our intent to reduce our direct emissions."

Bristol airport has switched to 100% renewables

Hoval launches compact, high capacity UltraGas



The UltraGas (1550) occupies less than half the floor space

Hoval has extended the upper range of its popular UltraGas condensing boilers with the launch of the UltraGas (1550) – a 1550kW boiler that features a remarkably small footprint for its output of just 3.3m².

Measuring only 1,550mm wide, 2,547mm high and a depth of 2,152mm, this compact boiler uses a standing system with upright heat exchangers to occupy less than half the floor space of other boilers of this capacity. This, combined with flexible connections, makes the UltraGas (1550) ideal for installation in tight spaces, freeing up plant room space for other items.

In keeping with the rest of the UltraGas family, UltraGas (1550) combines high efficiency with low emissions at all outputs thanks to its innovative aluFer heat exchanger design and modulating premix burner. NOx emissions, for instance, are just 31mg/kWh (relative to gross calorific value, according to EN 15502).

The premix burner generates an homogenous, optimum fuel/air mixture which can be adjusted across a wide range to meet varying heat loads by modulating the fan speed. As a result, UltraGas (1550) delivers a modulation range from 328kW to 1550kW. In preventing start/stop operation, this design reduces fuel consumption and emissions, as well as electricity consumption.

In parallel, the boiler's high water content works like a buffer for precise management of flow rates and return temperatures, further helping to minimise energy consumption and start/stop processes and simplify the hydraulic systems.

Control is via Hoval's intelligent TopTronic system, which can also act as an interface with building management systems. Hoval's TopTronic E is an entirely new system controller for Hoval boilers, calorifiers, heat pumps and other heat sources with the ability to control one or multiple conventional and low carbon heat sources with a single unit or in cascades with up to eight units.

Designed from the ground up, it delivers a completely new level of simplicity, modularity, connectivity and user experience without compromising on control functionality. As such, it eliminates the inconvenience and risk of trying to work with different controllers for different appliances and system configurations. Featuring 'plug and play' modular hardware, TopTronic E allows easy extension of an existing system with additional Hoval components (eg solar thermal panels or an additional water heater).

The Hoval UltraGas (1550) is currently available as a single boiler and will be launched as a double boiler in the spring of 2020.

hoval.co.uk

Hoval

Capacity Market cleared: EU Commission gives green light

The Capacity Market will soon be back in play after the European Commission approved it. Energy companies with agreements are looking forward to getting paid.

The market was suspended last year following a legal ruling by the European Court of Justice that the Commission did not conduct an in-depth investigation into aspects of compliance with State Aid rules.

The case was bought by Tempus Energy, which argued demand-side response was treated unfairly because it cannot currently bid for agreements longer than a year. New build generation can bid for 15-year agreements.

The Commission said it "did not find any evidence that the scheme would put demand response operators or any other capacity providers at a disadvantage with respect to their participation in the scheme".

Companies will be paid the £1bn withheld during the market's suspension

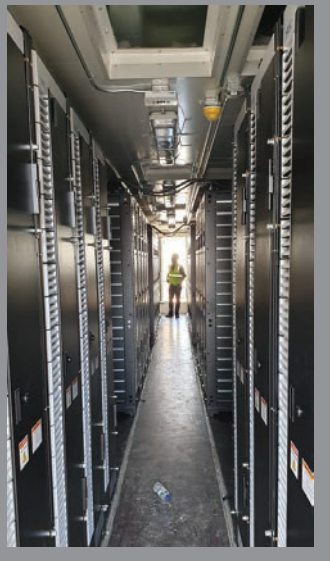
It also noted that the UK government has "committed to implementing certain improvements to the scheme for the future" with regards to minimum capacity entry thresholds, rules for new types of capacity and access to long-term contracts.

Beis agreed to look into the case for longer-term contracts for DSR within the five-year review, but has yet to announce any changes.

Energy secretary Andrea Leadsom said the department "will shortly consult on arrangements for implementing these commitments". The reinstatement means energy companies will be paid the £1bn withheld during the market's suspension and the three auctions scheduled for early next year are clear to proceed.

9MW BTM battery goes live at Port of Tilbury

A 9MW behind-the-meter battery is now live at Port of Tilbury. The storage project, owned by Gore Street Energy Fund, is using Origami's platform to tap revenues including Triad and frequency response. It also has a capacity market contract, with Beis hopeful of restarting payments in the coming weeks, subject to the outcome of further legal challenges.



Origami CEO Peter Bance suggested further Gore Street-owned batteries will use the platform to sell flexibility in markets and ancillary services. The fund acquired two projects from Origami last year, with a 10MW front-of-meter (FTM) battery in Brentwood, Essex part of the transaction.

Both were originally scheduled to be operational within the first half of 2019.

Good Energy becomes EV charging provider

Renewable power firm Good Energy has launched a business-to-business electric vehicles charging division, called One Point. Destination and workplace charging will become increasingly important as EV penetration increases.

Good Energy, which earlier this year outlined plans to increase B2B market activity, said that presents an opportunity to businesses.

The company aims to deliver end-to-end services for firms seeking to switch fleets to EVs or install charging infrastructure for staff, customers or both. As such, it has struck partnerships with RAW Infrastructure and SWARCO as installers, which Tim Wynn-Jones, Good Energy's head of energy solutions, said will deliver "gold standard" reliability.

He advised businesses to move quickly to secure grid capacity – a key aspect of EV infrastructure – and to "get ahead of the competition".

One Point's first installation is at the Watergate Bay Hotel in Newquay, Cornwall, where chargepoints use load balancing technology to reduce adding to grid constraints. The hotel's chief executive, Will Ashworth, said it wanted to "get ahead of the curve" as EV chargers become "the next hygiene factor for hotels".

Good Energy CEO Juliet Davenport said bundling together chargers with clean power enables businesses to take another step towards net zero by helping to decarbonise transport.

Open Energi and Zenobe strike deal

Flexibility aggregator Open Energi and storage operator Zenobe Energy have struck a deal to trade output from a 9.8MW/12MWh Tesla battery at Hill Farm, believed to be the largest from Elon Musk's firm in the UK.

Zenobe director Steven Meersman said Open Energi's platform and forecasting "compliments our capabilities as an asset owner and operator, and allows us to improve performance of this project in the challenging UK grid-scale storage market".

Open Energi director David Hill said the firm "designed our algorithmic trading capability with companies like Zenobe in mind". He added that as renewables penetration increases, "optimisation strategies in battery storage systems have never been more complex or critical".

Earlier this year, Zenobe launched a £120m funding offer for local authorities and fleet owners seeking to switch to EVs, including bus fleets.

EDF hired to help trade flex

Gresham House Energy has hired EDF Energy to trade flexible power from 20MW of batteries and 4MW of peaking plant in wholesale and ancillary markets. The utility will also load-shift around Triad periods.

"Our battery storage portfolio aims to generate sustainable financial returns for our investors while supporting the UK's transition away from fossil fuels and towards clean energy," said Ben Guest, head of Gresham House New Energy. "Asset optimisation is the largest contributor to revenues and through this partnership we are able to broaden our revenue stack and provide our investors with certainty – despite the shifting regulatory environment."

EDF's Vincent de Rul commented that now "is an important time for battery storage. The UK's successful transition to a low-carbon future will increasingly draw on optimisation of assets like these alongside low-carbon generation."

Engie wins contract with Milton Keynes Council

Engie will deliver energy and carbon reduction services to Milton Keynes council via an energy performance contract that guarantees savings.

The first phase of the contract aims to improve local authority owned buildings including sheltered housing. Further phases will likely involve large scale renewable generation projects with investment potentially upward of £50m. The seven-year facilities management contract has a three-year extension option. Both contracts will commence before the year end. Milton Keynes Council aims to be carbon neutral by 2030 and carbon negative by 2050.

"We want MK to be the world's first post-carbon city, and how we manage our own assets is an important step towards this goal," said council leader Pete Marland.

Sponsored column

Wilson Power transformers win IEMA Sustainability Award

The Institute of Environmental Management and Assessment (IEMA) launched Sustainability Impact Awards this year to recognise businesses and individuals whose impact on the transformation towards a sustainable world is prominent.

Wilson Power Solutions received the award for the New Product, Service or Technology category. The award came as recognition of Wilson e2 Super Low Loss transformers that have been in the market for more than 10 years now. Wilson Power's amorphous transformers tackled an often-neglected energy-saving potential and addressed the problem of transformer losses.

Erika Wilson, joint managing director of Wilson Power, said: "It is a rewarding feeling to be recognised as a family business from Yorkshire for our efforts to explore a new energy-saving area that is often overlooked. Universities, NHS hospitals, retailers and manufacturers are some sectors we focused on to push for this great carbon reduction route."

The judge's comment on Wilson Power's application was: "This product has made a real difference in practice in the often-overlooked area of energy efficiency, and within this area, the equally overlooked technology of transformers. It demonstrates innovative thinking – innovation which is continuing to be developed in the e3 model."

Leeds-based transformer manufacturer Wilson Power was named among 19 winners out of 106 total shortlisted organisations and individuals. Foreign and Commonwealth Office, Arriva Rail North, the University of Manchester and Environment Agency were some of the other winners.

Wilson Power's Ayah Alfawaris said: "Over 1,000 Wilson e2 Super Low Loss amorphous transformers are installed around the UK. These transformers help organisations reduce their energy waste through improved transformer losses."

Ayah Alfawaris: "We are extremely proud"

"This is very instrumental for organisations with strict carbon reduction targets. Over their life time, Wilson amorphous transformers can save organisations more than 500 tons of CO_2 emissions when they replace old energy-guzzling transformers."

Wilson Power has recently launched the Wilson e3 Ultra Low-Loss Amorphous Transformer. It far exceeds EU Eco-Design (Tier 2) specifications that are due to come into force in 2021 and sets ambitious standards for Tier 3.

"Ten years ago, Wilson Power realised the untapped potential of energy saving through improved transformer losses. Since then, the company has been investing in R&D to further improving the product offering," Alfawaris added. "We are extremely proud of what we have achieved thus far and proud to be among winners who combat climate change on a daily basis."

wilsonpowersolutions.co.uk

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We need to talk about Devon...

Local authorities and cities are taking the lead on addressing climate change where national governments are failing, says EnergyPro's Alex Rathmell

Devon declared a 'Climate Emergency' earlier this year. As a responsible authority it is convening local stakeholders, developing a specific action plan and increasingly applying a climate change lens to decision making.

This is part of a much wider trend. Local authorities and cities are taking the lead on addressing climate change where national governments are failing, because they are rooted in – and as such directly answerable to – their communities.

More than 200 councils have declared a Climate Emergency so far, in a movement which started in response to the 2018 IPCC report that stated the need for "immediate" and "unprecedented" transformation to give us a chance of staying below 1.5°C rise in global temperature.

Many authorities' first response to these declarations is to address the energy performance of their own buildings. This takes place in the context of estates and budgets that have been decimated by nearly a decade of cuts. Despite favourable returns from energy efficiency programmes, raising the capital funding needed is very challenging, particularly for the sort of deep retrofits demanded by the realities of climate science.

But for authorities that succeed in finding funds, eco-friendly building refurbishment projects set a powerful example for local communities, and improve the built environment for staff and clients. Many authorities use the successful RE:FIT programme and similar schemes, which offer a combination of compliant procurement and support in project development.

In another recent example, a panel of architects in 'fashionable eyewear' have awarded the prestigious 2019 Stirling Prize to a 100-home Passivhaus development for Norwich City Council. Again, leadership from a pioneering local authority, and great recognition for the idea that social housing residents should have comfortable, climate-resilient homes with low energy costs.

State failures

In the US, this trend towards cities and states taking matters into their own hands is occurring because the national government does not support action on climate change.

In the UK meanwhile, the government is happy to trumpet past successes (or those achieved in spite of, not because of, its policies), but appears to think that simply declaring a net zero target for three decades' time makes it a global leader on climate change. Meanwhile there is a glaring and increasingly embarrassing lack of effective policies to get us there.

With no disrespect to Norwich City Council, or the team that delivered that fantastic Passivhaus development, they should not be winning prizes for this in 2019... because it should be the norm.

We should not be building houses that do not meet this standard. Not so long ago, we had the Zero Carbon Homes Plan, which would have ensured that all new dwellings from 2016 would generate as much energy on site as they would use in heating, hot water, lighting and ventilation. This was to be supported by tighter energy efficiency standards and a scheme that would allow housebuilders to deliver equivalent carbon savings off site.

The government withdrew the plan in 2015 following lobbying from the construction industry. During the same period, the ECO energy efficiency programme was vastly reduced, CRC was scrapped, renewable subsidies slashed etc, etc.

None of these will go down in history as the most stupid thing the 2010-16 government did, but then they did set the

government is not. Amid the political maelstrom of recent days (weeks/years) you might be forgiven for missing the news of a "shock interest rate rise imposed on cheap Treasury loans" (according to *The Guardian*.)

Essentially, what has happened here is that the Treasury has increased the rate at which public bodies can borrow money for public works from 1.81% to 2.82%. This 'Public Works Loan Board' is the facility that enables local authorities to develop social housing projects and to invest in improving the estates used for delivering public services. Energy efficiency projects and other climate change mitigation projects often use PWLB borrowing, and for many authorities it is the only viable alternative to using internal funds for deep retrofit projects.

Public sector bodies can still access Salix Finance, but the restriction to initiatives with a five-year payback period is increasingly incompatible with the deep retrofit projects demanded by the climate emergency.

According to *The Guardian*, the Treasury appears to have a problem with some authorities' use of PWLB money for 'property investments' – ie schemes that deliver returns that offset budget cuts from central government. To some of us, this sounds like exactly the sort of wild west capitalism the government would be in favour of.

Faced with uncertainty about future government funding, but with a strong moral and social (and legal) obligation to continue providing basic services and dealing with issues like climate change, resourceful local authorities have taken matters into their own hands.

But apparently this is the wrong answer. And the above announcement means the plans of many authorities for climate-friendly investments to be financed by PWLB lie in ruins, at the stroke of a Treasury pen. Few investment proposals can survive a 50% increase in cost of capital. Just another small way that the government's hostile environment for the public sector is making it harder for the grown-ups (and, increasingly, children) who take the future seriously. Surely the Treasury could have come up with another way of restricting pure property investments by local authorities and encouraging massive investment into deep energy retrofits?

> ***Climate change is not interested in the size of the deficit or any other arbitrary self-imposed metric. It operates in the real world*** – **Alex Rathmell, EnergyPro**

bar pretty high for themselves.

We are still living with the legacy of this toxic bonfire of regulations, and the even nastier turn taken by UK politics; nothing of substance has come to fill the policy vacuum. Even the MEES (Minimum Energy Efficiency Standards) was watered down in favour of landlords. The current government is clearly leaning towards deregulation in the name of helping business, when most businesses are asking for clear leadership on climate change and a clear trajectory for tightening regulation.

We need government

As this vacuum extends into its fourth year, the climate crisis has returned to the forefront of public consciousness, driven by Extinction Rebellion, Greta Thunberg and Sir David Attenborough. However, the inconvenient truth is: we need government to be on-side.

Recently, we have seen an example of what happens when

Policies and support, please

The current life expectancy of the UK government is measured in weeks (or even days). So to whichever unfortunate persons end up inhabiting ministerial positions at BEIS, Defra, MHCLG or indeed the Treasury, the messages need to be really clear: climate change is not interested in the size of the deficit or any other arbitrary self-imposed metric. It operates in the real world. Maybe you should too?

Climate change mitigation and adaptation happens in the workplaces, communities and homes in which people live. If you starve these of funding, cut off the lifelines of European programmes that have positively impacted so many communities, and systematically stymie local authorities' attempts to do the right thing because of a political ideology, you will not get the outcome you say you want: net zero by 2050.

Our buildings are in a poor state, meaning they waste energy and are not resilient to climate change. This does not have to be the case, it is a product of political decisions made by your predecessors. Austerity has led to underinvestment in public buildings and a crisis in backlog maintenance in the NHS, and a failure to tackle the housing crisis and greedy landlords means we have among the worst-performing privately rented building stock in Europe.

As well as facilitating the financing of projects it is essential to provide assistance for local authorities, all of which have had their technical capacity reduced through austerity measures, to develop sound bankable projects – some kind of project development assistance funding is essential.

Net zero is impossible without a clear roadmap, actual policies, regulation and enforcement. Markets and private finance are also essential and there is huge economic value to be created, but you need to take the lead or it won't happen fast enough.

This means you need to learn to say no to those lobbyists in the housing, real estate and energy lobbies who say this is all too difficult and expensive and start listening to the technical and business model innovators and the financial sector who are saying: a) it isn't actually more expensive than 'business as usual'; b) it is an investment opportunity; and c) not doing it is catastrophically expensive. That would be real leadership. Just saying.

But for now, even if you can't actively support local authorities trying to do the right thing, please at least stop making it harder for them. te

Alex Rathmell is managing director of consultancy EnergyPro. This article – which is his personal opinion – was first published on LinkedIn.

Collaboration can reshape our utilities' future

Across the UK's business community, attitudes towards environmental responsibility are changing for the better. Net zero legislation has cast our nation as a global leader in climate action, public awareness is at an all-time high – and both public and private sector organisations are proving keen to play their part. Rethinking utilities consumption will be a crucial part of this change and it's something which many businesses are already prioritising. There will undoubtedly be challenges to overcome as our systems evolve. For example, the new environmental regulations announced in October's Queen's Speech are likely to create additional costs and risks for business consumers. Fortunately, there will also be valuable opportunities out there for organisations that take a proactive role in our decentralised, low carbon energy system. We all stand to benefit if we work together towards change; sharing experience and knowledge to help shape a system that protects both our planet and our industries.

Solutions that support businesses

At Inspired Energy, we have taken important steps forward on our own net-zero journey. The experience we have gained helps us support other businesses who want to do the same. And support is what we are all about; we have been around for almost 20 years now, leading our clients through the changes as the UK's utilities infrastructure transforms away from fossil fuels. During that time, it has become clear to us that no two businesses use utilities in quite the same way. That's why we dedicated ourselves to building the most complete utilities solution available. Through acquisition and investment, we have recruited specialist teams to cover the full array of a business' utilities needs. This is what makes us the UK's leading energy consultant and it means that our clients can use any or all of our electricity, gas and water services to create their own perfect-fit solution. So whether they want to step up energy-efficiency measures, navigate volatile wholesale markets, or take strides towards net-zero, they have the perfect partner for the road that lies ahead.

Here we explain the four elements we have built our services around. They are the key elements we believe businesses should consider when putting together an effective and sustainable utilities strategy.

1. Buy it well

Devising a procurement strategy that suits your business' budget, sustainability goals and risk-appetite can be tricky when markets are volatile. Having real-time oversight of the market is helpful, but the true value comes from combining that oversight with access to utilities experts who can help you interpret market data and guide your buying decisions.

At Inspired Energy, we can scan more of the marketplace than any other TPI, to help businesses secure the contract terms they want at the best possible price. We also have the experience and expertise to help them shape a buying strategy around their unique needs. That might include the need to buy through a framework. It might also include administration or invoice validation across all utilities for multiple sites. As buying and using utilities becomes more complex for many businesses, handing the hassle of procurement over to an expert partner helps to make it all a little easier.

2. Use it better

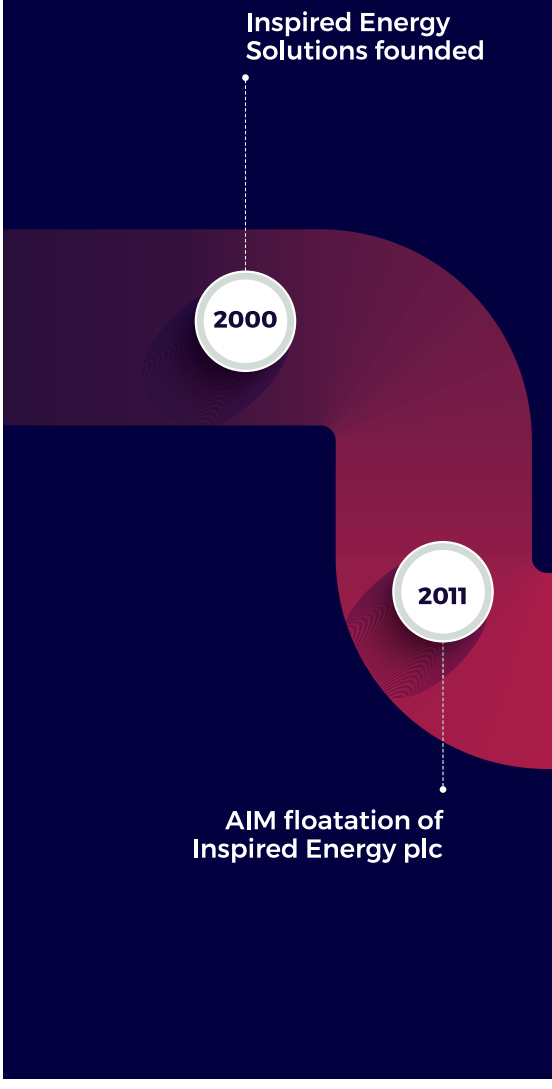
Efficiency and waste reduction can make a big difference to the bottom line, but only if action is meaningful and results are measurable. Many businesses identify efficiency measures but fail to implement them. Some struggle to get executive buy-in due to lack of data. Others take action but have no easy way to monitor success. These and other obstacles can be overcome with the right support and the right technology.

Our intuitive software provides the user-friendly tools and reports to help raise awareness, monitor ROI and drive better utilities use across every level of a business. We have developed this unique technology so that businesses can access the insight they need to cut costs and carbon. And we're always on hand should they need a little extra support using it.

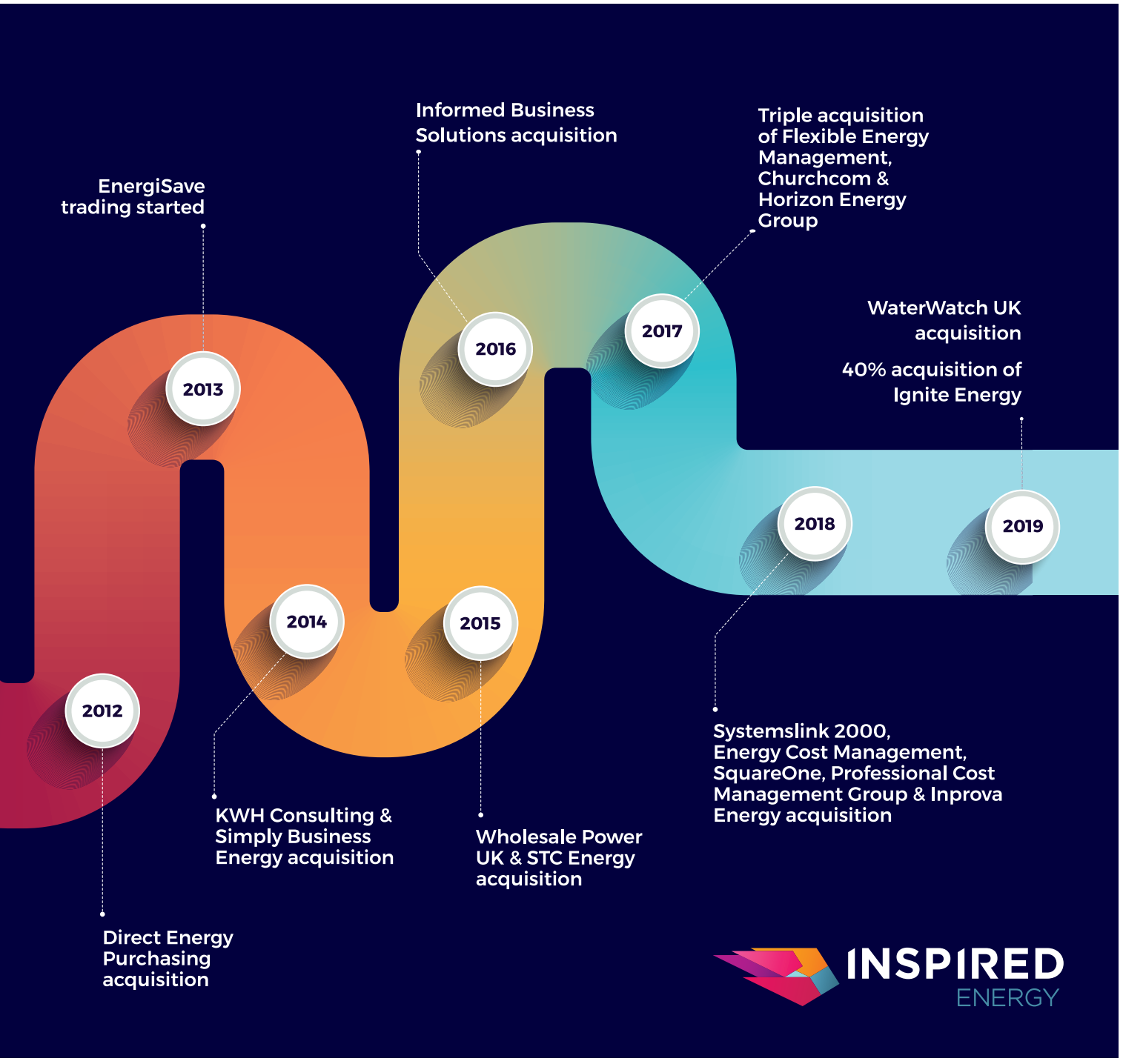
3. Make your own

In an increasingly decentralised system, on-site generation can protect businesses from power outages and rising costs associated with using the grid. Businesses who choose to embark on their own on-site renewable energy project will often have a range of different considerations and significant hurdles to address.

Company Timeline



[1] **Inspired Energy rated number one UK TPI in I&C Index in the independent Cornwall Insight report 2018, https://www.cornwall-insight.com/**



From feasibility studies and securing funding, through to build and management, Inspired Energy works closely with businesses to help them get maximum benefit from making their own energy. Flexible consumption is a brilliant way to unlock the true value of generation assets and this can be done without putting productivity in jeopardy. Navigating all the options, all the way through is easier when you work with an experienced partner.

4. Do it right

As our government maps out the route to net zero through new policy and regulation, businesses will need to give extra attention to compliance. Failing to do so could mean costly penalties or even long-term reputational damage. With compliance and sustainability credentials becoming so crucial to commercial success, businesses can benefit from help to manage their regulatory risk for efficiency and carbon reporting schemes like ESOS and SECR.

At Inspired Energy, we deliver accurate and timely reporting, ensuring that fines are avoided and reputations remain intact. We also understand that compliance activities can be used to support investment in efficiency upgrades to reduce consumption, cost and emissions. Working with an energy specialist is the best way to 'do it right', securing peace of mind and realising maximum value.

Built for you

Our business has been built for clients in all sectors and for businesses just like yours. With our own unique software and carefully selected teams of utilities experts covering everything from procurement and cost management through to innovative R&D, we have got the scale and experience to support you, whatever the future holds. ●

Discover what Inspired Energy could do for your business at inspiredenergy.co.uk/builtforyou

Finding value in a shifting landscape

The Energyst's latest demand-side response market report finds DSR providers are having to adapt to market changes and price declines, but that most providers remain broadly satisfied, writes Tim McManan-Smith

The Energyst's fifth annual report on demand-side response (DSR) provides a snapshot of how end-user organisations are providing DSR and explores how market changes are affecting their strategies.

According to a survey of our readers, the majority of providers remain broadly satisfied that DSR is worth their while. But revenue and confidence have both been eroded by changes to products, new regulations and the year-long suspension of the Capacity Market.

Providers with the ability to adapt, hope that new markets and product revisions will fill the revenue gap.

Some are installing the necessary measures to move from defunct services, such as frequency control by demand management (FCDM), into new products, such as weekly low-frequency static response auctions. Others believe that wider access to the Balancing Mechanism – a £1.1bn gross market – could afford greater opportunities in 2020.

Two distribution network operators have also successfully procured flexibility. While the market is nascent and limited to specific postcodes, there is hope that if DNOs can coordinate and signpost long-term requirements, distribution-level flexibility could provide additional value for those with assets in the right place at the right time. At the same time it could help reduce the cost of the reinforcement required to hit net zero.

The report also reveals that organisations that do not provide DSR have the appetite to do so – if it does not disrupt their operations.

National Grid ESO has stated in its 'Power Responsive' campaign that it will increasingly focus on SMEs and, ultimately, domestic customers. Interviews with operators of hundreds of relatively small sites – such as Marston's and Pizza Hut – suggest there is some potential and appetite for flexibility, if it can be unlocked at low cost. Otherwise, they will continue to focus on energy interventions that deliver higher, more predictable returns.

The report also suggests that interest in battery storage is riding out an apparent cooling in the market over the past two years due to price cannibalisation and regulatory uncertainty.

It is regulatory uncertainty that may be the biggest barrier to growing the market. Fundamentally, there is not yet a consistent long-term signal for flexibility and Ofgem has removed some of the existing signals, especially with its action on Triad. What is more, the products for buying and selling flexibility remain separate, each with its own rules and requirements and some existing barely long enough to set up the necessary administration.

With incentives, business interest may yet be converted into useful flexibility. But that requires consistency, both in long-term price signals and the steps required to react to them. te

Download the 2019 DSR report at **theenergyst.com/DSR**

Key DSR survey findings

For the '*DSR: Shifting value*' report, *The Energyst* surveyed companies that provide DSR and those that do not – including water companies, retailers, large industrial firms, transport companies and universities. Below are key findings:

Among DSR providers:

- Six in 10 could offer more flex without affecting business
- Insufficient rewards and revenue uncertainty main reasons for not doing so
- Triad avoidance is the most popular activity, then frequency services and CM
- Eight in 10 providers would consider 15-year CM contracts (caveats apply)
- Four in 10 still use diesel back-up BTM for DSR/peak charge avoidance
- Six in 10 satisfied with DSR overall, down from almost nine in 10 in 2016

Among non-DSR providers:

- Almost nine in 10 interested in providing DSR ... if no disruption
- Most have some form of onsite generation, solar most popular
- Two thirds not yet approached by service providers re: DSR

We also carried out in-depth interviews with DSR providers, some of which are published over the next 10 pages.

> ***The majority of providers remain broadly satisfied that DSR is worth their while. But revenue and confidence have both been eroded by changes to products, new regulations and the year-long suspension of the Capacity Market***

Value erosion forces rethink

Simec Energy's Steve Edwards believes the Balancing Mechanism now represents the best bet for flexibility, as frequency response and Capacity Market values have declined

The Balancing Market may be better suited to industrial loads, but FFR and CM values have taken a hit

Steve Edwards oversees a significant energy flexibility operation at Simec Energy and supply firm Marble Power, which form part of a wider group of industrial companies within the GFG Alliance

The company is active in the Capacity Market (CM) and Balancing Mechanism (BM). It also delivers ancillary services through DSR, though Edwards believes "the value in dynamic response has declined precipitously for new assets" and the testing regime effectively "locks out new loads unless they are some form of generation or battery".

He explains: "The testing requirements demand a very linear response, which is hard to achieve with inertial loads. You can do it in aggregate, but not as a standalone asset. That makes it very hard to qualify, and the level of technical support required absorbs a lot of site engineering time. It took a year to implement – and over that year the value fell away completely; frustratingly that decline seems to have surprised aggregators as much as it did industrial participants."

Informing management that anticipated returns will be a fraction of business case projections never goes down well, says Edwards. As such, Simec "would struggle to expand existing ancillary services without a stable and attractive level of value and a longer-term view from ESO".

Despite some progress on that front as National Grid works to redesign its services, Edwards says he is "not minded to go back into battle for Dynamic Frequency Response any time soon".

The Capacity Market

Suspension aside, Edwards says Simec is keen to continue participating in the Capacity Market. Having suffered rejections for "minor paperwork issues", he says the administrative regime seems "over-sensitive" when compared with commercial norms. "So we buy into the CM, the value picture – but we just discount it heavily because cannot rely on the paperwork being accepted," says Edwards. "We know our kit will respond, but that doesn't seem to be as important as process compliance."

However, he says the development of secondary trading "has been a big positive and has helped re-invigorate interest".

> ***The level of technical support required absorbs a lot of site engineering time. It took a year to implement – and over that year the value fell away completely***
> **Steve Edwards, Simec Energy**

The Balancing Mechanism

Edwards says the Balancing Mechanism now represents a more attractive route for its flexibility: "Its value will also change over time, but it is transparent. You can look back 10 years and see what bids and prices have done and build a clearer picture. That helps an awful lot to persuade people it is worth doing. There is enough value and it has been around for a significant time, so we feel less exposed to sudden changes in the market."

He adds that the BM is sometimes better suited to industrial loads "because a straight turn-up/turn-down for 30 minutes is easier to track than constant adjustment".

Meanwhile, transparency on bids and offers makes it "easy to check on performance in a way which ancillary services data doesn't allow". te

Change management: the going got tougher

Aggregate Industries has been delivering flexibility for many years, and is adapting to the shifting landscape. But the past 12 months have presented numerous challenges, says energy manager Richard Eaton

Aggregate Industries participates in three DSR programmes "and all three have changed this year", says energy manager Richard Eaton.

"Running to stand still," he says, is a fair description of DSR provision in 2019.

Life after FCDM

"One cement plant was in FCDM [frequency control by demand management]; our Northern Ireland cement plant was in the Capacity Market and we have an FFR contract covering 40-plus of our asphalt plants."

With FCDM now closed, Aggregate Industries spent the summer preparing its Staffordshire cement plant for National Grid ESO's low frequency static response trial, where services are procured on a weekly basis.

That two-year trial kicked off in June. Eaton expresses frustration that the closure of FCDM – in terms of exact timings – was communicated so late by National Grid, leaving the cement plant effectively providing no response for a couple of months.

"We've tried to minimise that downtime, but the low static frequency response service and FCDM are not mirror schemes, they require new relays and metering at the plant," says Eaton. "So being told [after the fact] by our aggregator that our FCDM contract came to an end on 14 June was not ideal."

Nevertheless, he says the plant is committed to carrying on providing frequency services – as it had done for 15 years via FCDM.

"Because we had an FCDM contract since 2004, providing DSR is almost treated as business as usual," says Eaton.

"We do not have to win over senior management [to provide

> ***"It is going to become complicated. As an energy manager with 300 sites, I just don't have the time to trawl DNO websites for each separate flexibility programme...We need aggregators to hold our hands through this"***

the new service], more a case of making them aware of how it varies and the works required."

FFR and RBR

Eaton says the trial with Open Energi and Ørsted, to provide both frequency response and help the wind generator and supplier to balance its position via its Renewables Balancing Reserve (RBR) product, has been a success – albeit tempered by market developments.

"It has brought in more revenue to the business than we would have achieved from FFR alone, but that is against the backdrop of falling FFR prices," says Eaton. "So while it has been successful, compared to last year it looks a very negative picture in financial terms."

The 10-site trial came to an end in April. Eaton hopes to expand it across the asphalt business – about another 30 sites. However, Eaton says "discussions are ongoing due to falling returns and the fact we have to make financial investment to upgrade the sites".

The looming uncertainty posed by Brexit compounds that challenge, says Eaton, though he is "hopeful it's more of a timing issue" rather than scrapping the rollout.

The Capacity Market

The 77p/kW clearing price in the June T-1 auction "now makes the previous year look very attractive," says Eaton. While 77p is peanuts, Aggregate Industries will "continue to consider the CM for our cement plant, just because of the nature of their operations", says Eaton.

"They operate 24/7 with a constantly manned control room, so they are geared up to deliver as and when required."

However, unless outturn prices climb "significantly", he says Aggregate Industries is highly unlikely to enter other operations into the CM.

"We would need to see a big increase in rates to consider assets like quarries. They are not 24/7 and the CM requires a lot of manual response, testing, stress events, the call to curtail, that is still quite manual – whereas our cement plants are very automated."

The BM and DNO flex

Aggregate Industries is in discussions with all three of its aggregators around wholesale market arbitrage and Balancing Mechanism opportunities for its cement plants.

"That is phase two: once we have settled into the static frequency programme in Staffordshire, we will also look at the BM," says Eaton.

The firm is also considering making its flexibility available to distribution network operators. However, to date, it has not had the right assets in the right locations for the services being procured.

Incoming complexity

Given DSR providers must increasingly sell flexibility to multiple parties, Eaton says large, multisite organisations will be heavily reliant on aggregators to make them aware of opportunities.

"It is going to become complicated. As an energy manager with 300 sites, I just don't have the time to trawl DNO websites for each separate flexibility programme," he says. "We need aggregators to hold our hands through this – hence the importance of a good relationship with an aggregator you can trust."

Positive outlook?

The aggregator code of conduct, developed by The ADE, is one positive aspect of the year to date, says Eaton, who is part of the committee running the Flex Assure scheme.

However, he says the negative aspect of so much change within DSR is that it eats bandwidth, limiting the time energy managers can spend improving other areas of the business.

> *It can seem like a lot of effort, and quite a frustrating place to be sometimes, but ultimately, this is what we asked for – and we just need to plough through with making these adjustments*

"We all wanted these changes [to balancing services], we all said we needed simplification of the products from National Grid – and now we are having to live through it," says Eaton.

"I guess you have to be careful what you wish for. [National Grid ESO] is opening up programmes to end users like us, but I don't think there is anything else they need to change," he says.

"It can seem like a lot of effort, and quite a frustrating place to be sometimes, but ultimately, this is what we asked for – and we just need to plough through with making these adjustments." te

Eaton hopes to expand on its trial to provide frequency response across its asphalt business

Local flex: building market confidence

UK Power Networks is committed to considering flexibility over reinforcement, but says building a fluid, functioning market is not easy

UK Power Networks has begun procuring flexibility to manage winter peak type constraints. But head of smart grid development, Sotiris Georgiopoulos, says flex will ultimately provide multiple services – from helping to deliver decarbonisation to "restoring supplies when the lights go out".

"Flexibility is important because the power system is changing. It enables consumers to support the grid and deliver carbon, financial and security benefits to enable a smart, flexible system at lowest cost," he says.

There is 9GW of generation and storage installed on UKPN's network "and we can see there is more coming", says Georgiopoulos. "Electrification of transport, and potential electrification of heat, will drive significant demand on the network. Flexibility is required to deliver the capacity we will need at lowest cost – and that has driven our flexibility programme."

Hurdles to clear

To date, UKPN has procured 18MW for delivery over the next two winters. Georgiopoulos says it is a start – and that networks are working to build a flexibility market – but it will not happen overnight.

"New markets are always challenging. They require a lot of work with participants. From a UKPN perspective, the key is to provide long-term certainty, to make clear that this is not a pilot, we are not just testing the waters."

18MW

The flexibility UKPN has procured for delivery over the next two winters

In that regard, he says UKPN is "investing in people and systems and developing the market by consistently providing a view of system needs ... and working with customers, aggregators and community schemes to understand what it will take for them to participate".

Georgiopoulos says UKPN is attempting to provide: certainty by publishing a five-year roadmap and offering contract lengths of up to four years; consistency by moving to two tenders a year; simplicity through a digital procurement process.

He says DNOs are also working to standardise procurement processes, with efforts via the Energy Networks Association's Open Networks project likely to deliver improvements "within the next six to 12 months".

Traditional reinforcement?

If networks do not find the flexibility they require where it is needed, the alternative is traditional reinforcement. "However, there is work still to be done to develop the flexibility offering, engage with customers, remove the barriers before we get to that point," says Georgiopoulos.

"We start the process to enable flexibility in two years' time, not tomorrow. We are not there yet and the market is not there yet. So we have to stimulate the market long term to facilitate short-term liquidity when we need it," he says. "We have at least a few chances to go to market for flex before we resort to a reinforcement solution."

While UKPN does not currently plan to "knock on doors" to directly engage with consumers, it is working with aggregators to ensure that operators of the 9GW connected to its network are aware of the opportunity, says Georgiopoulos.

"We have to ensure that we mobilise all the different market segments that could deliver."

Rewarding decarbonisation

While praising DNOs that have set out a long-term roadmap and a commitment to flexibility, some aggregators have questioned whether there is currently sufficient value on offer from DNO schemes to fully mobilise potential providers. Others suggest a need to stack non-energy benefits to build viable business cases.

In that regard, Georgiopoulos says Ofgem's recent open letter acknowledging that it will consider rewarding DNOs for outputs linked to decarbonisation and broader societal benefits in the next price control "is very encouraging".

"In the context of Net Zero, that is a way to enable some of the non-energy values to be captured within the regulatory framework," says Georgiopoulos. "It is important for industry to deliver [decarbonisation] but also important for Ofgem and Beis to ensure these topics are fully integrated into frameworks that reflect how companies are incentivised and funded." te

> *We have to stimulate the market long term to facilitate short-term liquidity when we need it*

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*I&C volumes, Cornwall Insight, April 2019

PUTTING ENERGY TO WORK

Tapping into revenue streams

Severn Trent Water has engaged in DSR via two aggregators for the past three years. Now it plans to ramp up its activity – and harness the knowledge to inform battery storage investment

Demand-side response manager Rob Wild says Seven Trent Water has approximately 15MW of connected flexibility. About 10MW is generation-based, the remainder load from its treatment processes. Wild thinks there is potential for up to 50MW of flexibility across the estate. Severn Trent's involvement has largely been STOR, the Capacity Market and FFR, but it is eyeing the wholesale market and Balancing Mechanism as value continues to shift.

Overall, Wild says DSR has worked well. "Payback is around three years, which is currently one of the best business cases within the organisation," he says.

"From a technical risk perspective and operationally, we have not had any concerns," says Wild, which has increased management confidence to invest further in flexibility.

"Handing over control to a third party was quite a big deal," he says, adding that the key to assuaging concern was engaging all stakeholders from the outset.

"The first time we looked at DSR, we put a team together representing all stakeholder groups – particularly the tech and standards team, given we are a standards-heavy industry," he explains.

"They were involved all the way down to choosing which aggregators to work with. We did a full procurement exercise, which may seem over the top, but it meant we could give stakeholders confidence," says Wild.

"If I was starting from scratch [in bringing DSR into a business], that would be a key message: Involve stakeholders all the way, and bring in the right resources – that can be expensive, but if you build it into the business case, you can do it."

Better data, lower bills

Wild says going through the DSR process and connecting up assets has led to a greater understanding of their performance: "It gives you more granular operational data, which has led us to realise that we have good amounts of headroom within processes. That is deliberate, but is has allowed us to get into the nitty gritty and work out if processes are truly optimised from a performance and energy efficiency perspective, which, for a company like us that uses £100m of power, is always going to be worth more than DSR."

Market Insight

Severn Trent will also use the knowledge it is building of flexibility markets to shape future investments.

"It means we can have more informed conversations and it's also applicable to other activities, such as storage," says Wild. "It is unlikely that we are not going to be operating dedicated storage in the future, so it is really important to understand the economic case."

Building confidence

Wild says there is still much to learn, but the knowledge acquired to date feeds into Severn Trent's wider environmental programme.

"This year, we've found top-down support on this. We have committed to the triple pledge of net zero carbon, 100% renewables by 2030 and 100% EVs where the vehicles exist, so the work we have done on DSR plays into that quite well," says Wild.

Life after diesel

The possible exception to that is diesel, which Severn Trent has been running in some DSR programmes via back-up generators.

To comply with the Medium Combustion Plant Directive, the company is fitting abatement technology (SCR), though Wild says the biggest challenge is "interpreting the legislation ... there is not a huge amount of upfront guidance." He says from a "practical perspective, the Capacity Market [contract] pays for MCPD compliance", though the cost of abatement rules out smaller engines.

Ultimately, the company is looking at technologies that could replace diesel for standby generation. "I am really interested in hydrogen as a storage vector, because we potentially have it available as part of the treatment process," says Wild.

To discover options for new storage, generation and flexibility opportunities, Severn Trent ran a 'soft market test' during the summer. It also asked for feedback on its procurement process with a view to enabling smaller companies to provide solutions. Wild says the plan is to use the feedback to go to market "in the near future for batteries, storage and aggregation services". te

Preparing for flex when value emerges

Premier Inn is trialling battery storage at the Gyle Hotel in Edinburgh. But energy manager Ross Greenhalgh says there are other energy opportunities ahead of flexibility that deliver better, less risky returns

Premier Inn has installed a 100kW/200kWh lithium-ion battery at an Edinburgh hotel in a bid to work out how battery storage could help cut costs and optimise its load profile.

The trial is an attempt to prepare for "life after energy efficiency", says energy manager Ross Greenhalgh.

"In terms of capital interventions we can make to reduce consumption, there will come a saturation point. So the trial is a look to the future as to how we can manage risk of increasing costs."

The plan is to avoid peak costs and provide frequency services with the battery, but for now, there are no plans to invest in more storage.

"It's working fine, it is not causing any problems at the site, it is replicable – we've ticked all of those boxes," says Greenhalgh. "But at the moment it affords lower returns than other interventions. When those higher returns have all gone, then we will have another look [at storage]."

However, Premier Inn is looking at other ways of making its estate more flexible. It is currently running a "data scraping" exercise, pulling together BMS data on its connected air conditioning systems to determine whether the buildings themselves can become a storage system. However, Greenhalgh says it is early days with "a lot of data analysis still to do".

> *The charging reviews are sending a confusing message about the value of flexibility and where that sits*
> **Ross Greenhalgh, Premier Inn**

Solar before flex

Premier Inn has 3MW of solar across some 200 roofs. Despite the removal of subsidies, Greenhalgh says it intends to install solar on all viable sites within its 800-strong estate.

He adds that the removal of the Feed-in Tariff may actually be helpful, as it also removes complications in expanding sites with existing PV installations tied to a subsidy.

"We have a number of sites where installations were not as big as they could have been [due to Feed-in Tariff bandings]. So we have prime sites with relatively small arrays. Now we can revisit and fill in all the gaps," he says.

Premier Inn's procurement department is also working to find a single partner to provide charging infrastructure across its estate.

"We are a hotel company, not an EV charging company, so our preference is for a fully funded third party service. We want EV infrastructure on our sites, because it is a great thing for our guests, but we do not plan to own or operate it."

He adds that as charging requirements increase, "it's important to partner with an organisation that has a vested interested in ensuring tech is updated when required".

But despite its push to increase onsite generation and acknowledgement that storage may ultimately be required to cut costs, Greenhalgh says there is currently no appetite for bundled EV-storage-generation packages.

"Lots of people are trying to bundle things, but it doesn't really fit with our strategy. I'm sure people can create suitable contracts but ... that is a very complicated way of doing things."

Flex provider in five years?

Asked if Premier Inn will be providing significant amounts of flexibility in five years' time, Greenhalgh is circumspect.

"It depends on how that cookie crumbles. There is a lot of uncertainty. The charging reviews are sending a confusing message about the value of flexibility and where that sits, behind or in front of the meter," he says. Nevertheless, he believes that "flexibility will always have a value".

"We can see with the rise of electric vehicles that the requirement for flexibility will increase. In theory, the value of flexibility should also increase." te

Flexibility: room for a bigger slice?

Restaurant chain reveals that it has an appetite for flex... but only if the price is right

Pizza Hut would like to invest in greater flexibility and load shifting capability, but given the relatively small store footprints and consumption, the cost benefit does not currently stack up, according to property director Raefe Watkin-Rees.

He says traditional energy efficiency investments have taken precedence at the company's circa 250 UK restaurants.

Over the past 10 years it has invested in 100% half hourly metering capability for electricity meters, analysing the resulting data to benchmark, spot problem areas and reduce bills.

The company also "ripped out a lot of gas kit and replaced with electric units". The programme "very quickly removed 20-30% of gas usage and over time, electricity consumption dropped 5%", says Watkin-Rees.

"That sounds small, but given the gas to electric switch, we have probably cut electricity consumption as much as 20% in real terms."

With an eye on potential load shifting and further demand reduction, Pizza Hut is now working out whether it can link up systems across the estate.

The company has installed building management systems at around 100 stores, where cost benefit stacks up, but hopes to find a 'BMS lite' solution for the remaining 150 outlets.

If it can find an affordable solution that enables remote control of fridges, aircon and kitchen equipment, there is potential for simple demand-management and flexibility, says Watkin-Rees.

But the barrier is cost, with potential rewards dampened by its previous investments in energy efficiency.

On average, each restaurant spends around £25k/annum on electricity. "That's a lot of money, but it's not big enough to enable investment in [flexibility] technologies," says Watkin-Rees.

"The cost of technology is probably the same if you are using 200MWh/year or 2GWh. So that is the challenge for industry – to find a simple plug and play solution." te

> ***"The cost of technology is probably the same if you are using 200MWh/year or 2GWh. So that is the challenge for industry***

Can anyone unlock DSR for small beer?

Brewer thinks it 400 sites with connected building management systems could provide useful flexibility – if a low-cost solution can be found

Marston's, an independent brewery and pub retailing business, has trialled peak charge avoidance and DSR at its breweries, but with limited success, as only a small amount of equipment was suitable, according to energy manager Chris White.

Theoretically, he thinks there is potential for several megawatts across its pub and hotels estate, particularly the 400 or so sites with building management systems that allow remote control of assets.

"The challenge is finding somebody with an appetite to do it," says White. "Most of the BMS are Trend systems with Modbus metering, sub metered down to circuit level or individual bits of kit in some circumstances. This poses technical challenges. A lot of the companies we have spoken with [regarding DSR] want bigger single assets, because it is easier for them to manage."

White says, given the size of Marston's estate, and relatively flexible heating and cooling loads, if a low-cost solution emerged that enabled its connected BMS to provide DSR, there would definitely be "an appetite to do it". te

Flexibility 'the key to net zero'

Flexibility should be framed as a key component in delivering net zero, says Vincent de Rul, director of energy solutions at EDF Energy

Electric vehicles and vehicle-to-grid will start to become vital sources of flexibility

"If you are a provider of flexibility, there is significant cost reduction and revenue potential. But the wider picture is the contribution of flexibility to the low carbon economy – and that it is a critical situation," comments de Rul.

He believes that message should be emphasised by all parties: "By businesses, by government, by regulator," says de Rul, "there is much more to be done."

He cites progress on single use plastic by way of example. "That is changing because people feel uncomfortable. So regulations are changing, businesses are changing, supply chains are changing – and that is all driven by public sentiment. If we can harness that with flexibility, it would definitely increase uptake."

Non-energy benefits

De Rul believes valuing and stacking non-energy benefits would help in that regard. "We need to be able to put numbers on carbon benefits, on air quality and health benefits – and be able to monitor performance," he suggests.

"Also, to be able to quantify the impacts of not [bringing forward flexibility]. Then the business case becomes much more interesting."

Risk versus reward

For now, de Rul says perception of risk versus reward remains a key challenge in signing up new flex providers. Falling prices in some contracted products have impacted the business case, but de Rul says DSR remains attractive for those that can access all available income streams.

"Where is the value? There is no one scheme you can rely on. You need to have access to the capacity market, frequency response, Triad, the balancing mechanism and wholesale markets – because there is a degree of uncertainty attached to all of them," he says.

"So you need to stack all the revenue streams – and have the agility to adapt to change – which our PowerShift platform enables while leaving users in control of their assets."

Certainty and support

While further change is inevitable in an evolving system, de Rul says some certainty – or at least better visibility – would bring forward more flexibility.

"A long-term vision would help address some market challenges. Triad has been a good stepping-stone into DSR but it is disappearing. Frequency response is becoming a more merchant product. The CM offers relatively small value.

"There is little clarity around when Ofgem's Targeted Charging Review (TCR) will become what it will be," says de Rul.

To try and rebuild investor confidence, he suggests policymakers and regulators outline a long-term vision in which flexibility is a cornerstone of a decarbonised system.

> *Perhaps it is better to do something that is not perfect, but is in place, is relevant and keeps people on the hook*

"We recognise that it is complex; there are a lot of involved parties and it is not easy to find a perfect solution. But perhaps it is better to do something that is not perfect, but is in place, is relevant and keeps people on the hook," says de Rul.

"It is important [for businesses and investors] to understand what we believe needs to happen, will happen."

Targeted support may demonstrate commitment to flexibility, de Rul suggests, but would require careful design to avoid backfiring.

"Incentives can be a good thing; incentives drove solar capacity and in doing so reduced the capital costs of the technology. But they are not always the answer, because if they are not designed in the right way, you lose the value and the understanding," he says.

"And incentive is by definition a short-term instrument, a transitory intervention; when it ends, if there is not a proper transition, that can cause a lot of business issues."

Next steps

De Rul believes electric vehicles and vehicle-to-grid will start to become "vital" sources of flexibility within the next few years. After gaining experience with EVs as aggregated small assets, EDF Energy aims to bring households into flexibility.

In the meantime, he says it is vital to breed confidence in the industrial, commercial and mid-markets. One factor is to keep building case studies that demonstrate operational risk is minimal, the other is to help mitigate price risk for businesses. De Rul points to the multi-year floor price it has agreed with Anesco at its co-located Clayhill Farm solar-storage facility as an example.

"That is a very strong proposition," says de Rul, suggesting that EDF Energy may roll out the model more broadly – potentially to even the SME and mid-markets. te

Understand your flex, then optimise it

Flexibility is the most valuable resource a business has at its disposal, Eric Bakken, strategic energy solutions manager at Enel X, tells The Energyst

In a shifting market, there is one constant when it comes to flexibility, says Eric Bakken, strategic energy solutions manager at Enel X

"The most valuable aspect is really understanding the flexibility within your business and optimising as much as you can behind the meter," he suggests.

However, when it comes to optimising, Bakken notes that auxiliary market revenue – a main driver of participation – has become far less predictable.

"A couple of years ago, you could project £x value from the capacity market, £x from Triad avoidance and £x per MW from whatever contracted programme you were participating in."

Now, he says that picture is much harder to predict, "especially three years ahead, when Triad is likely to shift to another mechanism".

Sustainability goals

Bakken says the broader focus on sustainability, driven by the UK's commitment to net zero, is an opportunity to wrap flexibility into a broader energy plan – and where the company is gaining traction.

"When we can connect flexibility with other business goals – energy efficiency, sustainability, cost reduction – we see much wider interest from leadership teams. So there remains strong interest in flexibility, but as part of an overall energy and sustainability strategy."

Bakken thinks that may be the future of flexibility.

"Flex is often a difficult road to go down if you have tunnel vision about what it could be. If you are looking at a 5-10 year energy plan that involves swapping out ageing kit, or installing new technology – solar PV, plus storage and/or electric vehicles – flex needs to be part of that conversation to ensure you are capturing the value," he says.

However, Bakken admits that the greater the number of moving parts, the more complex it can become.

"If you started out looking at a very simple question of how do we get more EV charging for our fleet or customers and all of a sudden you are looking at storage or generation assets and market mechanisms for selling energy back to the grid, that misses the mark of where that conversation began."

Bakken thinks one solution is to provide smart-ready EV charging infrastructure to enable flexibility and value, "when businesses are ready for it".

Incentives for DSR?

He believes there could be scope to unlock 'load' forms of DSR – and room for mechanisms that recognise its value as 'greener' than behind the meter generation.

"I'm not sure 'incentive' is the right term, but if we are looking at what we want to achieve for the grid in terms of net zero, perhaps a separate pricing structure for 'pure' curtailment is necessary," Bakken suggests.

"In the US, pure curtailment has different pricing to short-term generation – that is a fairly common model. Curtailment is a very green way of delivering flexibility, but it is not as reliable as turning on a generator or battery, because there are production and other economic issues to consider [for providers]."

> *If we are looking at what we want to achieve for the grid in terms of net zero, perhaps a separate pricing structure for 'pure' curtailment is necessary*

Prioritise curtailment?

However, Bakken agrees that any incentives for flexibility to help balance renewables must be carefully considered.

"What we don't want is to structure something that is not sustainable, that might achieve one aspect of what we are trying to fix for the grid, but that ultimately moves us away from the goal of a net zero society," he says. "If that is the goal, structuring the rules around how you price different technologies [might be more suitable than a subsidy]. So in my mind, curtailment should be valued above generation flexibility."

Regardless of incentives or environmental pricing, Bakken suggests providing "some longevity ... would really help. Because after a while, if the opportunities remain short-term and unpredictable, the juice may not be worth the squeeze". te

THOUGHT LEADERSHIP

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MODERNISING ENERGY GOVERNANCE

The energy industry's rules (the Codes) have been widely criticised as reactive, complex, and lacking co-ordination – in short, they are outdated and need to catch up. Action is needed to enable increased competition, facilitate innovation and, ultimately, drive better consumer outcomes.

Over the last two years Gemserv has been on a journey to explore the changes required to help the energy industry's transformation. We have consulted widely with industry, held 'innovation forums' and set out our thoughts in a series of thought-leadership papers.

Through our ongoing engagement, we have developed a digitalisation strategy that includes tools which will streamline the energy industry and improve the experience for the customer. Our Target Operating Model looks forward to a future where a 'digital toolkit' will give users easier access to the codes, the ability to request modifications and the ability to risk assess new market entrants, to name a few.

But digital transformation is not linear. We do not need to develop a perfect strategy before we can begin to deliver digital services. Instead, iterative release cycles which follow a "fail fast, learn faster" approach, will promote industry involvement throughout in a continuous process where behaviour change and technology change reinforce each other.

In a digitalised world, solutions can be tested with users quickly by running services in parallel, road-testing new solutions alongside existing services. Iteration helps in testing innovative design concepts, for example prototyping automation, machine learning and AI solutions.

A clear strategy is needed from BEIS and Ofgem to provide clarity for market administrators (such as delegated responsibilities and objectives for code managers) helping to ensure collective efforts towards common market goals.

A new industry self-governance framework should be created to align with this strategic direction, to be faster and more adaptable to address future market change.

We should see the codes as data and a family of applications and focus on how users want to interact with it. The focus is on web design and architecture, centred on open standards, application programming interfaces and cloud-based services. A Market Portal could create smart links to other market web-based services with easy-to-use dashboards and market interactive responsive services.

Our consultations and feedback from our thought leadership papers suggest we can take the first steps now and Gemserv, working with the Smart Energy Code (SEC), has taken the initiative to digitalise the SEC (see below).

It is the first step in modernising industry governance and to view a demo or to find out more please contact Gemserv.

@ Read more on Gemserv's view of the future at gemserv.com/modernising-energy-governance-a-golden-opportunity/

MESSAGE TO ENERGYST READERS

Dear Energyst reader

It may seem that the codes that govern the energy industry only concern industry insiders and the regulatory departments of major energy companies. That may have been true in the past - but it has to change. If the rules are too complex, too fragmented and too hard to change, it makes evolution of the industry impossible. Gemserv is one of the industry's code administrators and it is exploring ways to open up codes for users, aggregators, disrupters and all those who want to see the industry evolve.

One step is a series of thought leadership papers produced with Energyst's sister publication New Power Report.

Another is this first digitised code – the Smart Energy Code. To find out more please contact Gemserv and they can provide a demo or talk you through the solution.

Janet Wood, Editor, New Power Report

JOIN THE DEVELOPMENT LOOP

Gemserv is responding to calls from regulators and industry to update working practices on codes and make them easier to understand with CodeWorks.

We have digitised the Smart Energy Code, the multi-party agreement that sits at the heart of the smart metering rollout. Instead of reading more than 2000 pages of text, CodeWorks users can interact with code documentation, filter for information that is specifically relevant to them and access previous versions of the Code complete with all reasons behind the changes made. This will save time for businesses and regulatory teams, as well as making the Code easier to understand.

To find out more or to get a demo of CodeWorks to see if it may benefit your business, please contact us and we can provide you with a demo or a walkthrough of the tool.

Advances in batteries to deliver climate change goals

A new report commissioned by the Global Battery Alliance claims that battery technologies could cut global power and transport emissions by a third

With the right conditions in place, batteries could enable a major shift to bring transportation and power to greenhouse gas neutrality by coupling both sectors for the first time in history and transforming renewable energy from an alternative source to a reliable base. Advances in the production, use and reuse of batteries mean that the technology could become the most significant intervention to keep global warming within the limits set by the Paris Agreement on climate change between now and 2030.

According to a report commissioned by the Global Battery Alliance, a public-private partnership led by the World Economic Forum, batteries could enable a 30% reduction in carbon emissions in both the transport and power sectors. These two sectors alone collectively account for 40% of all greenhouse gas emissions today.

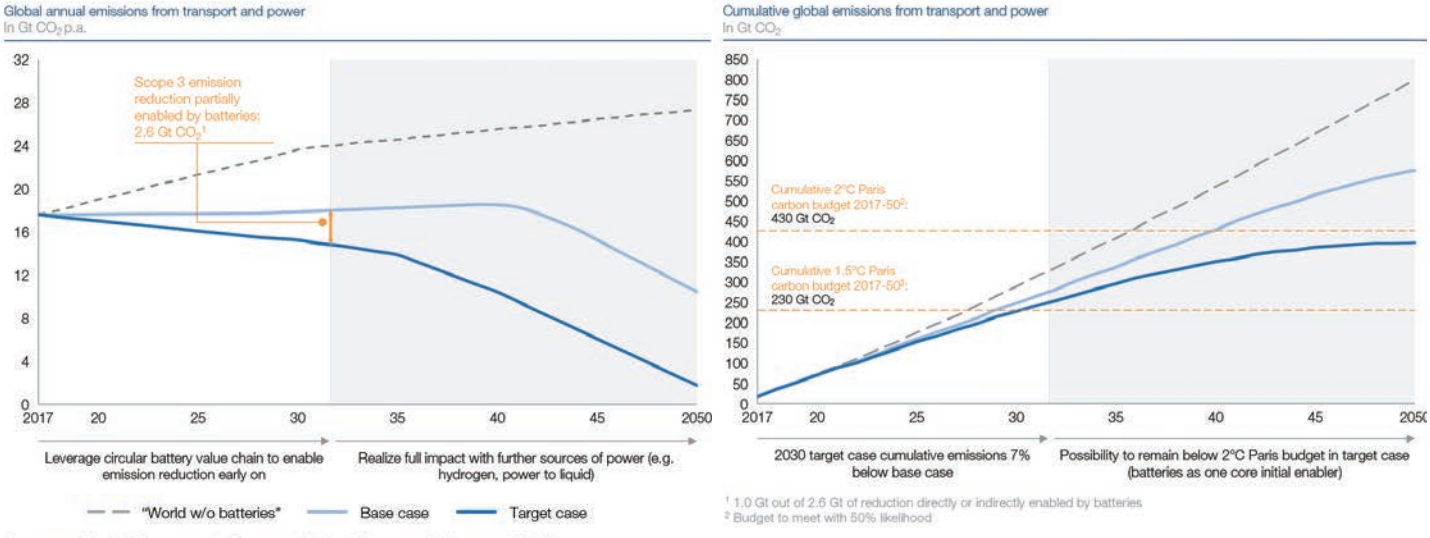
Such a reduction in emissions would help keep the world within its 2°C Paris Agreement goal. It requires immediate action along the battery value chain alongside investments in other technologies such as hydrogen and in other industries. This would also contribute to achieving the more ambitious 1.5° goal of the Paris Agreement.

In addition to examining the role batteries could play in helping to tackle climate change, the report finds that wider economic and societal benefits could also be accrued from systemically investing in the entire battery value chain from mining to reuse or recycling.

In terms of employment, 10 million high-quality jobs would be created. More than half of these would be in emerging economies. Additionally, 600 million people would be provided with electricity for the first time. This would close the world's existing energy access gap by 70%.

"Reducing the world's carbon footprint is the defining challenge of the 21st century. For the next 10 years, modern batteries that are powering the fourth industrial revolution represent

Figure 1: Batteries could help to ensure that greenhouse gas emissions stay below the 2°C Paris carbon budget in 2050



Source: World Economic Forum, Global Battery Alliance; McKinsey analysis, IEA, 2018b; IPCC, 2018

the greatest prospect for reducing atmospheric pollution from many of our most energy intensive economic activities," said Dominic Waughray, head of the Platform for Global Public Goods and managing director at the World Economic Forum.

Scaling up responsibly

Achieving the scale to make these goals achievable requires considerable change, the report finds. Firstly, today's global battery value chain would have to expand 19 times the size it is today. This would require $550bn of cumulative investments along the entirety of the value chain over the next 10 years, along with a set of targeted interventions. These could for example increase the productivity with which batteries are used, lower effective battery costs and cut greenhouse gas emissions along the battery value chain by close to 50% putting it on track to achieving net-zero emissions in 2050.

"We need to develop a sustainable, circular and low carbon value chain for batteries to contribute to the implementation of the 2015 Paris Climate Agreement and to reach the UN Sustainable Development Goals.

"But this task can only be achieved by effective cooperation between businesses, international organisations, governments and civil society," said Martin Brudermüller, chairman of the board of executive directors of BASF and co-chair of the Global Battery Alliance.

Secondly, it would necessitate a huge expansion in mining: annual extraction of minerals by 2030 would weigh more than 300 Great Pyramids of Giza. Some 120 additional battery state-of-the-art factories would also need to be operational to meet required demand.

Most importantly, a structural shift would be required to make batteries sustainable from an environmental and human perspective. This includes making sure the entire value chain is 'circular', whereby batteries are reused, repurposed or recycled at the end of their life cycle or simply used more efficiently.

The report points out that, by integrating EVs into electricity grids, they can create additional revenue streams for vehicle owners. Therefore, the business case for electric mobility becomes stronger, driving uptake and, in turn, accelerating economies of scale in the industry and higher utilisation of infrastructure.

In addition, by providing de facto additional energy storage capacity to power grids, EVs allow for higher integration of intermittent renewable energy into the grid, effectively reducing the need for storage, and driving down overall system costs and emissions in the power sector.

The report concludes that integrating battery-powered vehicles into the electricity grid at scale could cover 65% of demand for stationary battery storage and enable a higher renewable energy share in power grids globally.

Moreover, in 2030 recycling could provide 13% of global demand for cobalt, 5% of nickel and 9% of lithium. These shares are expected to grow as the volume of batteries reaching their end of life surge after 2030.

Commenting on the report, Bernd Heid, from McKinsey & Company, said: "Cost-efficient and sustainable batteries are one major driver to decarbonise road transportation as automakers will launch more than 300 battery electric vehicle models in the next five years.

"Around $70bn additional value can be created by designing batteries for the full lifecycle and building businesses around vehicle-to-grid, second use, and recycling. The mobility transition requires new industry coalitions including the regulators – and it needs them now." te

Download the report at: https://tinyurl.com/y4bwae8m

Key recommendations

The sustainable expansion of the battery value chain offers many environmental, social and economic benefits. However, this cannot be achieved without addressing some key challenges. The report outlines 10 key actions required:

1. Implement design and systems for life extension and end-of-life treatment. International convention bodies, regulators, battery manufacturers and vehicle manufacturers need to work together to enable the exchange of data; to improve the economics of life extension through repair and refurbishment, and recycling; foster product design and technical development to facilitate disassembly for repurposing, repair and recovery of materials; and harmonise national and international rules to ensure the safe and economic transport of batteries. A battery passport would support data sharing on materials chemistry, origin, the state of health of batteries, or chain of custody.
2. Battery manufacturers, vehicle manufacturers and utilities need to work together to make smart charging (V1G) and vehicle-to-grid (V2G) technically possible on a large scale, while regulators need to allow and incentivise them.
3. Scale up electric shared and pooled mobility: vehicle manufacturers need to accelerate the development and commercialisation of purpose-built EVs for sharing. Regulators should incentivise electric shared mobility, eg via preferred public procurement for EVs, fleet regulations (on taxis) and incentives for electric shared mobility.
4. Accelerate the roll-out of V1G infrastructure: public stakeholders and private companies should take concerted action to increase public charging infrastructure for EVs, allowing for V1G and V2G services, to enable a smooth economic transition to sustainable mobility.
5. Regulators should review and revise the regulatory framework for battery-enabled renewables as a dispatchable source of electricity, in conjunction with V1G and other strategies to address intermittency, to make best use of batteries in the electricity grid.
6. Increase the share of renewable energies and energy efficiency measures in the battery value chain: companies in the value chain should switch from fossil fuels and conventional power to renewables, as well as reduce leakages and waste during production.
7. Finance the sustainable expansion and support value creation and economic diversification in local communities.
8. Ensure consistent performance and transparency based on established sustainability norms and principles to improve social, environmental and economic performance of batteries. Among the established expectations include the following: OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas; and the UN Guiding Principles on Business and Human Rights
9. Establish integrated greenhouse gas (GHG) disclosure and emission regulations. Policy-makers should establish regulations based on life-cycle emissions.
10. Support the deployment of batteries for energy access: financial institutions, energy utilities and public policy-makers, in partnership with battery manufacturers, need to advance the deployment of affordable battery applications in mini-grid and off-grid solutions in areas so far lacking access to electricity.

Inertia 'taken for granted'

Speaking at Aurora's battery storage conference, National Grid ESO director Fintan Slye said new sources of inertia are required to keep the lights on. Brendan Coyne outlines some of the conference highlights

Inertia in the GB power system will become far more valuable, according to the head of the system operator, Fintan Slye.

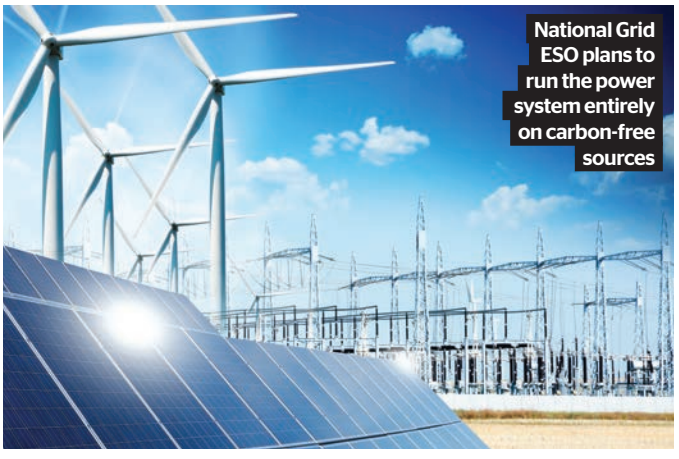
"Inertia will become much more important in the years to come," said Slye. "I think today it is taken for granted."

He suggested an inertia market will be required to deliver the necessary volumes as traditional sources – such as the spinning turbines of large power stations – are forced off stream.

"Inertia is at the heart of everything we do," he said. "We need inertia, so let's get a market-based solution for that."

Speaking at Aurora's battery storage and flexibility conference, Slye underlined that "flexibility is one of the biggest opportunities" as the UK attempts to decarbonise its economy.

"If you look at all the key challenges we need to solve [to reach net zero], flexibility becomes the key thing to unlocking [all of them]," said Slye. "So the opportunity is huge."



National Grid ESO plans to run the power system entirely on carbon-free sources

Fintan Slye: 'Inertia is at the heart of everything we do'

Earlier this year, National Grid ESO outlined plans to run the power system entirely on carbon-free sources when possible. Slye said it was indicative of how far the public mood has shifted that the system operator is now being asked whether that target is sufficiently ambitious.

"The narrative has most definitely changed and we'll continue to look whether we can push harder, faster and whether it is appropriate to do that," he said.

However, he said it is down to government to set policy that incentivises lower carbon forms of generation. Currently, National Grid's control room, he said, makes its decisions based on economics, not carbon emissions.

Slye said the 9 August blackouts have "pushed forward" discussions around appropriate levels of resilience and its value.

"You can carry large amounts of additional reserve but consumers have to pay... So what is the right balance; affordability is a big issue, versus the level of resilience people expect."

However, Slye also suggested that the blackout had raised broader questions about the resilience of other critical infrastructure – and its ability to "ride though" events, as heat and transport are electrified. te

Net zero 'requires transparent flex markets'

Consultancy Aurora says a carbon tax and genuine, transparent flexibility markets are required to deliver decarbonisation by 2050.

Its latest analysis suggests more than 100GW of new wind and solar generation will be required over the next 30 years, balanced by 30GW of short duration storage and at least 20GW of firm capacity.

Whereas unabated gas-fired generation provides baseload and back-up today, it cannot do so in a net zero world. Aurora said other technologies, such as long-duration storage will therefore be required at scale, along with hydrogen storage and carbon capture and storage (CCS).

However, the economics of some of these solutions are severely challenged unless carbon is adequately priced, suggested the consultancy.

Market interventions by government and regulator are therefore required to deliver net zero, said Aurora:

1. Price the externalities – a carbon tax or trading system is an efficient method to reduce carbon emissions.
2. Define the system needs – increasing renewables and removing thermal generation will create system operability challenges. These need to be clearly defined and tackled through transparent markets. Decentralisation of the power system means that some of these needs are location-specific and can best be solved with local flexibility markets.
3. Let the market decide – define the system needs and let the market provide the cheapest solutions. Pursue technology agnostic policies and regulations based on system requirements, to drive competition and innovation. te

Lithium-ion to deliver six-hour grid services

Fluence Energy's Marek Kubik has rebutted the idea that lithium-ion batteries are short duration systems and claims daily storage will soon be an economically viable proposition

Lithium-ion batteries will soon deliver economically viable daily storage – not just short duration bursts, according to Marek Kubik, market director at Fluence Energy.

Speaking at Aurora's battery storage conference, Kubik claimed Fluence has 1.5GW of storage projects awarded or operational around the world.

He said the firm, formed by Siemens and AES, is "building systems to fit markets". Some of those markets favour battery storage that delivers for "20-30 minutes", said Kubik, others reward "five to six hours".

While "technology agnostic", he said Fluence sees lithium-ion as the "dominant technology going forward, increasingly at longer durations" due to the economies of scale arising from carmakers investing hundreds of billions of dollars in electric vehicles.

"I rebut the idea that [lithium-ion] batteries are short duration systems. We are building five-six hour systems in markets where that is rewarded," he said. Kubik was speaking on a panel that discussed the need for longer duration storage to enable net zero energy systems.

"I describe [lithium-ion] as daily storage. As costs fall, five to seven hour [duration] battery storage systems will be very feasible and competitive against other technologies ... So it is not seasonal, but daily storage," said Kubik.

But he suggested that renewables penetration of around 80% can be enabled by such 'daily storage', affording other technologies "a bit longer" to mature in order to deliver the more challenging final 20% required in net zero economies.

Under the right models, co-locating solar and storage could drive down system costs, said Kubik.

"Storage has dominated dynamic firm frequency response, but the real opportunity is displacing thermal generation [within ancillary services] and transmission and distribution network [investment deferral]. That is where technology neutrality is key," he commented.

At the moment, he said, the "services in front of us in GB are short-duration services." te

Marek Kubik: 'We are building five-six hour systems in markets where that is rewarded'

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Lithium sulphur: driving down costs?

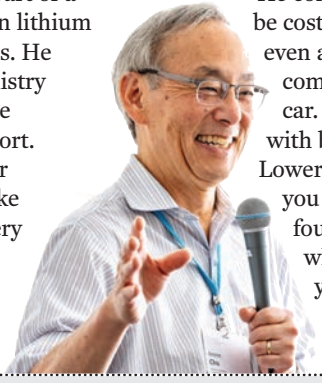
Nobel Prize winner predicts that the cost of electric vehicles could come down with advances in battery chemistries

The former United States Secretary of Energy and co-winner of the 1997 Nobel Prize for Physics believes lithium metal sulphur batteries will make electric vehicles as cheap as even modest combustion engine cars.

Steven Chu, now a professor at Stanford's physics department, is part of a team working on lithium sulphur batteries. He thinks the chemistry could change the game for transport.

Whereas other materials to make batteries are "very expensive, we have sulphur coming out of our ears", said Chu. "The oil companies have to put it somewhere, so if you can make a battery out of sulphur, it is a very big deal – lighter, smaller."

Chu said that if Stanford's work, led by Dr Yi Cui, is successful "we think a sulphur battery that lasts 15 years that is half the weight could put EVs in the hands of anyone that could own a car".



He continued: "It could be cost competitive with even a modest internal combustion engine car. It is inexpensive, with better density. Lower resistance means you can charge four times faster, which means you need less cooling, which means reduced weight. That enables a smaller battery and cheaper car.

"So this is the goal – sulphur is nearly free, whereas cobalt, manganese and nickel are not."

> ***This is the goal – sulphur is nearly free, whereas cobalt, manganese and nickel are not***
> **Steven Chu**

Chu was speaking at a conference organised by InnoEnergy. He was asked whether such disruptive technology could be commercially acceptable, given the sunk costs made by battery manufacturers, automotive companies and others in current technologies.

Chu said reinventing the wheel is not required: "Yes, it is a different manufacturing process, but when you go from manganese cobalt batteries to a sulphur battery... there is some commonality."

In a wide-ranging panel session, Chu, who is on the board of a company that aims to capture CO_2, said the economics of "pulling CO_2 out of the air" will not stack up until carbon prices are perhaps times higher than current EU ETS rates.

Using sequestered carbon (known as carbon capture usage and storage, or CCUS) also has a cost.

"To make something useful and economically competitive [from captured carbon] is hard," said Chu. "Until there is a price on carbon [of that order], nobody is going to pay for it." te

Europe and US can lead on batteries and EVs

Europe and the US can challenge Asia for dominance of the battery market, and therefore electric vehicles, according to Steven Chu.

"The battery will be the central part of the car; if you have a better battery, you will have a better car," Chu told the TBB conference in Paris.

"The question is, who is going to own that? What China has done for solar and many technologies is economy of scale; a $5bn factory is more profitable than a $0.5bn factory."

China, said Chu, has also made huge improvements in automation and quality control, which is "crucial" when it comes to battery storage.

However, he said innovation will be the key battleground. That is, "coming up with the best ideas, and how to translate that into low cost batteries, the lowest cost with exquisite quality control ... so Europe and the US should not rule itself out".

He cited South Korean electronics giant Samsung's fire issues with batteries as a cautionary tale. Samsung had very few phones "catch fire out of many millions", said Chu.

"It almost sunk the company. It turned out to be a quality control issue," he suggested, "[it] pushed a little too hard to get higher and higher energy density.

"Ultimately, after you have engineered [the battery] to death, you want to go to a different design. This is where US and EU scientists are probably going to have a better than level playing field," said Chu.

"Sheer invention will be needed in addition to economies of scale." te

POWER CONTROL DELIVERS AWARD-WINNING SOLUTION

OVERVIEW

Acknowledging concerns about the physical, energy and carbon output of data centres, coolDC has challenged the way that data centres are designed to be conducive to today's goals of being more carbon neutral. The company pushes boundaries by offering a range of data centre services from design and build to fully managed service packages with environmental sustainability at the heart of each project.

When looking for a UPS supplier coolDC wanted to find a company not only with many years of experience but also one that would understand the need to take advantage of the positive environmental changes for data centre design. With over 25 years of experience in supplying, commissioning and maintaining UPS systems and a forward-thinking philosophy, Power Control Ltd was chosen. Understanding that coolDC was looking to run a UPS with a small load to begin with but also quickly expand in the near future, Power Control was able to offer a solution to fit seamlessly with coolDC's vision.

As the demand for digital storage and processing shows no sign of slowing, coolDC is committed to offering peace of mind for businesses large and small. The company therefore relies heavily on a dependable source of power.

THE SOLUTION

With a need for scalability and growth, coolDC required a flexible and resilient backup power solution that would grow with its needs.

Following a full site survey and an assessment of the company's power requirements, Power Control presented a scalable modular solution to align with coolDC's concept of an expandable data centre. The proposal included two modular 500kW Huawei UPS5000-E with 50kW modules.

APPLICATION AND RESULTS

The Huawei UPS5000-E frames and modules were installed to a stringent timescale to ensure resilience was achieved before the site went live. Prior to the install, the UPS systems were witness tested at Power Control's in-house test bay. With innovation at the forefront of this data centre and future expansion a key condition, a day one capacity of 200kW on each system was agreed, giving coolDC the ability to evolve. Regular meetings were attended between Power Control and all of the vendors involved to confirm that each element within the new data centre would operate harmoniously.

Positioned in an N+N configuration, the two Huawei UPS5000-E systems keep to a low power usage efficiency (PUE) contributing to coolDC's goal of an efficient, environmentally friendly data centre.

TECHNICAL

Based on online double conversion technology, the UPS5000-E series provides reliable, efficient and uninterrupted power for critical ICT equipment. The modularised architecture improves flexibility and also reduces overall engineering costs.

Chosen for their impressively high efficiency, the Huawei UPS5000-E have hot-swappable static switches, and they also have a redundant control module (both being hot-swappable) so do not have any single point of failure other than the main input/output terminals. Designed to be a high performance, low TCO UPS solution, the Huawei UPS5000-E range not only delivers ultimate power protection but also maximum power density. Engineering works can be quickly undertaken, which integrates hot swappable power, bypass, control and monitor modules, allowing them to be removed or replaced without disturbance to the load. This in turn can mean a more reliable power supply. Its hot swappable modules, online maintenance and intelligent battery management make it one of the most advanced modular UPS solutions available.

- Smooth capacity expansion
- High efficiency at low load rate
- Intelligent hibernation design
- Achieving 99% efficiency in ECO mode
- Small footprint and easy construction
- Intelligent battery management, extending battery lifespan
- Low investment on power distribution system
- Redundancy design
- High grid capacity
- High load adaptability
- High environmental adaptability

A COMMENT FROM COOLDC'S CEO, TIM CHAMBERS:

"Our relationship with Power Control works really well. We have a connection at director level through Rob Mather, who was originally involved in the project. We now have a dedicated account manager, Sam Rea, who works very well with the account and looks to how we are going to innovate in the future. The installation was managed very well and Power Control's engineers are professional and work quickly. Everyone turned up on time and Chris helped us through the FAT test and with the installation on site."

Service and support forms an essential part of the Power Control offering and includes all aspects of service and maintenance for all brands and models of UPS, generators and batteries. The Power Control service team provides a complete 24/7 UPS battery replacement service, where it undertakes everything from the initial site survey and battery calculations through to delivery and installation of the new batteries.

For more information please visit www.powercontrol.co.uk, email info@powercontrol.co.uk or call the office on 01246 387329

PowerControl

Making the switch to green technology?

Eaton's Louis Shaffer speaks to The Energyst about a high-renewables future, why flexibility is key, and warns that 'green' power systems need to ensure they are not 'part of the problem'

In Europe, wind and solar power will dominate electricity generation from the early 2020s. To ease the transition to a high-renewable energy future, greater regulatory certainty will be needed to spur private investment in flexibility technologies. This was the core finding of an industry white paper, *Developing flexibility: the new cornerstone of the grid*, commissioned by power management company Eaton and the Renewable Energy Association (REA).

Barriers to participation

In the wake of the report, Eaton joined forces with the REA, the British Electrotechnical and Allied Manufacturers' Association, and a number of other interested parties to campaign to remove barriers to participation in the flexibility markets and to encourage greater use of distributed generation. In an open letter to *The Guardian*, the coalition stated: "The government has set out strong ambitions for the UK to be a world leader in flexible generation, most recently through the plans for a new Smart Export Guarantee.

"However, its rhetoric is not being matched by action. In the last two years Ofgem has removed embedded benefits for distributed generation and storage, de-rated benefits for batteries in the capacity market and eliminated feed-in tariffs for rooftop solar. Government now also plans to increase network charges and hike VAT for homeowners who invest in residential solar and storage."

Speaking to *The Energyst*, Louis Shaffer, EMEA distributed energy management segment manager at Eaton, comments that these issues remain unresolved.

"With the increasing use of variable sources of energy, such as wind and solar generation, we will need increased flexibility on the grid... If we leave it to the utilities, it is going to be expensive. What we need is more market flexibility," says Shaffer.

He pointed out that the technologies are already in place to manage this. "There are still some technologies emerging for long-term storage, so that solar energy produced in the summer can be stored for the winter, but in general, the cost of storage has already come down tremendously." Shaffer observes.

He adds that there is a large market for demand-side management but it is only being performed on a large enterprise level – "industrial-sized companies that can turn off a lot of motors", for example.

"In the future, there will be many, small distributed resources. We know how to connect to these using digital technology and to operate smart home systems; we have energy storage systems which can be used as buffers, but the current market structures and the way they are operated, work against this," continues Shaffer.

"For example, last year, in the UK, there was a capacity market bid. In the middle of the bid, with less than a month to go, they announced that it had to be for four hours. There were many battery companies, that had bid into this, that could offer an hour or two. So, why must it be for four hours? There is no real reason... Scandinavia has a market that does this very well."

Challenges to 'going green'

Shaffer points out that there are other challenges

around renewables and the decentralisation of the electricity grid. Not all 'green' solutions are as environmentally sound as they first appear. In particular, the use of harmful greenhouse gases in switchgear, in renewables applications, requires closer examination.

According to the United Nations' Intergovernmental Panel on Climate Change, sulfur hexafluoride (SF6) tops the list of the most harmful greenhouse gases as it is 23,500 times more potent than CO_2 and stays in the atmosphere for 3,200 years.

SF6 has been banned for most applications in Europe, but in recent years there has been an increasing trend in the use of SF6 gas in switchgear, a trend that is likely to accelerate due to the progressive introduction of a decentralised electricity grid in Europe – unless something is done by regulators.

Switchgear is often used in renewables applications such as windfarms and solar farms to protect against overloads and short circuits. In such applications, SF6 has been used to prevent dangerous arcing, Shaffer explains.

According to Shaffer, the use of SF6 gas for switchgear in the distribution network is not only undesirable, it is also no longer necessary as there are good alternatives available for switching applications. For instance, switching in vacuum combined with solid insulation is a safe and environmentally friendly solution that has been used across Europe for many years.

"SF6 has great insulating properties, but it is these properties that also make it so damaging from a greenhouse gas perspective," says Shaffer.

After the Kyoto Protocol identified SF6 as one of the worst gases behind global warming, in 2007, the European Union banned it for most uses, including sport shoes, tennis balls and other applications. However, a loophole was granted for medium and high-voltage switchgear in 2014.

"There are more environmentally friendly alternatives...Most companies, today, offer some vacuum switching options," says Shaffer. Adoption is being hampered by the lack of clear legislation, however.

Although the company is seeing a strong growth in industries where there is a demand for frequent switching, market adoption in general for SF6 alternatives has not been as fast as it should be.

"SF6 is no longer a necessity as there are alternatives, but it is cheap," Shaffer continues.

"When building solar farms, the top priority is often cost." He points out that negotiations around equipment procurement in this sector can be very challenging, from a price point perspective.

"When it comes to tenders, price is the overriding factor, yet the total cost of ownership should be taken into consideration. Without SF6, you do not have the cost of inspecting the equipment; you do not need to top up the SF6 and you do not have the emissions issue," says Shaffer.

Shaffer also claims that the tanks containing SF6 often leak: "In many cases, the tanks are simply pressurised, rather than being sealed, and they need to be topped up. This is not just an issue from an environmental perspective; it is a safety issue. When they leak, there is a risk of arc and the switchgear can explode. This is something that people are often unaware of."

> *SF6 has been banned for most applications in Europe, but in recent years there has been an increasing trend in the use of SF6 gas in switchgear, a trend that is likely to accelerate due to the progressive introduction of a decentralised electricity grid in Europe – unless something is done by regulators*

Emissions for decades to come

Eaton and other members of the Green Switching Forum have warned that industry appears to be "either unaware or unconcerned" that there is still a strong and expanding SF6 market. Moreover, switchgear has a long life-cycle of up to half a century. It will therefore be years before the impact of a ban on SF6 is realised, as each switchgear installed in a grid means further emissions for decades to come.

"If you are developing a wind turbine, you should make sure it is green," argues Shaffer. "The problem is that alternatives, such as vacuum technologies, are not a legal requirement."

The Green Switching Forum is therefore calling on the European Commission to stop unnecessary climate-harmful emissions and immediately publish a proposal to amend Annex III of the F-gas Regulation to ban the use of SF6 gas in the electrical sector.

As a minimum, SF6 gas for use in medium-voltage switchgear up to 36kV should be banned immediately, with short-term timelines fixed for higher kV switchgear.

It is also calling for EU incentives to encourage public authorities to support private sector actors to replace old installations with SF6-free switchgear, as well as financial incentives to push the private sector towards environmentally-friendly solutions.

Ultimately, Eaton believes that new forms of flexibility will be key to an affordable, renewables-led power system.

"To support current infrastructure, the government and industry will need to start investing in the technologies, services and modifications that can enable our energy system to cope with the dramatic shift in how we generate and use electricity. It's up to UK regulators and government to help foster the right environment and encourage businesses and commercial property owners to play their part," comments Shaffer.

At the same time, he warns that operators of renewable technologies need to ensure their infrastructure is truly green – by eliminating the use of harmful gases – to ensure they do not become part of "the problem". te

Mitie: large electric vans key to decarbonising fleet

Mitie's head of fleet and procurement outlines the key challenges as it bids to decarbonise its fleet by 2030. Brendan Coyne reports

Mitie has rolled out its first electric vans and remains on track to switch 20% of its cars and light commercial fleet to EVs by the end of 2020. But vehicle visibility and commitment from carmakers remains a key challenge, according to fleet and procurement director, Simon King.

The rollout is on track and the vehicles "have been hugely positively received by staff", but time is of the essence if the UK is to hit net zero.

While energy supply is rapidly decarbonising, transport, which represents around a third of UK CO_2 emissions, has barely moved.

"The criticality is there, so we want to go further and faster," says King.

That requires both vehicles in volume and sufficient charging infrastructure.

King says Mitie is speaking to all car manufacturers and believes volume constraints will start to ease next year. But larger electric vans are in short supply.

"We have Nissan ENV200s now joining the fleet, replacing Vauxhall Combos that we have historically used," says King. "There is some availability [of small vans] but larger vans with decent range continue to be a challenge."

King says Mitie is having "interesting discussions with OEMs" for larger vans arriving in Q3 2020. "But at the moment, that is a promise rather than guaranteed availability."

It is "slightly strange for a procurement director to have to say 'please supply me' rather than run a competitive tender, but it is a unique situation", says King.

"We are talking to all

Do EV charge points require a supply licence?

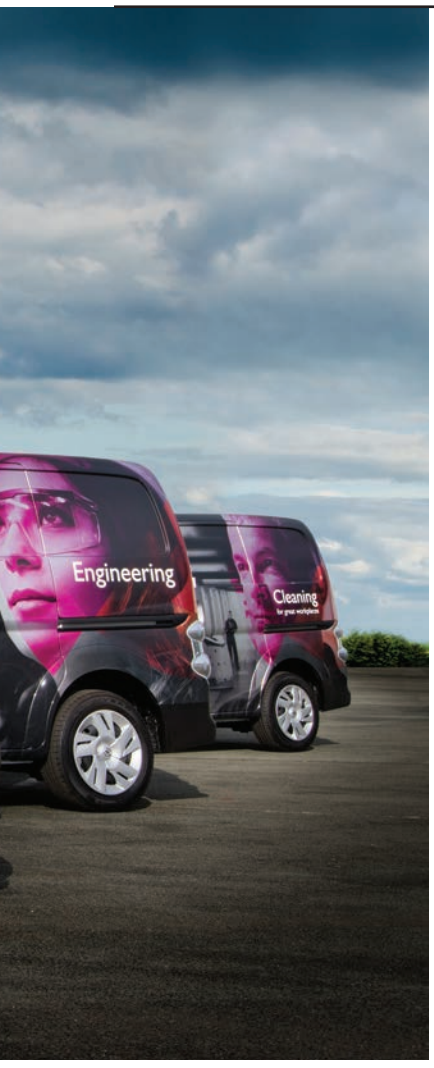
Ofgem has laid out a series of scenarios around what applies and where for businesses operating electric vehicle chargers and supplying consumers with power

Ofgem has published some guiding principles for businesses operating electric vehicle chargers and supplying consumers with power.

It has outlined the challenges of interpreting current energy supply regulations, and what these mean in an EV context.

Currently, selling electricity amounts to the supply of electricity, which generally necessitates a supply licence, though there are some exemptions.

The supply licence rules, however, cover supply to premises, which vehicles are not, says Ofgem. Therefore, selling power to the end



the OEMs and continue to engage all the big players, but if anyone has an offering that we may not be aware of, we urge them to contact us directly. We are really keen to work with anyone that has suitable vehicles, particularly mid and large-sized vans."

Range booster

Range is an issue for mid-sized vans, says King. He thinks a modular battery approach could solve the problem.

"If OEMs could develop a modular range with up to three batteries, for example enabling 90-180-270 miles, that gives the user a choice to meet their needs.

"A vehicle for central London has very different requirements [and charging options] to one operating in North Wales," says King.

"Also, as vehicles go into the secondhand market, of which fleet is a big route, that would enable people to add or remove range [to suit their needs]. We are discussing that with some OEMs. It would really help the fleet buying industry – and decarbonise the UK fleet."

Infrastructure challenge

The other major challenge is rapid charging infrastructure, says King. Mitie is installing chargers at its premises, at customer sites and at the homes of employees with EVs.

"But there are some homes where we can't install chargers, where they do not have a parking space, apartment blocks etc, and we also need to top up the lower range commercial vehicles on longer journeys," says King. "So the availability of infrastructure remains a challenge – alongside the practicalities of using it."

Simplify payment

King has "10-plus apps" to charge his car. Requiring new rapid chargers to have contactless payment is "a good step forward," but he says it is "unreasonable to expect commercial vehicle drivers to use multiple apps and have to top them up with their own credit".

> *While energy supply is rapidly decarbonising, transport, which represents around a third of UK CO_2 emissions, has barely moved*
> **Simon King, Mitie**

Mitie is currently asking drivers to pay with their own card and then charge it back to the company. Whereas with diesel, drivers use the Allstar card, and Mitie pays directly.

"Trying to replicate that is a challenge. Allstar does include some EV chargers [within its network], but coverage is low at the moment," says King. "I am sure as the market develops we will see consolidation, but that takes time. "We are seeking solutions now to make it easy for drivers to switch to EVs."

Next steps

Despite some hurdles, King says the switch to EVs is providing the firm with learning it can share with its customers and that Mitie is ahead of schedule.

He expects the electric fleet will total 200 vehicles by the year-end and 717 by the end of 2020, which will make it the UK's largest EV fleet.

The next step is to "determine the strategy of what a largely electric fleet looks like," says King, with Mitie committed to electrifying transport by 2030 as part of the EV100 collective.

"We're comfortable that cars and small vans will be there [in volume], but the larger vans, scaffolding lorries etc., are more challenging. So we are considering now how to address that," he says, because we need answers in the next three to four years."

Advice for fleet managers

King says anyone considering switching fleets to EVs needs to consider two aspects in parallel.

"Engage with the OEMs as early as possible to get the vehicle pipeline in place and at the same time, get your applications for infrastructure and charging in," he says.

"People have suggested the cars and the chargers are a chicken and egg conundrum, but they are not. You have to do them both in parallel." te

The chargepoint effectively comes under the definition of 'premises', says Ofgem

user, the EV driver, does not require a supply licence.

But the regulator does consider conveying power to the actual chargepoint is supply, so the chargepoint effectively comes under the definition of 'premises'.

Given the number of parties involved in public and private charging points, the regulator notes things may get complex. So Ofgem's Innovation Link lays out a series of scenarios around what applies and where.

However, it says parties should seek their own legal advice on interpretation of the rules, given supplying electricity without a licence is a criminal offence.

See details at bit.ly/2PfnXEM

Can phase change materials decarbonise heat?

Cranfield University has been heating campus buildings using a heat storage system based on phase change materials since March, cutting consumption and carbon. Now the company behind the technology is ready to go to market. Brendan Coyne reports

A UK engineering firm thinks it has found a way to deliver heating and hot water at lower carbon, lower cost and with a much smaller footprint compared with conventional systems. Marton Geotechnical Services (MGS) believes phase change materials could play a major role in decarbonising heat.

MGS' first full-size unit has been running at Cranfield University for the past six months, delivering heat and hot water to three campus buildings – and has notched utilisation rates up to 258%.

The next step is to commercialise the units. MGS business development manager Peter Harris thinks the modular 75kWh systems can be on the market by early 2020.

MGS' modular 75kWh systems could be on the market by early 2020

The backstory

MGS has traditionally supplied pipework and manifolds into the geothermal and landfill gas markets. But recognising the need for more efficient thermal storage, the firm started to explore phase change materials (PCMs) as a potential solution.

A bio-PCM based on a food industry fatty acid byproduct appeared to have the best properties, explains Harris.

"When the material melts, it goes through a phase change and has a very high latent heat storage capacity. The big advantage is that it is non-corrosive and stable, and as a byproduct has no detrimental impact on food stocks," he says. "Plus, because it is now being used extensively in the US, availability is good."

But the challenge was working out how to inject and extract heat in the most appropriate manner for commercial applications. The design of the heat exchanger is critical, says Harris.

"We came up with a heat exchanger design and tested it in a 12kg PCM vessel – and the exchange rate and performance of the thermal store was phenomenal: heat transfer in less than 12 minutes," says Harris.

The next challenge was to find a suitable host to test a full-scale unit. Harris came across Chris Sansom, Professor and Head of Centre – Renewable Energy Systems at Cranfield's School of Water, Energy & Environment, after reading an interview in *The Energyst*.

In 2018, Sansom had outlined an ambition to develop a 20MWh heat store that could store excess heat from Cranfield's biomass boiler over the weekend, ready for the demand pick-up on Monday morning – a challenge the university's energy manager, Gareth Ellis, had asked if Sansom's research department could solve.

The install

After adjusting flow and pressure rates to meet the buildings' requirements, MGS built and installed the unit in the spring. Since then, it has been used as a heat sink and modulating buffer and a combination of the two, primarily driven by Cranfield's building management system and linked to the biomass boiler that serves three campus buildings.

In basic terms, it takes and discharges heat to meet peak demand – and can do so within 35 minutes, many times a day.

The results

Data from the system to date has been impressive, says Harris.

"Of course, it depends on the demand and load from the buildings, but we have figures that show the unit, set at 75kWh nominal capacity, has at times supplied 179kWh of heat, which represents 258% capacity utilisation," says Harris.

In terms of savings, Harris believes premises with two gas boilers, for example, could replace one of the boilers with the PCM thermal store.

"That instantly halves your carbon footprint and gas consumption," says Harris, "because you are not burning gas to

> ***It depends on the demand and load from the buildings, but we have figures that show the unit, set at 75kWh nominal capacity, has at times supplied 179kWh of heat, which represents 258% capacity utilisation***
> **Peter Harris, MGS**

make the unit work, simply taking from the existing fuel source and utilising the flow of water from the boilers."

The space savings are significant, he adds. "By using a PCM, the thermal store can be five to 10 times smaller than using water, which delivers savings on civil engineering costs and means you can use them within basements, roofs, anywhere where space commands a premium," says Harris.

While the company is in discussions with commercial companies, as well as councils, Harris believes the modular units could also prove useful to heat network operators.

"You could effectively charge the units and transport them to areas of need for maintenance. Because of its small footprint, it is transportable. You basically just plumb it in, so it is very flexible," he adds.

Meanwhile, changing the PCM blend enables it to be used for cooling. "The temperature range is 0 to 85°C, so you could have two adjacent units, one for heat and one for coolth," says Harris, "which opens up further applications."|

Next steps

MGS is now in the process of commercialising the technology, with a view to launching in the next few months.

"If an order came in tomorrow, we could build them," says Harris. "But we want to semi-automate the manufacturing process and build out the right support team."

At latest, says Harris, the product should be commercially available by next spring, thanks to the "superb SME support" and real world trials enabled by Cranfield.

The professor's view

Cranfield's Sansom says the university's energy manager approached him and said: "I have a real problem here. I'm running everything I've got on a Monday morning to provide heat and water across three buildings – but I have to dump all the heat on Friday afternoons. Can't I store some over the weekend?"

Sansom, who had been working on a solution using other phase change and thermochemical materials, says MGS' approach was perfectly timed.

Since switching the unit on, Sansom says it has performed "way and above what we expected".

"We literally wanted to store the heat over the weekend to avoid switching on the auxiliary boiler on Monday morning. But the way it has been charging and discharging throughout the day, from my perspective, is very interesting," says Sansom, who has found many phase change materials do not replicate lab capabilities in real-world scenarios.

"We have about 20 sensors monitoring the store, and the data from those cycles is valuable. We will keep testing it to monitor durability etc, but as a product, it is virtually there," he adds.

"The university is sufficiently impressed with what it has seen that it is now looking at something on a bigger scale." te

> *We will keep testing it to monitor durability etc, but as a product, it is virtually there*
> **Chris Sansom, Cranfield University**

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Time running out to meet deadline on refrigerants

Food manufacturers and other businesses that use refrigerants need to act now on F-gas legislation

Global warming could send a chill factor through food manufacturers and cold storage businesses using refrigerants in the UK if they are not prepared for latest European legislation coming into force on 1 January 2020.

GEA, a specialist in food processing, packaging and refrigeration systems, says UK customers should be planning to replace refrigerants that have global warming potential (GWP) of above 2500, as these will be banned under the European F-gas legislation in certain static refrigeration applications.

Reclaimed and reprocessed refrigerant can continue to be used for servicing of existing equipment until 2030 but is likely to become costly and in short supply (as seen already and previously experienced with the phase out of r22).

Need to replace

Most cooling systems using greenhouse gases will have to be replaced with those that can handle natural refrigerants, such as ammonia – an environmentally-friendly refrigerant that has no impact on global warming or ozone depletion – to comply with the legislation which is set to be applied worldwide, including the UK after Brexit.

GEA is urging food companies to take action sooner rather than later, as time is running out to install the new natural refrigerant-based systems, needed to reduce their environmental impact, and it is not possible in the vast majority of cases to retrofit an F-gas system with a natural gas, especially ammonia.

GEA has already installed a large ammonia-based system for a major food manufacturer and retailer incorporating mechanical and absorption cooling, helping to deliver one of the most energy-efficient frozen food distribution centres in Europe.

> *Those putting off installing a new system or are ignorant of the legislation could find it comes back to haunt them*

Usually in a food storage environment up to 90% of energy use is for refrigeration; while this operation has a cooling capacity equivalent to 12,000 domestic chest freezers, the facility only consumes less than a third of the power used by the two cold stores it is replacing when comparing size. What is more, water and chemical consumption has been reduced by 86% with the annual water saving equivalent to 11 Olympic-sized swimming pools.

The ammonia absorber in the plant rejects its heat into a common condensing system, which enables recovery for both underfloor heating and defrost. This considerably reduces other associated waste streams, such as cooling tower water, chemicals, effluent, fan and pump power. Heat is also recovered for underfloor heating by subcooling ammonia which not only provides free heat but actually improves the compressor efficiency to boot.

Don't delay switching

Robert Unsworth, from GEA UK, believes food manufacturers should not delay switching to cooling systems that can reduce their emissions and power bills, citing an ammonia plant (especially a centralised one) as significantly more efficient than cold stores using greenhouse gases.

Unsworth said: "Cooling is very much in the spotlight and the deadline for switching to environmentally-friendly refrigerants is drawing nearer.

"I would estimate less than 5% of cooling systems in the UK can be effectively adapted so those putting off installing a new system or are ignorant of the legislation could find it comes back to haunt them.

"If cold stores, factories or freezers use one of the gases which is banned from the end of this year, or the final 2030 deadline, depending on the type of system, a leak could prove devastating as they may not be able to replace the gas in time to avoid a full or partial catastrophe. GEA offers an entire solution, and we're also driving this concept with the heat pump instead of a boiler for generating heat and reducing waste streams."

Unsworth asserts that a heat pump is a far more eco-friendly and profitable solution than traditional heating alternatives Industry, local authorities and homeowners have been using them for heating applications for many years – and food factories are now starting to see the significant financial and environmental benefits of using heat pumps in production processes. te

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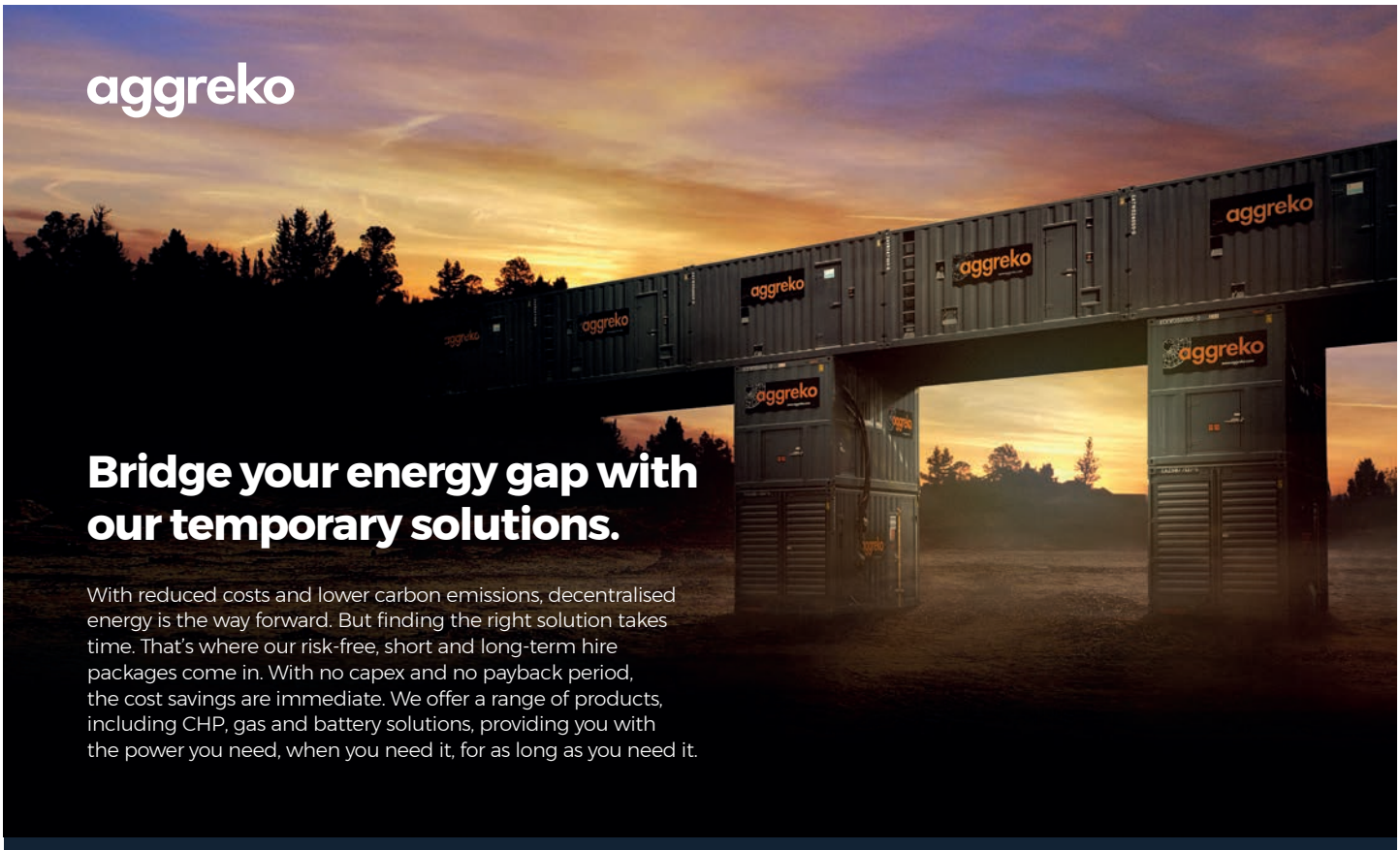

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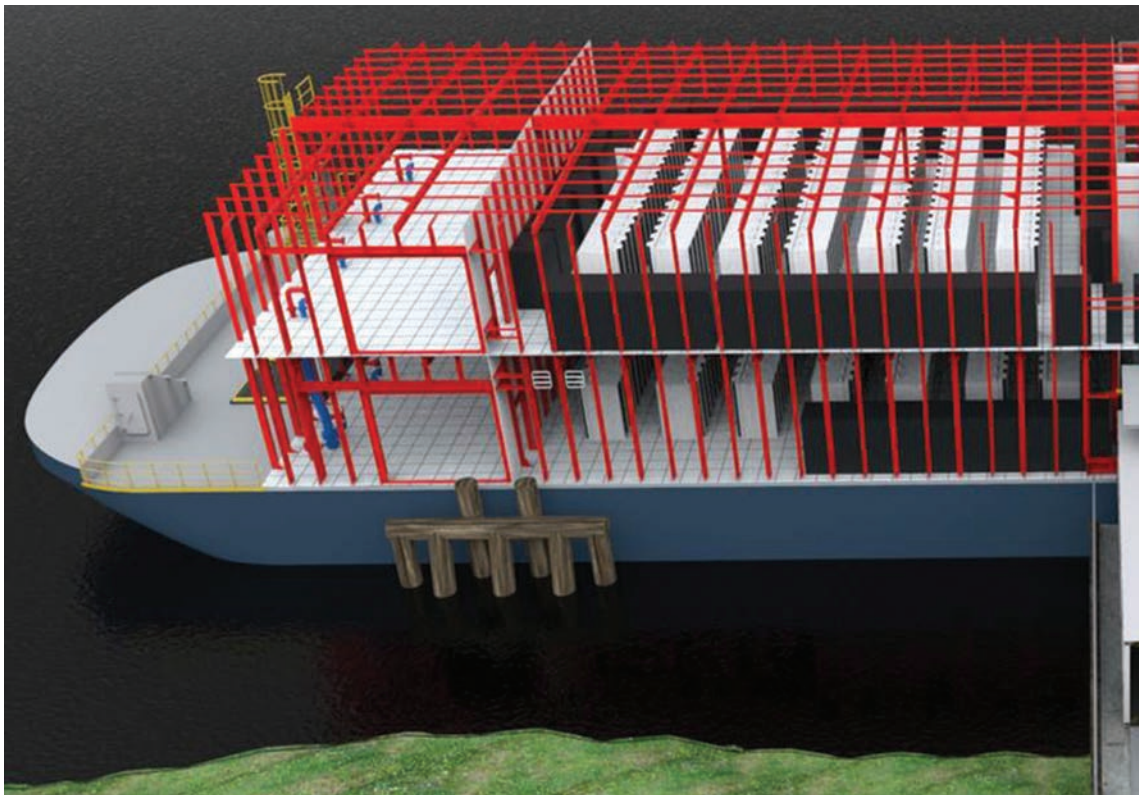


Cooling Ireland's demand for energy

Irish system operator EirGrid's analysis predicts that power usage from Dublin's thriving data centre sector could account for 31% of all demand by 2027. Could floating, water-cooled data centres help ease pressure on Ireland's grid and reduce carbon footprint?

Nautilus Data Technologies has been given the go-ahead for a floating data centre in Limerick, in the Republic of Ireland, which will use cold water from the sea at Shannon Foynes port to keep servers cool – significantly reducing carbon emissions and energy usage.

The 6-8 MW facility will have a power usage effectiveness (PUE) of 1.15, all year round, and will be one of the most energy efficient facilities in the sector.

By adapting cooling techniques already widely used on ships and thermal power plants, Nautilus aims to minimise the environmental impact of the data centre industry, initially focusing on Ireland and other key hubs across the globe – including the Netherlands, Virginia and California in the US, and Singapore.

In Ireland, rapid data centre development, particularly in the Dublin area, has put a significant strain on the grid. Irish system operator EirGrid points out that data centres need a lot of power and can require the same amount of energy as a large town. Its latest analysis predicts that demand from data centres could account for 31% of all demand by 2027.

Finding energy efficient methods of operating data centres will be key to supporting data centre growth in Ireland and this is where the Nautilus technology could have a significant contribution to supporting future development.

The Nautilus technology is reported to reduce operating costs by up to 30%, while cutting carbon emissions and air pollution by the same amount

Claimed to increase cooling efficiency by up to 80%, the Nautilus cooling approach is achieved without evaporating or consuming any potable water, while returning the water to its original source with negligible thermal impact.

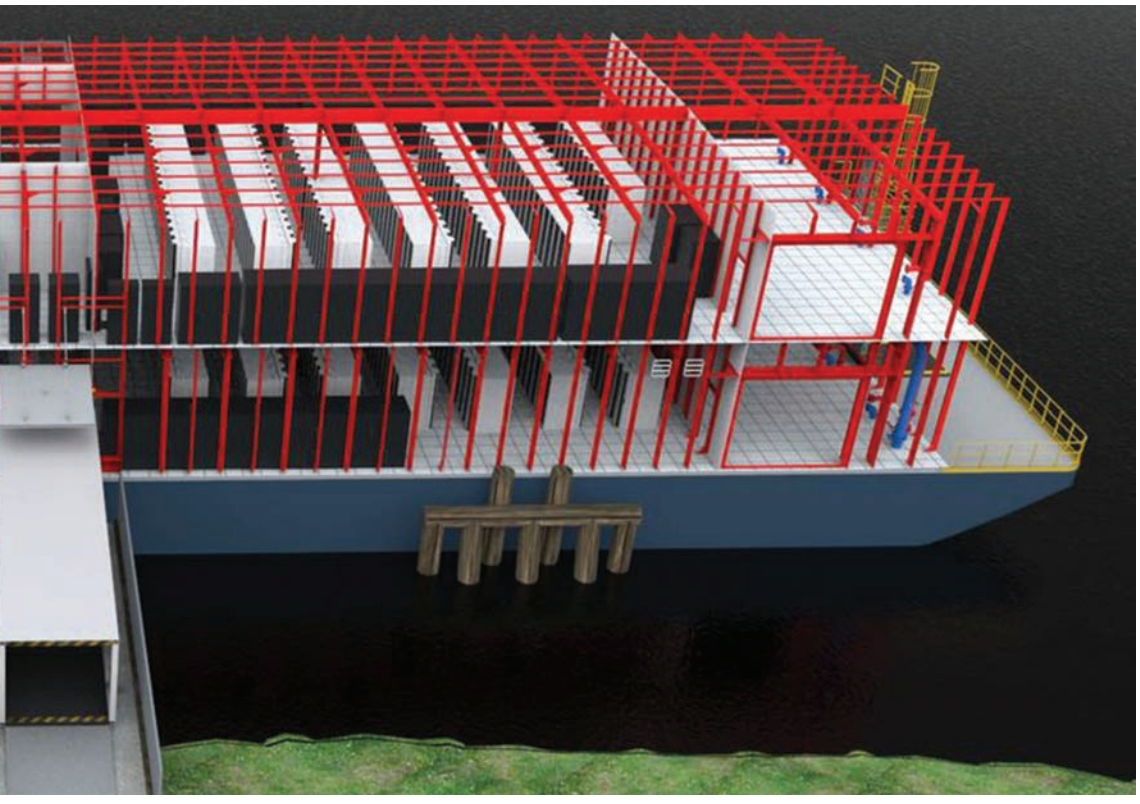
By eliminating the need for energy-intensive air-cooling equipment and water treatment chemicals, the Nautilus technology is reported to reduce operating costs by up to 30%, while carbon emissions and air pollution are also cut by 30%.

"We need to rethink the way we build and operate data centres, if we are to keep pace with the rising demand for services – the current method is unsustainable. Many data centres are air-conditioned, in some form, and not very energy efficient," says James Connaughton, president and CEO at Nautilus Data Technologies. "They consume large amounts of water, produce waste-water chemicals, and use significant amounts of refrigerant; there is a complex environmental footprint associated with the traditional approach."

He believes Ireland is still one of the best places in the world to have digital infrastructure: "We see a great growth opportunity for the data centre sector in the West of Ireland and believe this to be as strong, if not stronger than Dublin," Connaughton continues.

Each Nautilus water-cooled data centre is housed within a waterproof, dust-proof facility with NEMA 3 rating, F3 tornado rating and F3 hurricane rating. Internally, the facility has an extensive monitoring and leak prevention system for all piping.

"Because this type of cooling



The data centre barge will comprise four data halls, contained within two floors above the barge deck. In addition to ensuring better environmental outcomes, the Nautilus data centre will also meet high standards for reliability and security

simply involves pumps and pipes, all of our operating systems are inside the facility," adds Connaughton. "There are no external operating systems, which adds to the level of security. As cooling is brought right to the back of the rack, the servers can also be installed much closer together."

According to Nautilus, the use of this cooling approach results in one third of the spatial footprint, with up to five times the server capacity. Higher rack densities, coupled with reduced energy usage and faster deployment, are among the key benefits for operators.

The data centres are designed to be either located close to the water, on land, or can operate on the water, while moored on a barge. As Nautilus can pre-manufacture the entire data centre on a barge and deliver it to the port, the facility can be built while the site is being developed.

"Instead of undertaking the data centre build-out and site development, in succession, over a period of two years, this can be completed in parallel in under a year.

"This speeds up deployment, while the siting of the data centres also opens up significant opportunities – port infrastructures exist in both developed and emerging markets, around the world, and we can repurpose this and add value. Ultimately, this will sustain local jobs, as industrialisation shifts," comments Connaughton.

He believes that the approach could also offer significant advantages in areas such as the Middle East:

"Our cooling system can efficiently generate hot water which can lower the cost of desalination, or other industrial applications. We have the advantage of colocation with other industrial infrastructure to improve efficiency."

Hundreds of visitors have viewed the company's floating data centre technology, in the US, and have commented on its simplicity and quietness in operation. Connaughton now predicts there will be significant interest in Ireland, with the technology appealing to a number of data centre markets – from hyperscale and colocation, to the specialised AI space, which requires higher capacity hardware.

"As we look to the future, with the advent of high-performance computing, conventional air-conditioning will not be adequate to cool these new systems. Our method is an easy way to cool these more powerful servers," Connaughton concludes.

"There is no doubt in my mind that the next data centres will be water cooled." te

From prototype to commercialisation

Nautilus was the first company to successfully launch a waterborne data centre prototype in 2015 incorporating its technology on a vessel, demonstrating additional capability for large-scale modularity, mobility and flexibility in data centre deployment in both developed and emerging markets. In 2017, the company received an injection of investment worth $10m (£7.8m) from Keppel Data Centres. The company went on to build its first commercial data centre, offering power capacity of approximately 6MW, at Mare Island Naval Shipyard in northern California.

Commission: a four letter word?

Alex Hill, co-founder and managing director of energy management and software specialist ZTP, looks at the pros and cons of commission and says it is time for energy consultants and brokers to take pride in the value they provide to their clients

As with every debate, this one has been raging for years and has valid points on both sides. Some would like to see commission-based energy consultancy and brokerage fees eradicated, while others see it as a cornerstone of the energy consultancy sector.

Those arguing against the use of commission as a suitable charging mechanism may point directly at the use of the "it's free because the supplier pays us" selling tactic.

This is something that we have come up against time and time again when speaking to new clients, many of whom are under the impression that their current consultant is not charging them a penny because the supplier pays them instead.

Consumers unaware

The end consumer in these cases is unaware that the consultant/broker's fees are being added to their bills by the supplier, meaning that they are being charged, albeit indirectly.

Unclear fees are also an argument against the use of commission, with many consumers telling us that they do not have a clear picture of what their consultant is actually charging.

This is understandable when a consumer, whose primary knowledge base is outside of the energy sector, is being told they are being charged 0.4p/kWh. Sounds like a bargain. If that same consumer was purchasing 10gWh of power over the course of the contract and realised that they were paying £40,000 for a simple contract negotiation, they might reconsider.

Some might say that these are sales tactics and the consumer has enough information to work out the fees for themselves.

However, we must also point out the issue of disproportionate and hidden fees. Speaking recently with a representative of one supplier we were informed that the largest commission they had ever seen on a contract was 7p/kWh. No we haven't missed a decimal. That's seven pence per kilowatt hour. Bear in mind the current market rate for power is anywhere between 11 and 14p.

These commissions arise where a consumer is on 'out of contract' rates paying circa 25p/kWh and a broker tells them they could be paying 20p/kWh, a 20% saving. It sounds like a great deal to the consumer,who isn't aware that the market rate is 13p/kWh and the broker pockets 7p/kWh commission resulting in a 54% mark up.

Hidden fees

Just when you thought this argument against commission couldn't get any stronger, there are then the hidden fees. We have taken on clients in the past where upon inspection of their existing contracts the commission levels looked higher than expected. In more than one case, it turned out that the commission levels were double what our client had agreed with their previous consultant.

The clients in these cases were unaware of the overcharging until it was identified by us, but also unaware that they could have identified this at any time with a call to their supplier asking the simple question: "How much commission is on my contract?"

Now before we condemn commission to the history books, we should consider the positives of this charging mechanism, which largely centre around the reduction of administrative burden.

Large organisations employing energy consultants to manage contracts across hundreds of sites such as social or student housing, commercial real estate, logistics and retail often require the cost of contract negotiation and management services to be distributed to each site's cost centre.

Commission enables this to be conducted without the need for hundreds of invoices to be generated by the consultant and processed by the client. Due to the cost associated with the generation and processing of every invoice, payment by commission can actually save money for the consumer.

Administration reduction can also be a catalyst to further savings for consumers by offering a frictionless switching

> ***Some would like to see commission-based energy consultancy and brokerage fees eradicated, while others see it as a cornerstone of the energy consultancy sector – Alex Hill, ZTP***

process and increasing the number of consumers switching supplier to make savings. We have experienced for years the paradox where consumers are reluctant to help themselves save money because the process to switch supplier is too complex, time consuming or costly.

It is only once they are informed that the process is carried out on their behalf, and that their workload is kept to the absolute minimum that some of them agree. It could be argued that if consumers were required to receive, process and pay a separate invoice for brokering services, that this might deter some from proceeding with the switching process and prevent them for achieving the best deal possible.

A final argument for the use of commission is also rooted in business administration through cost distribution. A great function of the commission charging structure is its proportionality based on consumption and therefore spend per meter.

> *If you can stand confidently behind the service you provide and the fees you charge, knowing that you are delivering transparent value, the mechanism with which you charge those fees shouldn't be an issue*

This is especially useful where a consultant is providing additional services such as billing validation, consumption reduction, carbon reporting and a software as a service (SaaS) provision.

In these cases, meters consuming a larger volume of energy, where the benefit of the energy consultant may be greater, will be attributed a larger proportion of the consultancy fee via a commission. This again reduces cost to the end client by automatically apportioning cost to cost centres rather than requiring a manually internal process to achieve the same end state. Additionally, the cost of services is placed within the client's energy budget, removing the need to apply for a separate consultancy budget.

Clear risks and benefits

There is a clear case and series of benefits for the continuation of commission as a charging mechanism. However there is also significant risk to the end consumer.

Risk in the form of unethical consultants and brokers operating within the energy industry, and risk in the form of a consumer base who can too easily become lost in a series of half-truths and false promises.

A solution that we would like to propose would see a series of measures released to combat the unscrupulous entities plaguing our industry. These would include, but not be limited to, stating the commission as a separate cost line on every invoice, stating the commission on the contract so the consumer knows what they are signing up to, implementing a simple and clear code of conduct for brokers and consultants with acting in the best interest of the client at it's core, and implementing a commission cap on all meters based on fuel type, annual consumption and added value services provided.

As energy consultancies we provide a service that can have wide reaching and significant benefits to clients, and it is time to take pride in those benefits and their value.

If you can stand confidently behind the service you provide and the fees you charge, knowing that you are delivering transparent value, the mechanism with which you charge those fees should not be an issue. te

Five tips for success with renewable energy

Investing in renewable energy schemes can be fraught with pitfalls. But the benefits, if you get it right, are considerable. Hugh Taylor, from independent energy consultancy Roadnight Taylor, offers five top tips for success

The days of simply putting solar panels on a roof, for example, and harvesting government incentives are long gone – but there are still lots of opportunities to reduce energy cost and generate some extra income. Sadly, many installers are overselling schemes, leaving those investing in generation, storage and heat technologies with large bills and unrealistic financial returns. So how can you make sure your project is right?

1 Review your site energy demand and get a solution to fit your needs. Since the Feed-in-Tariff ended, the success of electricity generation schemes depends on using the energy generated on site, rather than exporting it to the grid.

First review the half-hourly demand for electricity throughout the day and the year, or heat loads, then make sure any new scheme (if an investment is appropriate at all) is sized optimally to offset purchased energy.

An oversized generation scheme will 'spill' energy onto the grid for relatively low export revenues. An oversized heat project will operate sub optimally and see much of your valuable capital sitting idle. Either will result in a lower return on investment.

2 Get grid connection applications prepared by independent experts. Since 2018, Distribution Network Operators have been able to charge fees to process connection applications – with some costing more than £8,000.

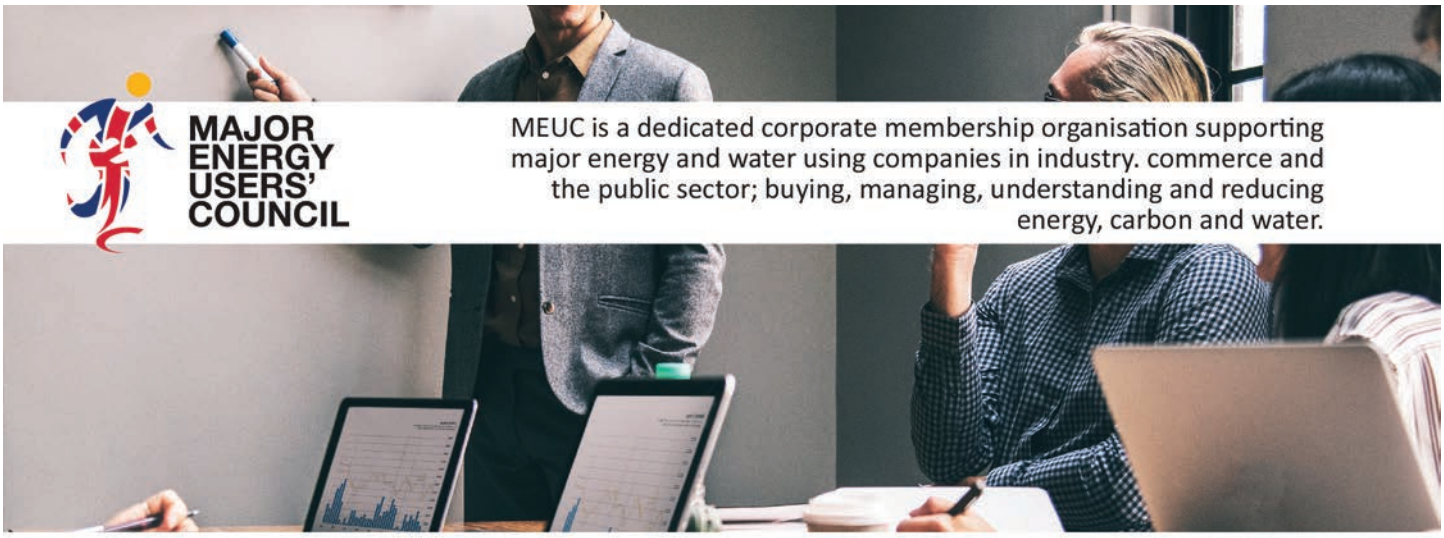
Since the switch from G59 to G99 standards in 2019, the amount and level of technical detail required within a valid application has increased significantly. In some cases, installers are charging high fees for what are now technically flawed applications doomed to fail. Others are putting applications in their own name, leaving the client exposed to a potential ransoming of grid rights in exchange for a lease option or installation contract. For peace of mind, make sure your application is drawn up independently.

3 Put schemes out to competition between different installers. Once you have identified the right scheme (the best technology, size and configuration) and the grid connection offer has been secured in your own name, put the specification out to competition. Invite three of the best-performing installers for your proposed system, size and location to tender; this ensures you get the right system, from the right installer – and at the lowest cost.

4 Guard against profiteering installers. Unfortunately, installers are invariably opportunists, with many trying to sell clients as large a project as they can get away with. It is crucial to compel your installer to put your best interests over their own.

This is achieved by independently ascertaining an overarching specification and an appropriate contract, competitively tendering this package amongst the best installers, scrutinising the winning bidder's designs and overseeing the quality of their installation.

5 Seek specialist advice. It is important to have your site and any potential for schemes reviewed by an independent expert. Holistically consider the technical, commercial, regulatory and policy-related aspects before committing to one any technology, system or installer. Making the wrong decision could be very expensive. te



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Councils 'should buy clean power direct' to hit net zero faster

Bristol-based Thrive Renewables says a no-lose option for councils tasked with delivering net zero is to buy local. Brendan Coyne reports

Local authorities should buy clean power direct from producers, particularly community schemes, to speed decarbonisation, according to Matthew Clayton, managing director at Thrive Renewables.

"If local authorities put out tenders for delivering renewable power direct into the city estate, that would be the fastest way for them to meet net zero objectives and ensure genuine local participation," says Clayton.

Renewables investors and developers, he says, are keen to fund and build projects, which can then be transferred to community ownership over the medium term.

Clayton says Thrive has already developed models that enable that approach in a subsidy-free environment, both private wires for industrial and commercial hosts and bridge funding that enables communities to take control of their own renewable assets.

Based in Bristol, Thrive's Clayton says the local authority, which hopes to find an institutional partner to fund the first £1bn tranche of its net zero programme, stands a good chance of attracting the required investment.

"I think they could get [the £1bn]," said Clayton. "It won't be overnight, but if an arbitrary

Funding for communities to take ownership

Thrive has deployed some £12m into community energy projects via bridge funding, which enables communities to take over assets from investors. The 7MW wind farm at Mean Moor in Cumbria is the largest of its bridge fund investments to date, at £7m. "Within five months the community has raised £4m, so has taken out over half of the initial £7m, and it plans to take us out completely over the next 18 months," says managing director Matthew Clayton, "so we will have managed the scheme from city investors and into community ownership."

PPAs and private wires

Thrive funded a 1.5MW turbine at potato processor Greenvale in 2014. The firm sought to maintain existing contracts and win new business by installing its own clean power, as well as hedge against market fluctuations. Greenvale consumes about 50% [of the output] on site and what they don't use "we take to grid", says Clayton. "It reduces their costs and helps win business from an ESG perspective."

line is drawn in 10 years and we look back at what has been achieved by the city, it will have made a material impact."

Clayton says the "intention and appetite" to decarbonise is "definitely there" from local authorities, with Bristol "probably leading the way".

"But the most powerful thing local authorities could do is look to purchase renewable energy directly from local energy projects."

Liquidity issue

In the broader market, he says utilities and trading entities also "have a role to play" in rebuilding the longer-term power markets required in a post-subsidy world.

"Fifteen years ago [pre-subsidies], energy traders were routinely trading, five, 10, 15-year futures around Europe. But then subsidies meant that the need for longer-term liquidity in the market evaporated," said Clayton.

"Now subsidies have ended, bar for nuclear and offshore wind, the energy market needs to again provide that longer-term certainty so investors can hang decisions on those contracts."

Clayton says given appetite for longer-term futures has returned, "I'm optimistic that we will see that liquidity start to stretch out again."

If it does not, he suggests, "frankly nothing will get built."

In the meantime, Thrive continues to seek subsidy-free renewables investment projects between £500,000 and £15m across both community projects and direct PPAs at industrial hosts. It has an additional £11m to invest following the sale of two wind farms earlier this year. te

> *Now subsidies have ended, bar for nuclear and offshore wind, the energy market needs to again provide that longer-term certainty*

Cost still outweighs sustainability for energy managers

Despite net zero pledges, nearly half of energy managers says it isn't their highest priority

Less than one-fifth (18%) of UK energy managers say hitting sustainability targets is their number one business priority, according to a survey commissioned by Npower Business Solutions, Energy HQ.

Despite the recent global attention on the environment and net-zero pledges from a number of UK companies, 48% of energy managers admit saving business energy costs still remains their primary concern.

These findings are potentially due to increasing political and economic uncertainty in the UK with three quarters of respondents concerned about potential business energy price hikes. Brexit is thought to be the greatest factor that will affect energy prices (32%) with 40% believing a no-deal Brexit will lead to consistently higher

More than quarter (28%) do not feel prepared if this happens. Regarding a potential change in government, respondents believe that this is likely to lead to increased price instability (60%), greater regulation (50%) and the continued rollout of new energy-related policies to meet net-zero targets (56%).

However, energy managers are already implementing a number of strategies and tools to help manage energy efficiency and better prepare their business for continued uncertainty. More than half (52%) have employed employee behaviour change programmes and 41% are focused on engaging in a long-term (5-10 year) energy management plan.

48%

of UK energy managers say saving business energy costs still remains their primary concern

41%

of UK energy managers are focused on engaging in a long-term (5-10 year) energy management plan

Ben Spry, head of flexibility services at Npower Business Solutions, Energy HQ says: "By incorporating demand-side response schemes and other energy efficiency tools at their disposal into their longer-term plans, businesses won't be forced to choose between cutting energy costs and hitting sustainability and decarbonisation targets."

Employee behaviour change programmes are also highly effective in reducing business energy consumption, with 42.8% of energy managers reporting they have led to the greatest reduction in energy use for their business.

Other energy-saving business tools referred to included LED lighting (30%) and implementing energy monitoring tools/ software (21%). te

Jo Butlin, managing director at Energy Bridge, looks at the key ingredients to ensure future-proofed energy investment

Investing in UK energy: buy, twist, stick or bust?

With another two suppliers hitting the buffers recently, government and policy at a standstill, regulatory change cauterising investor confidence and the smart meter rollout way behind schedule, there is an argument to say forget the UK energy market and go and look elsewhere to invest.

But it is not all as bad as it may appear. Despite the barriers that are created through a vacuum of policy, the fundamentals are all pointing to a world of opportunity:

- We know now, even with today's generation mix, that the need for flexibility in demand and supply is growing;
- We know that the electrification of transport will create increased demand, generating the need for new generation assets;
- We know that developments in AI and data analytics will only improve the operational efficiency of buildings and assets;
- We know that to achieve anything near to net zero by 2050 we need fundamental change to how we heat our buildings; and the big one
- Climate change and the need for action are not going to go away and the drive for change is more likely to accelerate than decelerate in the UK.

While hunkering down with existing assets and waiting for circumstances to change may feel like the least risk option, it is also likely to deliver lowest returns.

Policy and regulation change will always follow, not lead, markets. So how, in a world of opportunity, do investors navigate policy vacuums and uncertainty?

There are three key ingredients that if put in place can help deliver an investible and future proofed investment strategy:

1. Maintain optionality: As we have seen time and again, a reliance on revenues delivered through regulated schemes can be a fool's game. While, initially, returns may be good, when the hatchet goes down, businesses can be left floundering for a new business model or replacement revenues. Lessons should be learned from the experience of FITs, embedded benefits, Capacity Market and CfDs, rapid changes to which have resulted in both loss of investor confidence, but also the need to replace lost revenues quickly. Going forward, investors should ensure that there is at least a strategy for a 'plan B' and preparedness to pivot quickly if required.
2. Understand the full risk landscape: Everyone knows that energy is complex. The need to reconcile a physical market to a paper market when demand and supply are only known after the event, and sometimes a long time after the event, creates the complexity. All parts of the energy value chain are impacted to a greater or lesser degree by this characteristic and it is imperative that investors understand how. By understanding the full risk landscape, it is possible to create and manage plans to mitigate those risks. As a rule, over the past five years, the drivers of value shrinkage could have been foreseen and planned for.
3. Maintain the quality of people: There is a need to both understand underpinning market structures, regulations and policy but also commercial and operational reality of how business dynamics actually work in the market. Assumptions on either need to be robustly validated and it is people with experience and knowledge who can support investors in making decisions and appointing suitably skilled teams.

It is not an easy time for investors, but by applying rigour and expertise to decision making there is a way through.

It is not straightforward but, as a sector, the underlying fundamentals should be sufficiently attractive for investments to be made with confidence. te

> ***Despite the barriers that are created through a vacuum of policy, the fundamentals are all pointing to a world of opportunity***
> **Jo Butlin, Energy Bridge**

Energy at the heart of Parliament

We are used to seeing the House of Commons at times of high drama, but the media coverage can give a rather misleading impression of what really goes on there. Behind the scenes, away from the cameras, you will find MPs learning more about energy and climate issues by talking with academics and those who work in the industry.

One forum for these discussions is the All Party Parliamentary Group for energy Studies (PGES), where MPs and Lords discuss topical energy issues with experts in their field.

The PGES' Summer Reception is always an entertaining event and Alfa Energy Group was delighted and honoured to host this year's reception on 9 July. MPs and Lords were treated to speeches from energy experts before the socialising began.

Jeremy Nicholson welcomed guests on behalf of Damir Ahmovic, CEO of Alfa Energy Group. He highlighted the challenges for energy as the UK aims to achieve 'net zero' carbon emissions by 2050, pointing out that UK action will count for little without viable solutions to reduce emissions globally.

The environmental theme was taken up by guest of honour Dr Christoph Frei, Secretary General of the World Energy Council. Dr Frei spoke about the scale of the task ahead of us and the difficulty in making predictions so far into the future. But he also expressed his optimism that better and cleaner technologies will deliver so long as the right policies are in place – a positive note on which to end the formal part of the event.

Alfa Energy Group would like to thank the PGES Studies and all those who attended for making the evening such a tremendous success. It is heartening to see MPs so interested in the issues affecting energy users. Their relationships with industry experts will be especially important as Parliament considers what measures are required to hit the UK's ambitious 'net zero' climate target by 2050.

Alfa Energy Group partners with businesses to provide energy management and procurement services, while supporting them with compliance. We are proud to support the work of the PGES to help keep MPs informed about the policy and technological issues that are so important to business energy users.

Alfa Energy's Annual Conference also brings together energy experts, academics and business leaders to discuss the latest developments in the ever-changing energy landscape. Our next conference will be held on 26 March 2019, so save the date now and get in touch to reserve your place by emailing Alfa Energy Group at events@alfaenergygroup.com

Left to right: Dr Christoph Frei, Secretary General of the World Energy Council, Damir Ahmovic, CEO of Alfa Energy Group, Ian Liddell-Grainger MP, Chairman of the Parliamentary Group for Energy Studies

Jeremy Nicholson, Corporate Affairs Officer, Alfa Energy

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A metered response...

Amjad Khan of TPI Lumens Business Services previously suggested metering and billing issues are having a serious impact on SMEs. Colin Grenville, a director of the UKAEE, probes a bit further

The causes of an apparent energy debt crisis for SMEs were outlined in the August/September issue of *The Energyst* as being "in the most part... caused by metering and billing problems", specifically:

- Issues resulting from inaccurate meters
- Regularly underestimated supplier invoices, resulting in an eventual large catch-up bill

While some of this is true, the article implied metering issues are more prevalent than reality would suggest, and it follows that energy debt might accrue from such issues. The article opened with reported research from the Money Advice Trust based on a sample size of just 22 and extrapolated that to apply to the whole SME population, although did note the lack of published data about energy debt in this sector.

The article continued to state that: "Faulty components mean many of the UK's 53 million gas and electricity meters are inaccurate."

I think the tax man would have something to say about that, but it does depend on your definition of "many".

Looking at available data from the Office for Product Safety and Standards (OPSS), 231 electricity meters and 1,212 gas meters were independently tested in 2017 of which the majority were found to be working correctly.

Of course, not all faulty meters are identified and reported for testing so there may be more, though it is encouraging that of the meters tested most were found to be within expected tolerances in line with the GB National Legislation or, from 2006, in line with the Metering Instruments Directive.

In Service Testing

Of the UK's 53 million meters, the majority are domestic meters which fall under the OPSS's 'In Service Testing' (IST) programme.

IST is a national sampling scheme for domestic gas and electricity meters based on BS 6002-1:1993 (sampling procedures for inspection by variables). Suppliers are required to submit samples to the IST approved test stations for laboratory testing and the programme helps identify meters or populations of meters where accuracy is below expected standards.

Meters may continue in-service for as long as they conform to the regulations and must be removed from service if not. Accordingly, IST is a key component in consumer protection.

Metering accuracy is therefore generally excellent. Additionally, upgrades to the Balancing and Settlement Code to introduce half-hourly metering to 05-08 profile meters under BSC Modifications P322 and P272 have also improved the availability of detailed energy data.

This helps inform time and intensity of energy use and enable improved understanding of energy waste, as well as giving suppliers the accurate data required to improve billing quality. Nonetheless, there remain many smaller meters which do not benefit from half-hourly settlement and here it remains important that the customer takes regular meter readings and checks these against their supplier invoices.

As with all business costs the end user should ensure energy is managed closely and any variances investigated. Such variances can be minimised by submitting regular meter readings to the suppliers and avoiding estimated billing altogether.

Furthermore, a good record of regular meter readings will be helpful in the unlikely event that there is a problem with meter accuracy in the future, both aiding identifying a problem and the prompt resolution of any subsequent supplier billing queries.

Fit for purpose

In addition to checking meter readings, it is also important to ensure the meter is fit for purpose. Meters have a specified accuracy where the margins of error do not exceed the prescribed limits throughout the entire load range at which the meter is designed to operate.

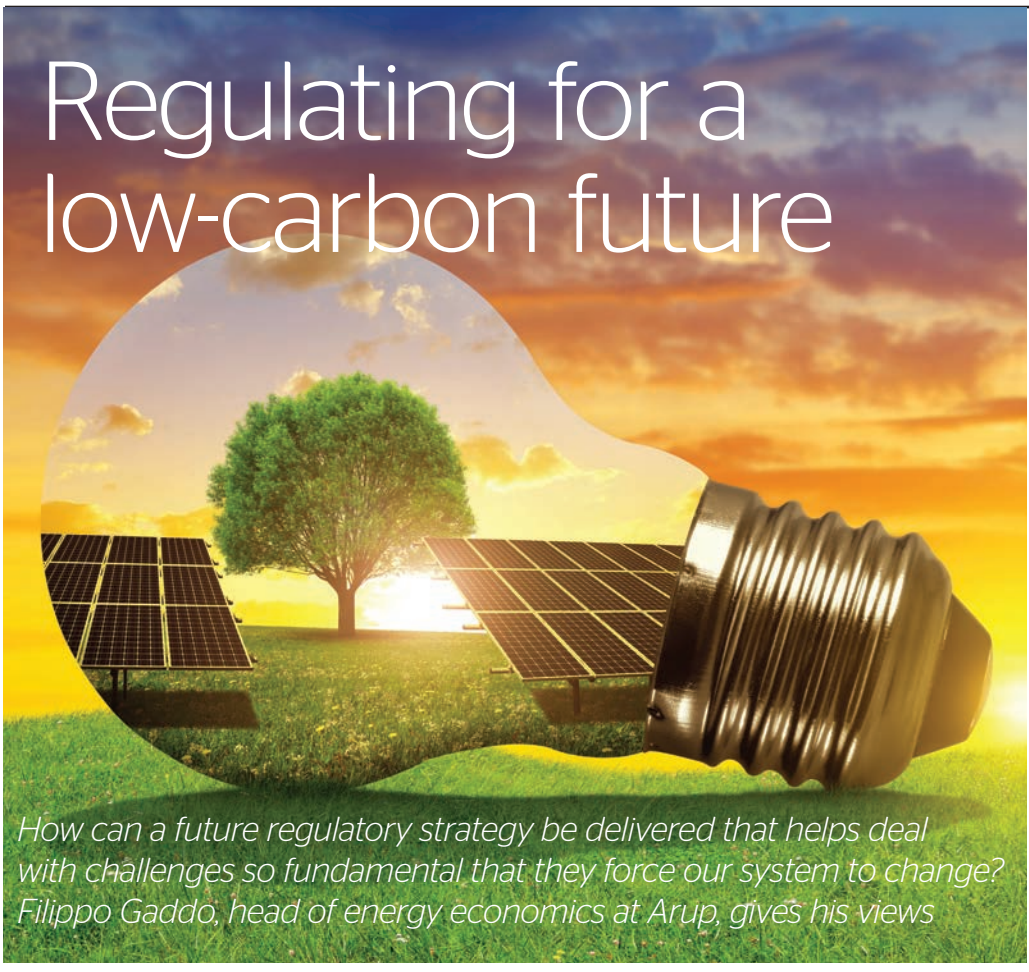
Accordingly, having an incorrectly sized meter may lead to measurement accuracy problems. An Ofgem factsheet on meter accuracy and billing disputes, including testing can be found at https://www.ofgem.gov.uk/ofgem-publications/42361/5875-factsheetmeteraccuracy-and-billingdisputes-pdf.

While the government mandated roll out to smart meters, on the many smaller 01-04 profile class meters, has been delayed again, in the interim many suppliers are now offering free Automated Meter Reading (AMR) meter upgrades to existing manual meters as part of the energy contract offering which are then transferrable to other suppliers if you switch. These can provide half-hourly interval data for the many smaller sites as well as being linked to energy billing to eliminate estimate reads.

While manual meter reading is still recommended to calibrate from time to time against data on remote monitoring systems, the days of crawling around into dark, confined spaces with a torch are perhaps nearing an end. te

UKAEE will be holding a joint meeting with the NE Branch of the Energy Institute, titled 'A Christmas Present for Kiribati', on 10 December. Visit: https://tinyurl.com/y2ultbj5

Regulating for a low-carbon future



How can a future regulatory strategy be delivered that helps deal with challenges so fundamental that they force our system to change? Filippo Gaddo, head of energy economics at Arup, gives his views

The launch of the *Strategic investment and public confidence report* is a welcome and timely prompt from the National Infrastructure Commission (NIC) on the necessary debate around the future role of regulation in utilities. It demonstrates that our system and regulators are not failing and have delivered against significant challenges. But the industry cannot rest on its laurels.

Despite success, the challenges of decarbonisation, decentralisation and digitisation are so fundamental that the whole system will inevitably need to evolve. Developing a long-term vision will be essential, and clearly defining the role of regulators within this will be key.

Strategic policy statements will be needed to create a vision for a future system – agreed by industry, defined by government and with a clear mandate for regulators to execute change.

It is that central vision which will breed greater confidence for investors and gives utilities flexibility in the way they deliver business plans and investments, which will in turn help achieve the positive societal outcomes that everyone in the industry should be aiming for.

Regulating for a resilient low carbon future

Regulation is critical to delivering access to affordable, reliable and sustainable energy. But at present regulators do not have the power to mandate actions on issues like climate change.

Most in the industry would agree – regulator, government or utility – that recent business planning cycles have placed a lot of emphasis on protecting today's consumers by keeping costs low in the short term, and less on contributing to long-term thinking to solve future societal and environmental challenges.

So, the conversation provoked by the NIC needs to be used to address the intergenerational trade-offs and give our regulators and utilities the power to deliver in the long term. Examining regulatory cycles and the longevity of strategic investment decisions is just one example of what should be looked at.

Who loses out in the short term if the focus shifts? In our interconnected world, a whole system approach and a need for system resilience across utilities – water, energy, telecoms – is blurring the lines between industries and sectors.

Unifying efforts and creating efficiencies across regulatory bodies spanning multiple industries, that often serve the same consumers, should offer some additional protection.

The role of the UK Regulators Network (URN) will be essential, and the NIC's suggestion of more powers needs significant follow through. The URN will quickly need a remit to coordinate whole system thinking and frameworks around issues like innovation, resilience and digitalisation.

Beyond the NIC report

Understanding how we would regulate new or additional technologies like carbon capture and storage (CCS), Electric Vehicle charging infrastructure and district heating will be critical in clarifying their role in a low carbon energy system. Ongoing discussion on applying a Regulated Asset Base (RAB) model for new nuclear power should also be considered; and whether a RAB-like model for local energy systems, energy efficiency and microgrids is needed.

If regulated models are extended to new sectors and technologies, would Ofgem manage them? Would different regulators be needed? Or would the remit of existing bodies such as the Oil and Gas Authority, for example, be expanded? What would be their remit and governance? And finally, how could a new competitive/proxy model that has been developed by Ofgem already (such as OFTO or the SWW model) be potentially applied to new technologies?

Although it was not within the scope of the study, the role of new regulated models and how they interact with existing regulation needs to be addressed.

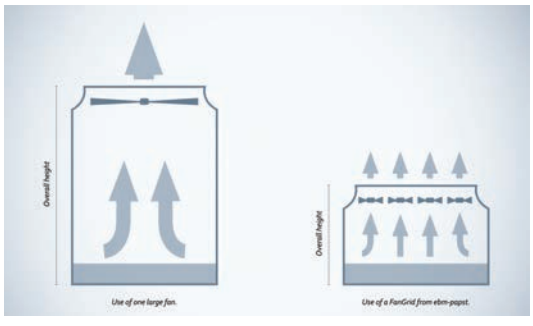
I agree with the NIC that there is a need to enshrine the use of more streamlined competitive models in policy and legislation, but this also needs to go a step further and cover other areas that will almost certainly need to be regulated in the future given net-zero ambitions. te

Team players for efficient cooling towers

Smart EC fans withstand harsh environmental conditions

Energy efficiency requirements for cooling towers for data centres, hospitals, hotels, office complexes and other industrial buildings have become more rigorous. In this context, the fans used in the towers, which are main components, play a key role. If modern EC motors are used in cooling towers instead of conventional AC technology, energy consumption and operating costs can be significantly reduced. It pays to convert to EC technology for other reasons as well. The EC fans from ebm-papst feature infinitely adjustable speed control, can be interconnected and withstand harsh environmental conditions.

Fans in cooling towers are responsible for efficiently dissipating heat to the environment; in particular, heat generated when a process, system or building is cooled using water. At the same time, the fans that are used must be extremely rugged because they have to withstand high humidity levels, various environmental influences and rapid changes in temperature. And last but not least, they must be as quiet as possible – particularly if the cooling towers are located near residential areas or mixed-use zones.



The ebm-papst approach includes replacing the large fan with several smaller fans running in parallel operation (a FanGrid)

More fans, more benefits

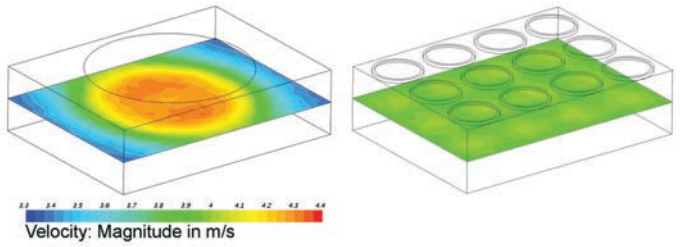
With conventionally structured cooling towers, it is becoming more and more difficult to satisfy these requirements completely. In order to generate high air flow, very large fans are typically used. They are driven by transmissions or belts from an AC motor. Due to the weight of the large single fans, they have a solid design and cannot be installed until they reach the construction site. This makes it virtually impossible to precisely balance the rotating impeller, which frequently leads to premature failures in operation. Such fans often run in two-phase, star/delta or on/off operation. In addition, the corners of the cooling tower do not have uniform through-flow and the towers also end up being very high because, to achieve even through-flow there must be a large space between the fan and the heat exchanger nozzles. The ebm-papst approach includes replacing the large fan with several smaller fans running in parallel operation (a FanGrid), which translates into several benefits in practice.

The individual fans can be stacked or arranged in rows to use the available space to maximum advantage. Due to the fans' small diameters, cooling towers can be built more compactly and depending on the floor space, have a rectangular or square cross-section. Smaller fans are easier to handle than one large fan. The latter benefit makes transport and installation easier, but is also a major advantage when replacing the fans. And until a fan is replaced, the cooling tower can operate normally. The speed of the other fans is simply adjusted to maintain constant air performance. During the design process, the relevant redundancy requirements can be taken into account. In addition, the air distribution is much more even when several fans are used. Flow-through is more uniform for all components and disadvantageous dead zone are reduced.

Fans are available in wide range of sizes and a variety of diameters

Today, the benefits of a FanGrid can be leveraged in a wide range of applications. Motor and fan specialist ebm-papst provides FanGrid fans for cooling towers in axial or centrifugal design, for example. This means that different requirements for pressure increase and air flow can be satisfied. Axial fans show their strengths when high air flow and moderate pressure increase are required: for inlet operation, for example. Centrifugal fans are designed for high back pressure and are recommended for pressure operation. A wide range of sizes with a variety of diameters is also available.

ebm-papst has a flexible selection tool to help customers find the optimal combination of fans for a wide range of applications: the ebm-papst FanScout. Based on up to five application-



Air flow comparison: The air distribution in a FanGrid (right) is much more even; all components receive a more uniform flow-through

specific operating points and the anticipated operating times, this software determines the most efficient FanGrid solution. The amount of installation space available, maximum number of fans required and redundancy requirements can also be taken into account. And there is also an option to determine the life cycle costs of the best combination. In this way, users receive a reliable, robust cost breakdown upon which they can base their investment and modernisation decisions.

EC technology: energy efficient and quiet

The driving force behind cooling tower fans are modern GreenTech EC drives that function highly energy efficiently in full and partial-load operation, are designed for long service lives and feature infinitely variable speed control. This ensures a constant air performance under all conditions. With over 90% efficiency, the motors deliver much more than the values required in efficiency class IE4. The flow machine design also contributes to increased efficiency and quiet operation. Problems due to noise protection regulations are a thing of the past.

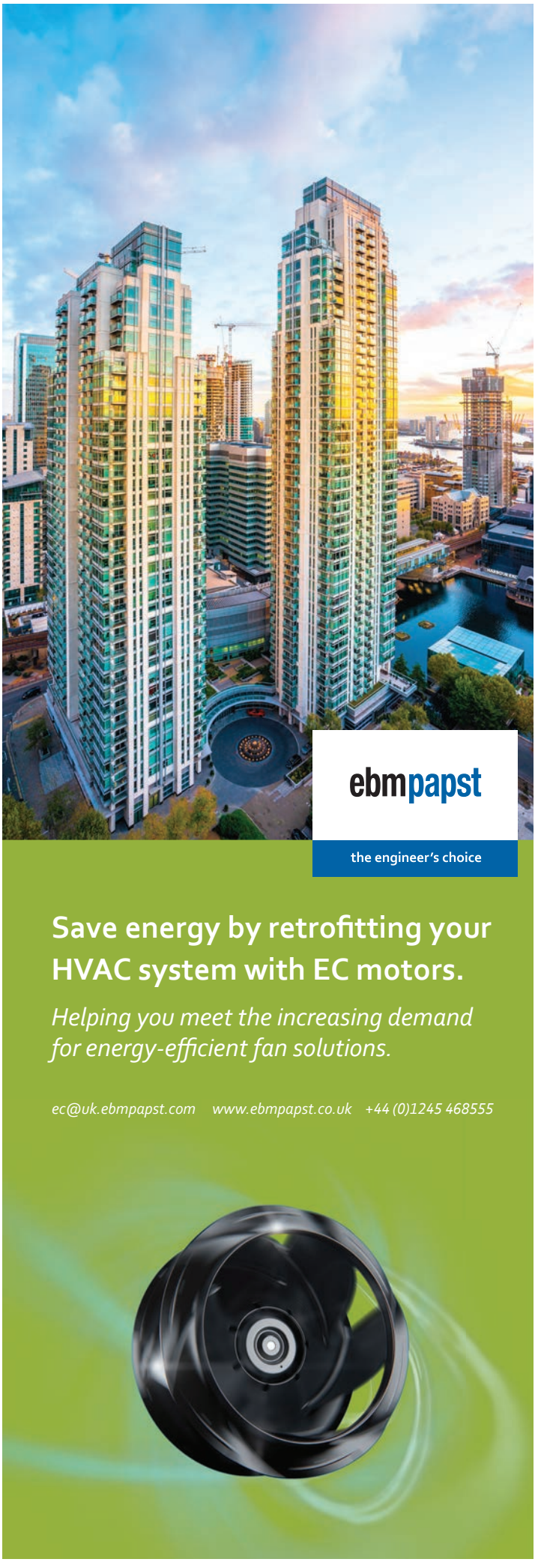
An example application shows that the energy savings pay in practice. Instead of one large fan with a diameter of 2,100mm, four axial fans with a diameter of 910mm each were installed in a cooling tower to generate the same air flow of 87,040 m³/h at a static pressure of 100 Pa. This enabled power consumption to drop from 7.8kW to just under 5.3kW (four times 1.32kW). In total, the retrofit meant annual energy savings of almost 22,000kWh for the operator.

For rotation monitoring, the fans can be continuously monitored via an ebm-papst cloud connection. In the process, internal measured values such as speed, motor temperature and vibration values are read out and transmitted to the ebm-papst cloud. Users always have an eye on the FanGrid fans and, if necessary, can plan preventive maintenance on their cooling towers.

Successfully tested under extreme conditions

To withstand the high humidity and rapid changes in temperature common for use in cooling towers, the fans have extremely rugged designs. All components are protected by special coatings. The fan series have proven their resistance under extreme test conditions. Salt spray tests, vibration and shock tests, and proprietary corrosion and moisture tests were used for qualification. ebm-papst created a custom environmental classification, H2+C, for its tests. And ebm-papst EC fans have reliably performed their function in cooling towers for years. ●

FanScout is a flexible selection tool to help customers find the optimal combination of fans for a wide range of applications



Hydrogen key to net zero

Volker Schick, market development manager, Europe at Wärtsilä Energy Business, says the UK will struggle to hit net zero without green hydrogen

There remains a huge amount of work to do to decarbonise industry, heat and transport and achieve the government's net-zero commitment by 2050. However, the UK is in an ideal position to pioneer the solution – green hydrogen and green hydrogen-based fuels.

Harness excess wind

In 2018 we saw more than 100 negative-price half hours caused by excess renewables, and these occurrences will become increasingly common. But that excess power can be used to split water molecules into hydrogen and oxygen using electrolysers, enabling a vast number of uses.

Green hydrogen-based fuels such as synthetic methane can be stored for long-term energy storage to help our flexibility needs, used to power gas peaking plants or as a replacement for fossil fuels in transport, heating and industry. Concerns have been raised around the cost of green hydrogen projects. However, Bloomberg recently projected an 80% drop in costs by 2030 as the industry scales up, opening the way for its widespread use as a carbon-free fuel.

Germany's approach

Germany has identified hydrogen as the key technology to achieve carbon neutrality and plans to become the world leader in its development.

The German government has announced that 20 new research laboratories will receive a total of €100m a year to test new hydrogen and hydrogen-based technologies for industrial-scale applications.

Energy firms including Ørsted and Shell are seeking offshore wind planning permits in Germany and the Netherlands without a grid connection, and instead will use the power produced specifically for the production of hydrogen, with a large-scale electrolyser installed in the sea.

Multiple studies have shown that energy system integration and sector coupling could substantially reduce the overall costs of decarbonisation. For Germany, it has been estimated that the transition to a well-integrated energy system in 2050 would be €600bn cheaper than a system that is strongly dependent on electricity only.

Plot the right path

Our *Pathway Towards a 100 per cent Renewable Energy Future* report calls for a holistic approach to decarbonisation.

Renewables already provide as much as 40% of the UK's electricity generation and that proportion looks set to grow significantly. It won't be too long before renewables effectively become baseload generation.

Once that happens it is essential that we have smart, flexible generation capacity, which will include battery storage for short term supply-drops and the use of green hydrogen-based fuels to power flexible power plants when demand is high and renewable generation is low.

To help in the development of hydrogen-based fuels and sector coupling we developed the Wärtsilä SparkUp Challenge back in 2017. Our eventual winner was Carbon Recycling International (CRI), a world leader in the utilisation of CO_2 to produce synthetic fuels, greener chemicals and products with lower carbon footprint.

We are engaging with governments, cities and industries around the world that share our vision and we are collaborating to make it a reality. However, the UK risks falling behind without clear policy in place to encourage and incentivise the development of hydrogen, hydrogen-based fuels and battery storage.

Ahead of hosting COP 26 in Glasgow next year, the UK government will announce its long-awaited energy white paper setting out its pathway to net zero.

Along with encouraging the installation of additional renewable capacity, the document must consider the need for sector coupling to accelerate decarbonisation across all sectors of the economy. This includes support for developing green hydrogen-based fuels, while creating a clearer roadmap for decarbonisation and developing the framework for an open market in flexible generation.

In May last year, the UK announced a £20m funding pot to enable the development of hydrogen technology, but much of that has been focused on initiatives for producing hydrogen out of natural gas using CCS. It is a unique strategy, but would ultimately ensure the UK's dependency on fossil fuels after 2050.

The UK has a huge opportunity to develop into one of the leading players in the development of green hydrogen but the long-term planning must start now. Otherwise it will be impossible for the UK to achieve its legally binding commitment to net zero. te

> ***Hydrogen from natural gas using carbon capture and storage would lock-in UK fossil fuel dependency post 2050***

Coventry hospitals cut costs by £1.6m per year

Vital Energi have guaranteed to cut energy costs by £1.6m a year for University Hospitals Coventry and Warwickshire NHS Trust by installing modern energy generation equipment and completing energy system upgrades at two hospitals.

University Hospital and the Hospital of St Cross will benefit from the energy efficient solution that will see carbon emissions cut by 4,125 tonnes each year.

The £6m scheme involves a CHP engine being integrated into the complex waste compound system at University Hospital,

with comprehensive modifications to facilitate the new technology.

This will deliver a low cost and low carbon heat and power supply to the hospital under an energy performance contract that guarantees the savings for 15 years.

The project also includes complete upgrades to the BMS system at the Hospital of St Cross and upgrading 2,000 lighting fittings to new efficient LED bulbs.

A considerate construction plan will be provided to avoid disturbance to hospital operation, and any disruption to University Hospital's energy supply. Vital Energi will provide operation and maintenance services for the CHP system for the next 15 years.

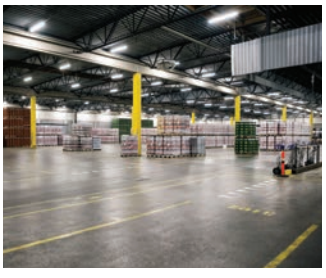
The scheme is being delivered under the Carbon and Energy Fund (CEF) and is expected to be completed by March 2020.

If Carlsberg did lighting...

Ledvance has played an instrumental part in helping Carlsberg's logistics centre reduce energy consumption by light by 50% – resulting in savings of 650,000kWh and 400 tonnes of CO_2 emissions per year.

Since the logistic centre is open around the clock, all year round, proper lighting matters a great deal for improved safety: a clear and homogenous lighting of work and circulation areas facilitates orientation and can help to reduce accidents.

The current conventional low light in some parts of the warehouse interior as well as exterior sometimes made it



hard to navigate and work top efficiently. The ramifications on safety, productivity, and overall employee stimulus – especially for night shifts, were all too significant to ignore. Not to mention, the problem of fluorescent tubes and metal halide lamps burning out during operational hours and not being replaced due to the disruptive downtime a replacement would entail.

In the five large warehouses, the conventional luminaires, each fitted with three 58W T8 fluorescent tubes (4000K), were replaced with damp proof 55W/ 4000K LED luminaires. Besides their very good efficiency of 115lm/W, the luminaires were selected for their high luminous flux of 6400 lumen, their neutral white colour temperature of 4000K and their ability to live up to all norms required at Carlsberg's logistic centre.

With a lifetime of 50,000 h (L70 / B50) the LED luminaires last about 2.5 times longer than the conventional types.

Scottish Power helps Virgin save £650k

ScottishPower has saved its industrial and commercial customers large sums of money after successfully predicting the key moments when the UK's electricity network would face peak demand last winter. ScottishPower successfully predicted three key Triad periods and alerted its Triad Management customers beforehand, helping them plan different strategies to reduce demand. Virgin Media reacted to the notifications resulting in a demand reduction of on average 13.9MW across 65 sites. By lessening the load on the National Grid when it was under most pressure, Virgin Media avoided using 830,000kWh of electricity, enough to fully charge more than 20,000 electric vans and saved £650,000 on electricity costs as a direct result.

New energy management software

Global Procurement Group (GPG) has developed new technology to provide real-time data on how much energy assets consume. The technology has been developed by the company's tech arm – ClearVUE Systems and Energy Lab.

ClearVUE's Alpha.Lite energy software as a service (e-SaaS) is a cloud-based, low-cost monitoring and targeting platform requiring no expensive hardware or site visits. The firms claims it provides valuable insight into energy consumption, identifying inefficiencies and helping reduce costs.

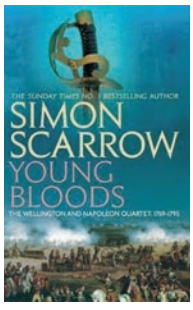
For more sophisticated energy management, the Alpha.PRO cloud-connected monitoring and targeting system provides live streaming of energy data to one-second granularity. Using the platform, businesses are able to get a complete view of their energy fundamentals, from a single circuit to multiple assets across the globe.

GPG also owns third party intermediary Northern Gas and Power.

David Hall

Schneider Electric's vice-president Power Systems UK & Ireland loves how technology and gadgets can be used to reduce climate change

Who would you least like to share a lift with? I can tolerate anyone, for a minute.
You're God for the day. What's the first thing you do? Reverse climate change.
What is the best piece of advice you have been given? Work hard, deliver results and treat people with respect along the way.
If you could travel back in time to a period in history, what would it be? I love technology and gadgets so if I could travel through time I would go forwards, not backwards.
Who or what are you enjoying listening to? I struggle to get through any artist's album in full (I'm a shuffler) but right now Noel Gallagher is getting good airtime.
What's your favourite film (or book) and why? I am keen on historical fiction, particularly military achievement, so the Revolution Quartet series by Simon Scarrow (Wellington and Napoleon), and the Emperor series (Caesar) and Conqueror series (Genghis Khan) by Conn Iggulden.



If you could perpetuate a myth about yourself, what would it be? It would be that I am an 'innovative electrical engineer' who developed technologies to reduce climate change – unfortunately, I am far from knowing everything about this complex and ever-expanding topic. Luckily, I work with some highly skilled and very talented people at Schneider Electric whose expertise we are very lucky to have to drive innovation.
What would you take to a desert island? How about a solar panel, a fridge and one of the beer pumps we saw at the bar when we met at the Schneider Electric press day at the new Tottenham Hotspur stadium. It fills the glass from the bottom up before stopping automatically at the brim so you don't spill any. I would just need a good electrical engineer to connect it.
What would you do with a million pounds? Travel more. Moving away from the traditional holiday locations to more remote destinations and experiencing different people and cultures. Definitely see wild animals in Africa before it is too late.

> *Nice cars and Swiss watches tend to be my weaknesses. The trouble with these interests is that you can't drive two cars or wear two watches at the same time!*

What's your greatest extravagance? I'm a petrol head, so nice cars and Swiss watches tend to be my weaknesses. The trouble with these interests is that you can't drive two cars or wear two watches at the same time!
What should energy users be doing to help themselves in the current climate? Whether in the workplace or at home, we all need to focus on our attitudes to energy reduction. As a minimum, challenge yourself to change your own energy lifestyle to ensure we all switch electrical items off when not in use. You should also investigate and learn about all the technologies available to you right now to help significantly reduce energy consumption. If you want to make it easy for yourself, call Schneider Electric, it's what we do. Play your part in delivering net zero and saving the planet.

What's the best thing you did workwise recently? We launched new switchgear that is brilliant for wind farms – smaller, drives lower overall cost for our customers and is more technically advanced, helping developers progress faster with renewable development. We also engaged with UK Trade to make sure we promote more UK content in terms of jobs both directly and indirectly. Helping to improve the environment and local job market feels like a good place to be. te

Pic: Sniers Moregut/Twitter

Bottom's up: At Tottenham FC's new stadium the beer fills through a hole in the bottom of the glass before stopping automatically at the brim, avoiding spillages and waste

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