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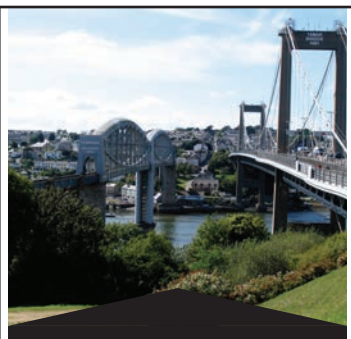

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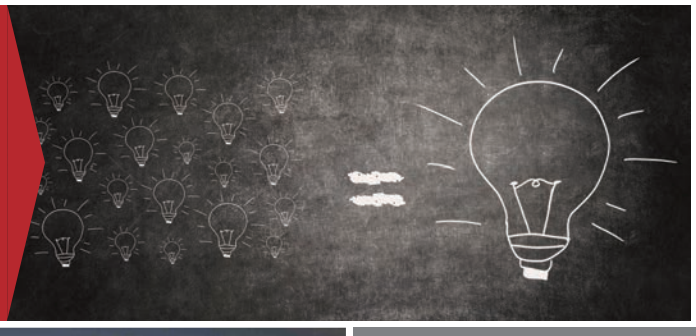

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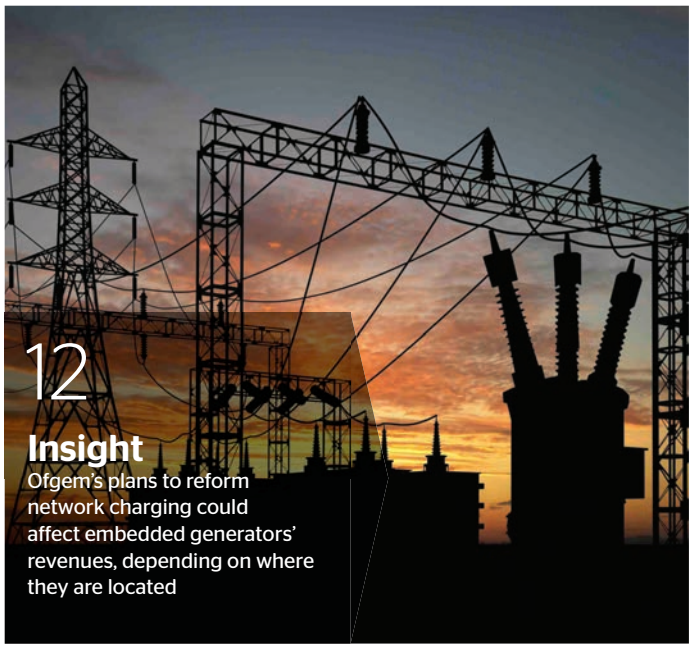

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Electric dreams

Decarbonising electricity requires storage to help balance fluctuations in output of different types of renewables generation. As such, there continues to be a huge amount of interest in storage, particularly Lithium-Ion batteries.

But how much is actually required?

McKinsey has predicted that there will be 1000GW of electricity storage globally within the next 20 years (for perspective, Li-Ion despite the hype, currently accounts for 4.3GW globally according to the IEA).

> ***In power systems with up to 95% renewables, the required electricity storage capacity is found to be below 1.5% of the annual demand in energy terms***

However, the need for so much storage capacity is less clear. A review of more than 60 studies on power and energy models by the University of Groningen concluded that for power systems with up to 95% renewables, the required electricity storage capacity is found to be below 1.5% of the annual demand (in energy terms). While for 100% renewables energy systems (power, heat, mobility), it can remain below 6% of the annual energy demand.

The Energyst recently surveyed readers about flexibility, including storage. We also interviewed some readers that are considering storage investment and found many are looking from a resilience perspective over anything else. Alex Mardapittas, CEO of battery and UPS manufacturer Powerstar, also thinks it's the cornerstone of behind the meter storage business cases. He cites a critical automotive component manufacturer that makes bearings from special alloy blocks provided by Rolls-Royce. "If there is any voltage dip, even for less than a second, the machines stop. That means they have to bin the alloy block. It's a lovely looking bin, but Rolls-Royce charges them £154,000 per block destroyed – and last year they binned eight blocks."

On that basis, perhaps short-duration storage will be used by the industrial and commercial sector to protect core business services or help maximise onsite generation to avoid cost rather than as a means to make revenue from grid services.

We will discuss demand-side response and storage at two London events in coming weeks. If you want to question experts about the economics of storage and flexibility, register for the DSR event, 13 September, at www.dsrevent.uk.

Behind the meter is the focus of the Battery Storage Event, 30 October. If you would like to attend, visit batterystorageevent.uk

We hope to see you there.

the energyst

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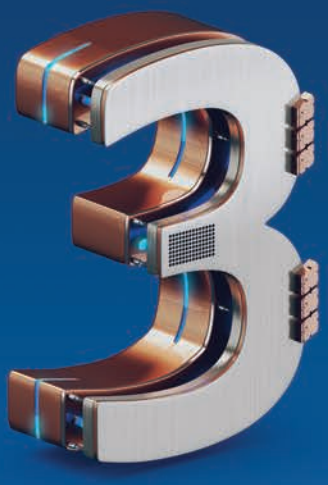

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Constraint trading, grid access and Triad: Ofgem scopes major charging review

Ofgem has shown its intentions regarding major changes to network charging and access.

The regulator is trying to ensure that the way businesses and households are charged for using the grid is reflective of the costs their actions cause.

Ofgem believes that distributed generators are exploiting loopholes in the current arrangements, and wants to force "developers to respond to signals that reflect the economic reality, not the peculiarities of the regulations".

Ofgem therefore plans a Significant Code Review to redesign charging and access arrangements, and needs to finish the redesign to coincide with the next set of price controls for network operators, in 2022/23.

The regulator indicated it aims to better define access rights and choices within the review. However, it will likely leave some elements of access reform to the networks themselves, such as continuing to providing different sorts of flexible connections, and enabling companies to trade curtailment and constraints with one another where they might ordinarily have to stop exporting generation.


Network charging regime change is coming

Letting industry deliver some aspects of change would allow the regulator to concentrate on core reforms to transmission and distribution charging.

DUoS

Ofgem said it may look at creating a new zonal charging structure for distributed generation. At present, distribution use of system charges (DUoS) treat generation as negative demand. So generators tend to get paid, even if their generation is not beneficial to the system. That may change, with Ofgem mooting zones that are demand heavy or generation heavy, with distributed generation charged – or credited – accordingly.

Triad/TNUoS

Ofgem dropped further hints about killing off the current Triad system within the consultation. The regulator said while the Triad regime has merit, it may also be introducing uncertainty, as predicting Triad periods becomes increasingly difficult, and causing distortions due to the differences in the way small and large generators are treated and charged.

For generators, Ofgem may move to treat charges for both distributed generation and transmission in the same manner, which could see distributed generators lose another chunk of income.

For demand customers, Ofgem said options could include moving away from charging based on demand during Triad periods to fixed time of use windows, akin to the bands used for DUoS charges.

Households and EVs

The regulator also plans to look at making households pay more reflective charges for network use.

While Ofgem said it does not plan to make any changes that affect basic household usage of electricity, its proposals would affect, for example, electric vehicle users.

If they are willing to charge their cars outside periods of network constraints, they could reduce network charges and connection costs. If not, they may pay more.

Feed-in Tariff scheme to close in April 2019

The government has confirmed that the Feed-in Tariff subsidy scheme for smaller-scale renewables projects will close next April. Beis does not plan to replace the scheme – and there will be no grace period for queued projects that miss the cut off date.

Beis said it may also move to stop those with early high tariffs earning higher subsidies should they replace their generation with more efficient technology, though it has yet to decide how to approach that aspect.

While stating that small-scale generation should be able to compete without subsidy in a level playing field, the department has launched a call for evidence around the value of small-scale renewables to the UK energy system, and how government and the private sector can help address existing market barriers.

UK Power Networks eyes 200MW+ of DSR and outlines tender plans

UK Power Networks said it could require in excess of 200MW of demand-side response to defer load-related reinforcement by 2023 and has outlined plans for its next round of tenders.

Publishing its Flexibility Roadmap, the distribution network operator also said it would commit to flexibility first, ie always assessing the case for flexibility over traditional reinforcement.

The document outlines plans for a procurement process that will begin with expressions of interest in September and invitations to tender for both 2019/20 and 2020/21 in December. The tenders will take place in March with contracts between one and four years available to successful DSR providers.

UKPN will tender for six months out as well as 18 months ahead of delivery – and will publish the locations in which it requires flexibility ahead of the procurement process. By 2023 that could be at as many as 53 substations.

Npower pays penalty for advanced meter failures

Npower faces a £2.4m penalty for failing to meet the deadline to install advanced meters at business customer sites, and for installing standard meters at some sites when it should have installed advanced ones.

Ofgem said the fine should serve as a warning to suppliers as the 2020 smart meter deadline approaches.

The fine is less than the £3.7m Ofgem wanted to impose but Npower challenged the regulator's original decision.

Suppliers had to 'take all reasonable steps' to rollout advanced meters to large business customer sites by April 2014. Npower installed 15,200 by that deadline out of 22,400 meter points requiring advanced meters.

Of the remaining 7,200, Ofgem found Npower had not taken all reasonable steps to install advanced meters at 4,000 sites. The regulator said it had also installed traditional meters at approximately 200 sites, breaching licence conditions.

Ofgem said Npower left it too late in the roll-out period for its efforts to install advanced meters to be effective. It added that the supplier did not make sufficient efforts to engage with customers to resolve installation difficulties in many cases; and didn't make sufficient efforts to ensure the meters were able to send meter readings.

These definitions of failures of 'all reasonable efforts' will serve notice to suppliers ahead of the smart meter rollout.

While households are not obliged to have a smart meter, suppliers are required to make 'all reasonable efforts' to offer every customer a smart meter by 2020.

Assessment: 'Go light on nukes, heavy on renewables, flexibility and energy efficiency'

The government should prioritise energy efficiency and keep investing in renewable energy and flexibility to deliver a decarbonised economy at lowest cost, the National Infrastructure Commission, an executive agency of HM Treasury, has recommended.

In a wide-ranging report, the commission urged ministers to quickly make decisions to avoid locking in higher cost outcomes.

Should government act now, the National Infrastructure Assessment suggests the UK can decarbonise power, heating and transport using low carbon and renewable sources so that consumers pay the same in real terms as today.

Commission chair Sir John Arnett said the UK has a "golden opportunity" to decarbonise without piling costs onto bill payers.

"Ministers can seize this chance by investing in renewables and other low-carbon technologies so they become the main players in our energy system – something that was considered a pipedream as little as a decade ago," he said. "But they need to act now to realise the full potential of what can be achieved."

The UK has a 'golden opportunity' to decarbonise

Power

The modelling for the report was carried out by consultant Aurora. It suggests that both high nuclear and high renewables pathways could deliver the same level of decarbonisation at comparable costs.

However, because the long life of nuclear assets could render them more expensive in the long term, particularly if renewables and battery costs continue to fall, the commission's report says government should rein in, at least for the medium term, the urge to fund more nuclear plants to see if those cost declines materialise.

In the meantime, a clear pipeline for auctions (contracts for difference) to help drive investment in renewable technologies should be established, said the commission, though government should prioritise mature technologies such as solar and wind to deliver extra capacity at lowest cost.

The report emphasised that investment in flexibility is a low regrets option.

Gas

The report also echoed calls by the Committee on Climate Change to establish proper hydrogen trials, which some of the gas networks are starting to push forward. Community level trials should be in place within three years, it stated.

Transport

Establishing the right framework for charging infrastructure will be critical to decarbonising transport. While the private sector could deliver most of what is required, ministers should consider targeted support for areas where the private sector is unlikely to invest, suggested the Commission.

It said vehicle-to-grid services (using car batteries to balance the power system for short periods while charging), or using second life EV batteries, could also cut overall system balancing costs, by reducing the need for other forms of flexibility, such as standalone batteries.

Carbon capture task force calls for subsidy and public risk share

The government-appointed carbon capture, usage and storage (CCUS) task force has delivered its recommendations to help deliver CCUS at scale.

It calls for similar subsidy support that has driven down the cost of offshore wind and other technologies during the past two decades, and for government to agree to share transport and storage infrastructure risks.

CCS or CCUS features prominently in most 2050 scenarios aiming to limit climate change to non-catastrophic levels.

Advocates argue that its component technologies are well understood, with energy minister Claire Perry pointing to about 20 projects around the world in the task force's report.

Meanwhile, according to studies delivered by the Energy Technologies Institute, the UK has vast storage resources equivalent to 78,000 million tonnes, and world-class oil and gas expertise.

But CCS/CCUS is not yet at a commercial stage, as Perry notes in her forward.

Norway's Sleipner gas field is used to store CO_2. Pic: Creative Commons/Blair175

Convincing investors to back it, even if their investment is de-risked by tax- or bill-payers, might prove challenging.

However, the task force thinks it can be done with the appropriate regulatory frameworks, subsidies, risk transfers and business models in place.

The report outlines the case for CCUS: that it could enable a hydrogen economy; could decarbonise heavy industry; may help decarbonise heat and transport and; potentially balance a power system dominated by renewables.

The report says CCUS could also generate new revenues from storage service provision to Europe, as well as retain jobs and skills as North Sea oil and gas production diminishes.

Commit to clusters

The task force makes a raft of recommendations, calling on government to commit by the end of this year to two CCUS 'clusters' by the mid-2020s and to ensure hydrogen projects can be funded under gas network operators' next regulatory framework (RIIO2), before they have to submit their spending plans to the regulator in September 2019.

Government and industry should identify North Sea and Irish Sea gas and oil assets approaching the end of their lives and consider keeping them open as potential CO_2 stores, the report adds.

To finance CCUS, the task force recommends government, industry and finance communities determine which risks might be shared and any new funding mechanisms that may be required.

'Uncertainty' as National Grid consults staff on restructure

National Grid is consulting staff about an organisational restructure.

The system operator said no decisions have yet been made, but has not ruled out job losses.

Staff would be allowed to apply for voluntary redundancy, the company said.

National Grid is separating out its system operator role from its wider business after government considered its duties for carrying out policy and balancing the power system were in conflict with its broader activities, such as building interconnectors and signalling where network investment is required.

Meanwhile, regulator Ofgem plans to allow network companies less generous earnings as it develops the next regulatory price control.

Commenting on the plans, the union Prospect said "the potential scale of these redundancy plans will create great uncertainty" for members.

Centrica Business eyes new CEO as Hanafin steps down

Centrica Business CEO Mark Hanafin will step down next March. The company said it has started to search for his successor.

Hanafin has been with the firm for a decade. Last year he took the reins at Centrica Business, a key division encompassing energy supply, wholesale energy, energy optimisation and energy solutions.

He drove the firm's push into distributed energy, bringing CHP firm ENER-G into the fold, and more recently demand-side response aggregator Restore.

Centrica group chief executive Iain Conn said Hanafin "was a major influence on Centrica's strategic review in 2015 and has been an invaluable member of my team since I joined the Group at the end of 2014, providing wise advice and support to me and to the Centrica executive team overall".

SSE gives green light for Npower deal

SSE shareholders have voted in favour of forming a new merged retail company combining SSE and Npower customer bases.

SSE chairman Richard Gillingwater welcomed the decision and said "demerging SSE Energy Services and combining it with Npower is the right thing for customers and for the energy market as a whole".

He added that the new supplier would "combine the resources and experience of two established players with the focus and agility of an independent supplier".

The decision to allow the merger now rests with competition authorities, though SSE is confident the deal will conclude this financial year.

Eon to axe 500 jobs

Eon plans to cut 500 jobs, about 5% of its UK workforce. The company said the redundancies would be made in non-customer facing roles. CEO Michael Lewis said the cuts were due to an increasingly competitive environment. He singled out the forthcoming price cap on tariffs as a contributory factor.

Eon is trying to cut £100m of costs over the mid-term. It has previously flagged the negative impact of energy market intervention and Brexit on its UK earnings.

Next Energy adds 67MW of solar PV

Next Energy Solar Fund has acquired 10 solar farms with a total capacity of 66.8MW for £42.2m.

The plants, located in the South West, take NESF's operating portfolio to 689.4MW.

Six of the solar farms earn 1.6 Rocs, the remainder earn Fits between 7.71p/kWh and 10.34p/kWh. All were connected to the grid between 2012 and 2014.

The fund said it continues to pursue further acquisitions.

Westcott PV park will be subsidy-free

Business park says PV investment will make it carbon negative

A Buckinghamshire business park is to build a subsidy-free 15MW solar PV farm on its land. Westcott Venture Park's owner, Rockspring, said it also plan to secure enough grid capacity to add battery storage to the site.

According to the firm, it will enable Westcott, located between Bicester and Aylesbury, to become the UK's first carbon negative business park – as it will generate more power than tenants can use. Excess power will be exported to the grid.

Westcott already has a 1.6MW solar plant, connected under the Fit regime in 2011 and developed by WolfeWare, which will also oversee the new scheme.

Solar contractorBritish Solar Renewables (BSR) is honing detailed design and plans to start construction within weeks.

BSR will also handle operations and maintenance.

The company estimates the solar development will deliver an internal rate of return greater than 7%.

How to enhance your energy strategy with demand side response technology

In this new educational series titled "How to enhance your energy strategy with demand side response technology", GridBeyond challenges the way many businesses see DSR, often as a peripheral service that sits alongside an energy strategy rather than an integrated and enhancing solution.

The series currently consists of a CPD accredited webinar and accompanying e-book, which are part of the GridBeyond Academy. Ideal for those with an intermediate understanding of DSR and energy management, the e-book touches on three core concepts in energy management: Reduce demand, Increase generation, and Optimise energy use, to unfold the integration and enhancement opportunities within each, that DSR and advanced energy technology present. The webinar then takes these core principles and shows the practical application of DSR technology on an industrial or commercial site, using real-life case studies to illustrate how GridBeyond clients have successfully used DSR technology to enhance their energy strategy. The interactive webinar also offers attendees the opportunity to ask questions of industry expert and managing director at GridBeyond, Wayne Muncaster.

Fundamental to the GridBeyond Academy is the basis that education leads to better business decisions, which is why many resources, including this latest webinar, are CPD accredited for assurance of high educational quality without promotion.

The academy has seen engagement increase by 135% when comparing 2017 to 2018, with 2018 still being far from closed. This demonstrates both a significant need for educational resources on energy related topics, and an increased interest in demand side response and energy services.

The GridBeyond Academy was recently highlighted at National Grid's Power Responsive Summer Reception event for fulfilling the industry objective to increase reach and improve accessibility to the services available through National Grid - one of the areas GridBeyond covers in its suite of energy solutions.

The e-book "How to enhance your energy strategy with demand side response technology" is available now, and the webinar of the same name takes place at 11am on Thursday 27th September. To download the e-book and to learn more about the webinar and register your place, visit www.gridbeyond.com/academy

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Fund keen to buy AD plants with subsidies

John Laing's environmental infrastructure fund (JLEN) has added a further 10MW of anaerobic digestion (AD) plant to its books.

The fund has acquired Egmere Energy and Grange Farm Energy for about £36m.

The 5MW Egmere plant, located in Norfolk, predominantly produces biomethane for gas grid injection, and has a 500kW CHP engine. It earns both RHI and FiT subsidies.

Grange Farm, in Lincolnshire, has a similar spec, output and revenue streams.

The plants were acquired from venture capital funds managed by Downing, EIS funds managed by Amersham Investment Management and minority shareholders.

Future Biogas will continue to provide management, operations and maintenance services to the AD plants after the acquisition.

The acquisitions double JLEN's AD portfolio. The fund has acquired two plants in the past year and outlined plans to buy more due to attractive yields when posting annual results in June.

Increased wind power drove renewables output higher in 2017

Wind up, coal down while warm 2017 cuts final energy demand

UK renewable power generation output increased in 2017, driven largely by more wind power capacity and higher wind speeds.

That led to renewables topping 29% of the generation mix, up from 24.5% in 2017, according to latest government data. Renewable generation capacity now exceeds 40GW.

The UK's high carbon price continues to drive coal off the system. Coal generation for the year stood at 6.7% of the total, down from 9% in 2016. Gas generation dipped to 40.4% of the mix, nuclear output also fell marginally to 20.8%.

Overall, final consumption of electricity dropped by 1% to 300.7TWh, the lowest level since 1995.

Final energy consumption was also lower by 0.7%, though the data suggests this was due to warmer weather, and that on a temperature corrected basis, final consumption increased by 0.9%.

Energy consumption in the industrial sector increased by 1.6%. Transport increased by 0.9%.

Energy consumption in the domestic sector fell by 3.7% due to warmer weather.

In the service sector, energy consumption in the private commercial sector fell by 1.0% between 2016 and 2017, in the public sector it fell by 1.7%. Consumption in the agricultural sector increased by 3.4%.

Ex-Drax expert to spearhead switch to energy from waste

Simec Atlantis Energy has hired former Drax conversion manager Ernie Rowe to spearhead conversion of the Uskmouth coal power station to a 220MW energy from waste (EfW) plant.

The company thinks conversion to EfW could deliver a second life for coal-fired power stations. In the UK, unabated coal has to come off the system by 2025.

In a market update, the firm, part of billionaire Sanjeev Gupta's GFG Alliance, said it hopes to produce power from the plant by the end of 2020. It will burn biomass waste and waste derived from non-recyclable plastic.

The company is involved in a joint venture to create pellets from refuse-derived waste and solid-recovered fuel. It calls this fuel 'Subcoal' and claims it will deliver an average calorific value of 20 mega joules per kg.

If the conversion is successful, Simec Atlantis believes it may act as a prototype for future conversions of coal plant to EfW that can also burn the Subcoal pellets.

The company said it will shortly announce the results of the front-end engineering and design (Feed) contract for the station, before tendering for engineering, procurement and construction (EPC).

The project is "of huge international interest," said Rowe. "With governments and utilities around the world being forced to close down coal-fired power stations, this conversion will offer a new alternative to decommissioning."

Chief executive Tim Cornelius said the plant has a 20-year PPA and 20-year fuel supply agreement in place. "It will have a lower levelised cost of generation which will allow us to deliver high margins on power sales," he said.

Cornelius said cash generated from power sales would be used to fund other projects.

Eunomia creates grid constraints map and says developers should collaborate

Consultancy Eunomia has developed a map showing grid constraints and opportunities for developers using the Renewable Energy Planning Database (REPD). In a new report, the firm says developers should form consortia to ease grid access and reduce their costs.

The report outlines the sometimes challenging process developers can face for connection agreements, and the costs imposed if network reinforcement is required to accommodate new generation.

But the firm says developers could use its maps to work out where new capacity might be sited without reinforcement, reducing queues for connections and maximising available network capacity, leading to lower cost connection offers.

Eunomia believes it may also enable developers to take more creative approaches in constrained areas, such as locating behind the meter at large energy users.

"Carefully deployed, such projects would allow renewables to reduce the demands on the distribution network, rather than increase them," states the report.

Developers keen to site projects in a constrained location could use the maps to identify other nearby projects and form consortia to share the cost of reinforcement, says the firm.

Eunomia also suggests DNOs could improve the maps by supplementing REPD data with their own data, such as that regarding already planned reinforcement work.

"Having monitored and analysed every renewable energy and storage application across the UK in recent years, we've already seen some interesting and unexpected opportunities," said Eunomia senior consultant Duncan Oswald.

"With a new wave of subsidy-free renewables looking an increasingly likely prospect, it's the right time for the companies that run the UK's distribution network and the developers that bring forward projects to start preparing.

"That means making sure that there is access to good, easily interpreted data on grid constraints, and a more effective way of managing the queue for connections."

Centrica takes stake in smart charging firm

Centrica has invested in Israeli smart charging firm Driivz to position itself for increased take-up of electric vehicles and the revenue opportunities they present for energy companies.

The UK's largest energy company will integrate the Driivz software platform to deliver smart charging, initially for businesses, via its Centrica Electric Vehicle Services unit.

In July, National Grid suggested EV batteries could provide "useful levels of support" to the grid from about 2030, with around 8GW of usable EV battery storage providing vehicle-to-grid services by 2040.

Driivz's cloud-based EV charging platform is currently used by about 200,000 drivers worldwide.

New world order: five options for UK and Ireland smart grid design

The Energy Networks Association is consulting on how to design a smarter, more flexible grid that harnesses distributed energy and flexibility in order better manage intermittent generation and enables electric vehicles to become a resource, not a problem for network operators.

The association has set out five 'worlds', ranging from a set up where distribution networks act as system operators and call the shots, to one where the electricity system operator (National Grid) retains command, with stages in between where the regional and national system operators coordinate around procurement and dispatch of flexibility.

It also moots a system where a new party, a flexibility coordinator, acts as a neutral market, providing services to both distribution networks and the national system operator.

The ENA suggested its proposals go beyond those put forward by Dieter Helm in the government-commissioned Cost of Energy review. Helm called for the creation of National System Operators (NSOs) and Regional System Operators (RSOs) with licence distinctions between distribution, generation "abandoned at the regional level".

Some distribution network operators have already started their transition to distribution system operators, where they procure balancing services from customers with generation assets or flexible loads to help manage parts of their networks that are running close to their limits.

Under all scenarios put forward by the ENA more flexibility, or demand-side response, will be required to keep the power system stable, as well as network reinforcement – i.e. more wires and substations.

How the smart grid (or grids) is managed and by whom is the key question for rulemakers and companies responsible for keeping the lights on and the ENA seeks views on its proposals from businesses by 25 September.

Charging changes may cost small generators

Andy Pace, director of Energy Potential, explains how Ofgem's plans to reform network charging could impact embedded generators' revenues, depending on where they are located

Ofgem published its consultation on future network charging arrangements and its plan to undertake a Significant Code Review (SCR) on 23 July. This consultation is wide ranging in scope but one of the key items it looks to address is the cost reflectiveness of network charging, particularly for generation connected directly to the distribution networks.

Distributed generation (DG) has increasingly benefited from additional revenue streams that are not available to transmission connected generation. This additional revenue is termed 'embedded benefits' and its value has increased considerably in the past five years. The concern for many industry participants is whether the value of embedded benefits represents the costs avoided by connecting at distribution rather than transmission.

Ofgem has already made inroads into the largest perceived distortion of embedded benefits by reducing the Triad benefit for embedded plant to close to zero (CUSC modification proposal – CMP264/5).

However, the planned SCR from Ofgem looks to go further on transmission and distribution network charges for DG.

Triad: Negative outlook

Ofgem identifies the Triad benefit as still not being cost reflective, even after the recent cuts under CMP264/5. This is because the new Triad benefit is set at the locational

element of Transmission Network Use of System (TNUoS) charges plus an avoided infrastructure charge.

However, in DNO areas where this falls below zero, the value is floored at zero to prevent generators being incentivised to switch off at times of peak demand. The process of flooring the Triad benefit to zero is very material in some areas with locational prices falling as low as negative c£30/kW.

Ofgem still considers a negative Triad charge to be undesirable and has suggested applying a capacity based charge in the same way as transmission connected generation are charged. This will have a big impact on DG in Scotland and, to a lessor extent, those in the Northern region, based on the current level of the locational element of TNUoS.

Credit where due?

Secondly, Ofgem is turning its attention to credits awarded to DG at low and high voltage. These generators are charged under the Common Distribution Charging Methodology (CDCM) and receive a credit regardless of their impact on the distribution network.

Historically, it seemed reasonable to award credits as DG would offset demand and reduce the need for DNOs to reinforce their network.

However, the huge increase in DG now means that some areas of DNOs networks may require reinforcing in the future due to DG rather than demand. These areas are known as Generation Dominated Areas (GDA) and Ofgem is concerned that paying credits to DG in these areas is not cost reflective, as they may be driving costs for the DNO.

Generation domination

Ofgem plans to consider whether DG in GDAs should incur a charge rather than receive a credit and also suggests that demand customers in those areas should receive a credit. The issue of GDAs has been looked at a number of times and Ofgem placed a condition on DNOs to review this issue as part of its acceptance of the CDCM in 2010.

Since then, DNOs have submitted two reports and brought forward a Distribution, Connection and Use of System Agreement (DCUSA) change proposal (DCP 137), which proposed a reduction in credits to DG in areas defined as GDA. Ofgem rejected this proposal in 2015 but asked DNOs to keep the situation under review and consider bringing forward a change in the future when there is more evidence of benefits to support the case for change.

Ofgem is considering whether charges should be levied on distributed generation connected in Generation Dominated Areas, rather than just reducing credits

Zonal marking

Identifying GDAs is not a straightforward exercise for DNOs. The previous reports and DCUSA change proposal all used different definitions of what constitutes a GDA. The most recent definition was in DCP137 that proposed a two-test rule.

The first is a summer minimum test that determines whether the capacity of a primary substation could be breached when demand is at its lowest in the summer.

The second test was a winter maximum test to see if peak demand was more likely to drive reinforcement of the primary substation.

These tests were undertaken at 2½, 5, 7½ and 10-year timescales to determine whether a primary substation would become GDA in the future. The proposed solution was to reduce credits under a sliding scale mechanism, with credits completely removed once the primary substation became generation dominated when applying the test 2½ years out.

Andy Pace

Levying charges?

At the time, the DCP137 change proposal only applied to HV connected generation and the test of GDA was only applied to primary substations. It should be noted that the proposal only suggested reducing or removing credits.

However, Ofgem is considering whether charges should be levied on DG connected in GDAs, rather than just reducing credits.

If DNOs start to charge, they will need to consider whether there is any implication for 'pre-2005 generators'. These generators connected under 'deep' connection rules and paid all their charges upfront to avoid ongoing network charges.

Another issue that Ofgem will need to consider is the type of connection that DG have. Most DG that connected recently have a non-firm connection. These DG are therefore not driving reinforcement costs for the DNOs as their export is curtailed when the network is constrained. Ofgem recognises this in its consultation document and plans to link any changes to distribution use of system charges to the type of access that a user, such as DG, may have. te

Energy Potential has summarised the impact analysis undertaken by DNOs as part of DCP137 and DG can look up their primary substation to see if it would have been defined as GDA. This resource can be viewed at energy-potential.com/comment

The impact of widening the Energy Intensive Industry Exemption...

To ensure the UK meets its low carbon targets, the government has introduced several policies that are driving renewable growth. The cost of electricity has also increased, which has made UK prices higher than in other countries.

Certain energy intensive industries (EIIs), including plastics, steel and mining, are exempt from a significant proportion of environmental subsidies to help them compete with EU counterparts.

The Department for Business, Energy and Industrial Strategy (BEIS) is consulting on widening the eligibility of charging relief for EIIs.

The aim is to discover whether lowering the electricity intensity test, a calculation to determine the percentage of electricity cost against Gross Value Added, would remove competitive distortions in the market.

Changes to qualification are not expected to come into force until 1st April 2020 at the earliest, but could add another 1% onto electricity costs for non-exempt users.

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The energy legislative landscape is varied and complex. We ensure you remain aware of existing and future energy laws and regulations and help you comply with your statutory duties. We help you obtain any cost relief by applying for environmental management schemes and achieve best practice through energy management accreditations and standards.

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INSPIRED ENERGY

Inspired Energy rated as leading UK TPI in Cornwall Insights I&C Index

Cornwall Insight, recently released its Q1 2018 update 'TPIs in the Business and Industrial energy Supply Markets' ranking Inspired Energy as the leading TPI in the Industrial & Commercial ("I&C") sector index rankings out of the 111 TPI's shortlisted.

Importantly the independent report is based on the opinions of business energy suppliers, which reinforces Inspired's strong positioning within the TPI market and that it's development and growth strategy is well received.

With the recent acquisitions of ECM and SystemsLink, Inspired Energy was earmarked as a strong influencer in the consolidation of the I&C TPI market, also gaining a strong endorsement by being featured in the top 5 of TPIs who meet supplier needs best.

This report reaffirms Inspired's position as the market leaders in the UK TPI sector, which the Company attributes to its great team with their great breadth and depth of expertise and excellent levels of service and advice to the Group's growing client base.

Gareth Miller, CEO of Cornwall Insight, commented: "TPIs are responding to rising competition across the market through transactions, better technology and utilising their expertise beyond the transactional nature of brokering energy supply contracts. Following its recent acquisitions and wider market activity, Inspired Energy has been successful in moving to first place in our Q118 I&C TPI index.

National Grid sees big solar growth for decades to come

Future Energy Scenarios report shows PV penetration at least doubling, potentially quadrupling, while EVs become a significant source of storage. Brendan Coyne reports

National Grid expects "significant solar growth" for decades to come, even in its most conservative modelling of the UK's future energy mix.

According to its annual *Future Energy Scenarios* report, solar capacity will double from about 14GW today to at least 28GW by 2050. It could reach 65GW.

A more immediate effect of solar's rise is on minimum electricity demand on the transmission network, which is starting to happen on summer afternoons rather than early mornings. That happened for the first time in March 2017, and National Grid expects it to become a regular occurrence.

Balancing the system at times of low transmission demand is "challenging", according to National Grid, because many large power stations cannot be turned on and off quickly.

However, the system operator said this is where electric vehicles could play a role.

"As some vehicles will not, or cannot, charge overnight there is also an increase in daytime demand. This helps to smooth the within-day electricity demand profile," states the report.

National Grid predicts up to 11 million EVs on UK roads by 2030, and as many as 36 million by 2040 – suggesting virtually all cars would be electric in that scenario.

All scenarios show a high penetration of all-electric vehicles, and all of them feature smart charging to manage peak demand. Vehicle-to-grid services (V2G), using car batteries to balance the grid, will provide "useful levels of support" after 2030, said National Grid, as much as 8GW by 2040, and 13GW in 2050.

Battery storage

National Grid appears to have again revised storage deployment rates in this year's FES document, with less than 5GW installed in all scenarios by 2020, compared with about 6GW outlined in last year's document. Longer term scenarios suggest between 12 and 28GW of storage capacity may be »

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installed by 2050 – but this figure does not include EVs.

Gas

Gas continues to play a significant role in both heat and power generation in the coming decades across all scenarios, some of which could come from hydrogen.

If the high levels of renewable generation modelled in some scenarios materialise, hydrogen could also provide a demand response service to the electricity system. Producing hydrogen via electrolysis requires a lot of power, so could be scheduled for periods of low electricity demand or when there is excess power on the system, states the document. Some electrolysis technologies can be quickly switched on and off, so could potentially be used as fast acting flexibility.

Gas storage

Although producing hydrogen from renewables in that manner could enable a form of gas storage, National Grid underlined the UK's lack of traditional storage since the closure of Rough.

"Gas storage has an important role to play ... in supporting security of supply and providing flexibility in the operation of the gas market," states the document.

"There has been some recent development of medium-range storage as capacity is increased at existing sites. However, the economics have not been favourable for the development of new storage for some years."

Demand-side response

The document suggests there will not be much growth of industrial demand-side response (DSR) until post-2020.

It also defines DSR as purely 'load' response; turning power consuming equipment on or off, or up or down. Switching to onsite generation does not count.

National Grid also outlines the implications of recent regulatory change on decentalised thermal generation, with cuts to embedded benefits and the UK's interpretation of the European Medium Combustion Plant Directive (MCPD) leading it to reduce the upper ranges of smaller thermal plant on the system compared to last year's document. National Grid's scenarios now suggest between 7-16GW of decentralised thermal plant on the system by 2050.

The UK government's decision to go further than the MCPD requires and extend NOx limits to smaller generators if they take on new Capacity Market agreements or balancing services contracts, means all small diesel and some gas generation that wish to bid for such contracts will have to fit abatement technologies.

"For some projects, the cost may outweigh future revenues, leading to project closure," states National Grid. te

Figure 1: Solar capacity

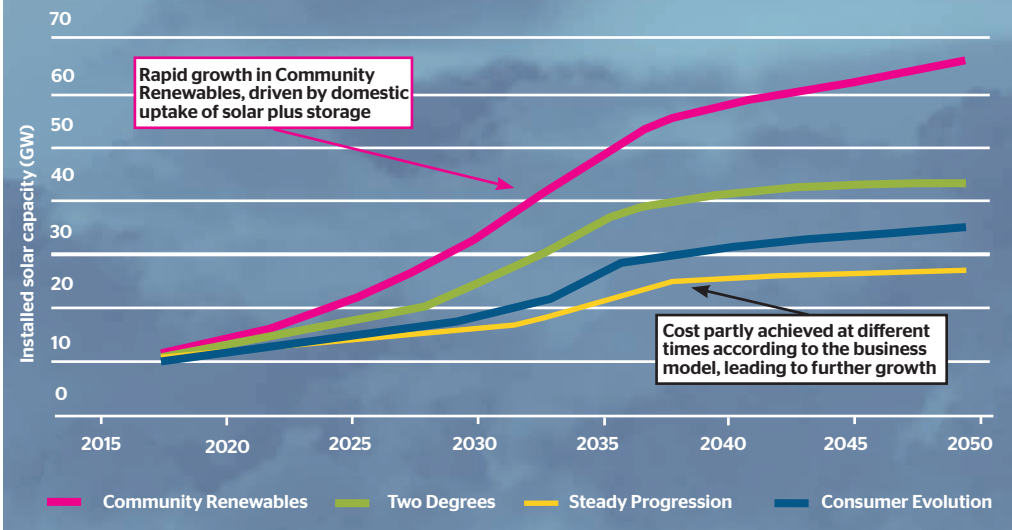
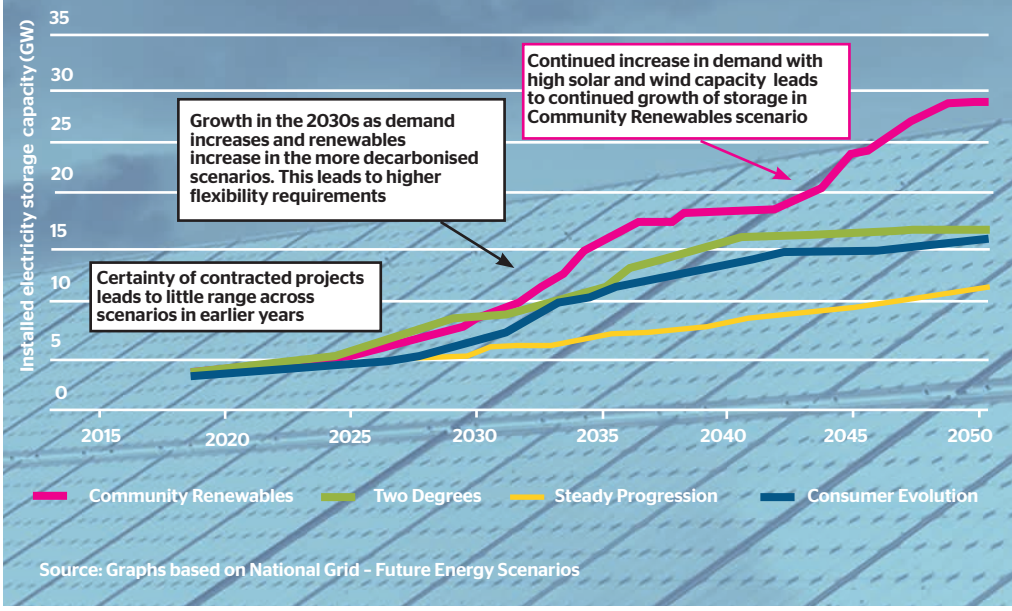


Figure 2: Electricity storage capacity



Source: Graphs based on National Grid – Future Energy Scenarios

Gas continues to play a significant role in both heat and power generation in the coming decades across all scenarios

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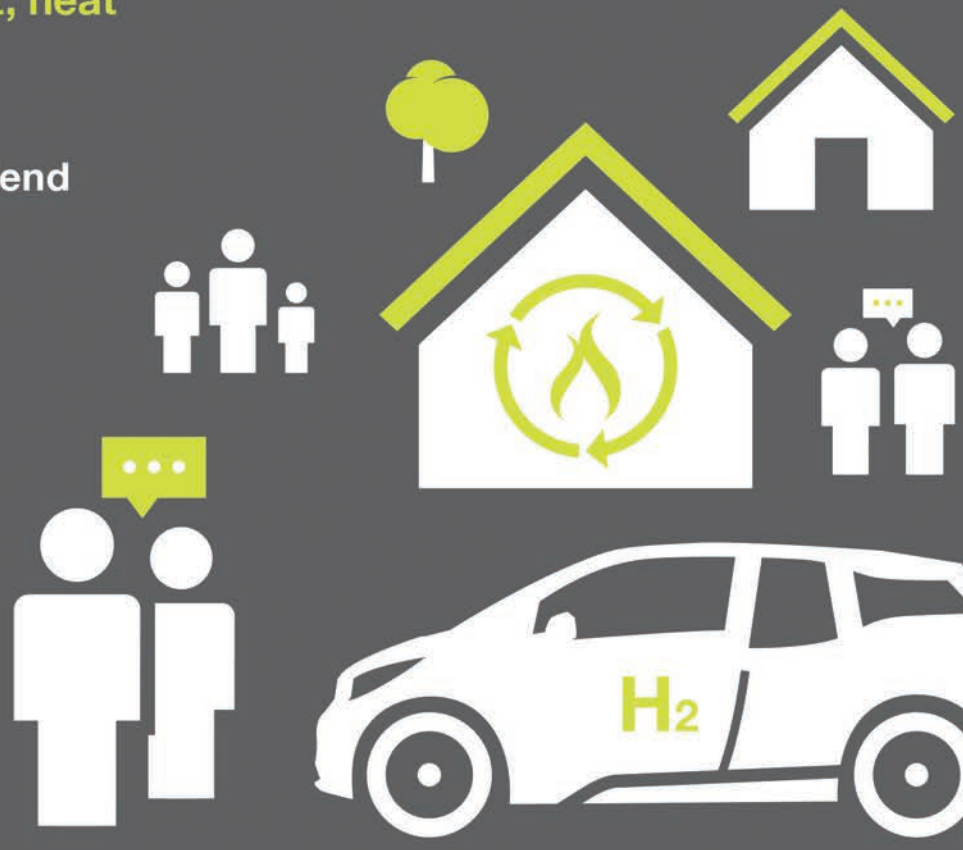

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Balancing risk and reward

Argonaut Power takes an Esco-type approach to fully funded, behind-the-meter energy storage. Managing director Roberto Castiglioni believes the firm can strike a transparent balance of risk and reward. Brendan Coyne reports

Argonaut Power launched late last year to provide battery storage as a service. Nine months later, the Ingenious Infrastructure-backed firm is getting its first behind-the-meter deals over the line.

Managing director Roberto Castiglioni admits countless firms – largely ex-renewables developers – now tout funded battery solutions. He says Argonaut's approach differs in the way it constructs a "clear, transparent proposition" tailor-made to each site that appropriately balances risk. That's why it's taken almost a year to transact.

Roberto Castiglioni

Storage: not like solar

Castiglioni says the crucial difference with behind-the-meter (BTM) storage versus renewables deployment is putting the customer "at the heart of the transaction" and understanding that each business has unique requirements. But he says investors also need appropriate returns for risk. Striking that balance is key.

"Storage is not like renewable generation; solar and wind didn't require much structuring," says Castiglioni. "A PPA and heavily subsidised revenue is quite simple. Here the game is totally different. You need to ensure that merchant risk is properly mitigated."

Behind the meter, risk is mitigated because of defined customer needs, such as cutting consumption and carbon and increasing resilience.

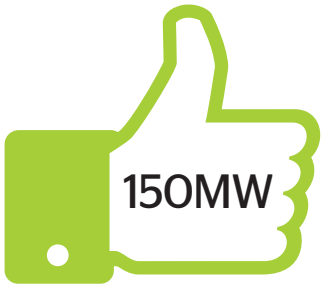
However, Castiglioni agrees with those that suggest merchant risk should not be feared, provided people know what they are doing.

"At the beginning of this century, merchant risk was totally acceptable. But the market went from merchant to subsidies – and for more than a decade we have been spoiled," says Castiglioni. "It's time to return to the good old merchant profile, but we need to help investors make that transition."

Behind the meter that goes back to understanding customers, he says.

"We structure the energy savings or the revenue share in a way that is quite interesting for the customer," says Castiglioni. "We believe we have a solution that gives a good offer to the customer but at same time, makes it bankable. That is key; often it can be skewed on one side or the other."

Castiglioni claims Argonaut has "turned down a few opportunities because we didn't believe the risk was appropriately allocated", but thinks it has laid the foundations for growth. It aims to deploy 50MW of storage by the end of 2019 and 150MW by the end of 2020. While much is made of falling battery prices, Castiglioni thinks first mover advantage will be important – and prices may not fall as fast as some predict.



Amount of storage Argonaut Power hopes to deploy by 2020

"Behind the meter, the best customers will go first. So if you [wait for battery price declines] you might not get the customers you want. Battery prices will fall over time. But not in the short-term and delivery times are already 6-7 months versus 3-4 months when we started," he says.

"So the sooner you start, the more data you collect, the more experienced you become, the better you can manage the battery and stack the revenues."

However, Castiglioni does see an opportunity for immediate cost reductions: the firm is packaging second life batteries under 30-year contracts. That duration requires "the right kind of customer" and a thorough understanding of each business case. But Castiglioni believes that should be true of every storage contract.

"Yes, that can be time consuming," he says. "But for the right customers, it is only right to put in the time." te

Resilience, not revenue key to BTM storage

A share of grid services or arbitrage revenues is almost irrelevant for some I&C firms, according to Alex Mardapittas, CEO of Powerstar, a storage and UPS manufacturer that recently entered into a partnership with Argonaut.

Mardapittas says resilience underpins the storage business case and for certain companies can enable payback in less than 12 months. He cites a critical component manufacturer for Rolls-Royce. "They make bearings from special alloy blocks provided by Rolls-Royce. If there is any voltage dip, even for less than a second, the machines stop. That means they have to bin the alloy block," says Mardapittas.

"It's a lovely looking bin, but Rolls-Royce charges them £154,000 per block destroyed – and last year they binned eight blocks." Since installing Powerstar's kit in April "we have saved them two events, which is £300,000", claims Mardapittas.

"So they don't care about grid revenues. Yes, they avoid DUoS red bands and Triad in winter and are doing FFR. But they don't really care about that. Resilience is what they want. So [from an end user perspective] storage should not be a device for revenues but to protect the overall needs of the company and to integrate other forms of generation."

An energy-filled evening of spectacular views and conversation

Stepping into the House of Commons, you are immediately enveloped by the incredible atmosphere, and you may even have been fortunate enough to enjoy the spectacle of the sun setting over London and the River Thames. And there's no finer way to enjoy it than in engaging conversation with friends, colleagues and new acquaintances.

Every year, the Parliamentary Group for Energy Studies (PGES) organises an Annual General Meeting and Summer Reception, and on 26 June 2018, Alfa Energy Group was honoured to be the hosts.

Events like these are a great opportunity to foster dialogue between many sides of the same die, bringing together consumers, academics and politicians with seasoned energy professionals who know the markets intimately and have valuable insights to share.

The evening was warm, relaxed and, most importantly, informative. With 2020 climate change targets looming ever so closely on the horizon, carbon emissions were a point of focus and concern for many of the attendees.

The keynote speaker for this year's event was Minister of State for Business Energy & Industrial Strategy, Claire Perry MP, who, when speaking of some of the key challenges of industrial strategy, said that "economic growth and carbon reduction go hand in hand". Businesses now must focus on expanding but in a more environmentally conscious way. It is a challenge, but they're not alone in this endeavour. In Alfa Energy Group, they have a dependable partner to help them towards carbon neutrality.

"As long-standing, active members of two all-party Parliamentary energy groups, we have been witnessing the changes in policy drivers first hand and directly managing its effect on businesses. It was an honour being asked to host the event not least because of its glorious setting but for the ability to introduce our clients to the government and give them the chance to understand and influence the thinking that goes into the policy formation," said Damir Ahmovic, CEO of Alfa Energy Group.

Alfa Energy Group would like to thank the Parliamentary Group for Energy Studies as well as all those who attended and made the evening such a tremendous success. It was an evening to remember, not least because of the spectacular setting and view from the House of Commons.

Alfa Energy Group partners with businesses to provide energy management and procurement services while also supporting them with matters of compliance.

Another event to look forward to is the Alfa Energy Annual Conference, which, once again, brings together energy experts, academics and business leaders to discuss the latest developments in the ever-changing energy landscape. The next conference is scheduled for 14 March 2019. Save the date now and get in touch to reserve your place by emailing Alfa Energy Group at **events@alfaenergygroup.com** or by visiting **https://alfaenergygroup.com/events/** where you'll also be able to access the photo gallery from the PGES Annual General Meeting and Summer Reception.

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Pick higher hanging fruit

Ørsted believes it can unlock benefits for customers and its own balancing requirements through energy-as-a-service. Can it convince businesses to take a longer-term view on energy? The Energyst spoke with sales and marketing director Ash Phillips

For most firms, energy is an annual cost to manage. Some take a mid-term outlook and projects with straightforward economics and returns stand a chance of board sign-off.

But that can mean bigger wins are left on the table because they require a longer commitment, something many boards are reluctant to undertake.

Changing that mindset is a key challenge for suppliers pushing energy-as-a-service, the new iteration of the Esco or energy performance contract model.

Ørsted believes it has the credibility to succeed where others have failed. It plans to deliver fully funded and managed energy solutions via contracts lasting up to 20 years, whereby the customer gains guaranteed energy and cost savings and Ørsted can better balance its wind-dominated generation portfolio.

Balancing act

The company began developing its energy-as-a-service proposition two years ago, roughly the same time as launching flexibility solutions such as Renewable Balancing Reserve (RBR) and Site Optimisation. Through RBR, Ørsted pays companies with flexible

Will energy-as-a-service replace energy managers?

Ash Phillips acknowledges energy managers might worry that Eaas may put them out of a job. But he says that is not the case.

"Energy managers face growing challenges in an ever changing environment. Their role is becoming very large and complex, but perhaps without the resource to manage it," he says.

"Our conversations are very much at board level, particularly with blue chip customers [given the length of the contracts being discussed], but we are very conscious of the role played by energy managers," adds Phillips. "Working together is the key – and energy managers can be as involved or hands off as they wish. But personally, I can't see a situation where a customer doesn't want to retain some element of control over energy."

consumption or generation to help balance its market position.

Penalties for being out of balance could double to £6,000/MWh this winter. That means energy companies, particularly those with inflexible generation portfolios such as wind, must find new ways to balance supply and demand as closely as possible.

Via energy-as-a-service (Eaas), Ørsted hopes to install assets such as onsite generation and storage – and maintain, manage and optimise them to deliver best returns. It can also take-on the entire energy management function for customers, as well as provide the commodity.

Visibility and control of customer consumption and generation could therefore become an increasingly useful tool for the utility, bringing distributed load and assets into its suit of balancing tools.

Ash Phillips

Balance sheets

On the flipside, businesses gain a funded solution and management of their energy requirements. This can involve Ørsted building, operating or maintaining equipment – whether remotely or by embedding staff within customer premises. Sales and marketing director, Ash Phillips, says it enables the company to ensure kit is operating in the most efficient manner, delivering cost savings and revenue opportunities both for customers and for Ørsted.

"It's a win-win for both parties," says Phillips. "It helps balance our own position and enables us to use all of our assets and tools to do that. But it also offers huge benefits for customers," he suggests.

"By providing end-to-end solutions we can maximise on every aspect of energy management," says Phillips. "Energy is a big cost for customers, driven by rising non-commodity elements. We can remove that complexity and allow them to do what they do best."

Hearts and mindsets

To date, Ørsted has announced one energy-as-a-service deal in the UK, an 18-year contract with Milton Abbey School in Dorset, which covers onsite generation and storage and ongoing optimisation.

Phillips expects Ørsted to announce further Eaas contracts by the end of the year, but says convincing customers to move from an annual cost management mindset to a multiyear energy strategy is the "key challenge".

He says customers are right to ask "how many of these contracts have you done?" given the contract length will usually be at least 10 years. Equally, Ørsted has always been an energy company, not an energy management company.

"That is also a challenge, but Ørsted has built a lot of wind farms and energy from waste schemes," says Phillips. "We have considerable expertise in long-term energy projects which give us credibility in that sense."

Shift happening

Phillips says some firms are comfortable with taking a longer-term view, pointing to the large corporates taking part in the RE100 scheme, where they pledge to source renewable power. Corporates are also keenly focused on driving carbon out of their supply chains, which Phillips says is another growth driver. With government pushing energy efficiency within corporate reporting, there are more levers coming in to play.

The upshot is that other large utilities are also touting energy-as-a-service packages. If they can persuade customers to think longer-term while mitigating risk and guaranteeing benefits for customers, the Eaas service model has a fighting chance. Phillips is convinced that the shift is already under way.

"The conversations we have today with clients are completely different to when we started developing energy-as-a-service two years ago," he says.

"I think the evolution of this market over the next couple of years will be very interesting, particularly as third party costs continue to rise and companies look for ways to remain competitive on the global stage." te

Flexibility is key to converging energy and transport markets

Octopus Investments sees a converged energy future underpinned by bundled smart services. Brendan Coyne reports

Flexibility will probably be "one of the most important commodities in the future energy market", according to Simon Pickett, investment director at Octopus Investments.

The firm, which manages more than £7.5bn for retail and institutional investors, is one of the biggest renewables investors in the UK. But its energy arm hopes to bridge the gap between capital and solutions by becoming a 'virtually integrated' energy company.

The aim is to finance generation and deliver power through flexible and virtual power purchase agreements, meaning they need not be long-term nor buyers locked in to a single supplier; supply energy through Octopus Energy; provide flexibility services through platforms such as its investment in Reactive Technologies; and, increasingly, deliver transport solutions as part of an integrated energy package.

Simon Pickett: Energy, flexibility and transport are converging

"We want to become a next generation business that puts technology at its heart, not just a fund manager investing in renewables," says Pickett.

Full service

In terms of convincing people to unlock flexibility within their processes and operations, Pickett says the challenge is two-fold.

"The first is a fear from the operations side that [providing demand-side response] will have a negative impact. That is understandable; their core business has to remain untouched. But good technology allows you to unlock flexibility without touching processes, so that is an education piece," he says.

The bigger challenge is that "businesses have been approached by multiple people all trying to do different things," according to Pickett.

"Very few [energy or services companies] have taken a truly holistic approach to cover all energy needs – and transport is a key part of that moving forward. The diesel bill is about to become the electricity bill. You cannot do that in isolation."

Scale and sizzle

Pickett says businesses recognise that vectors are beginning to converge, but believes there is room for greater creativity from market participants to help unlock demand.

"It's a bit like selling a sausage," he suggests. "You have to sell the sizzle otherwise you are selling a dead pig. The energy industry has been a bit guilty of that."

However, he accepts that delivering everything as a service is no mean feat and forcing the pace is likely to result in failure.

"We need to engage at the rate that customers want, not at the rate we would like. As a fund, it would be nice if things had scale, but we started with solar one project at a time, then moved on to multiple deals, then invested billions in really good projects. Transport is the next frontier, so [the challenge] is how to work in a way that works for the customer, not just for deploying capital."

Vehicle-to-grid

If suppliers can bundle transport and energy services correctly, the opportunity presented by harnessing vehicle batteries is significant, Pickett suggests.

"We hope vehicle-to-grid [V2G] comes to fruition in the way we are expecting. The easy approach in the first instance is to just shift charging. But the opportunity to go beyond that is huge, in terms of flexibility," he says.

> *The diesel bill is about to become the electricity bill... Transport is the next frontier*

That potential prize is one reason why the company has not yet piled into standalone battery storage.

"Storage is interesting, but I see it as a subset of flexibility – and flexibility is probably one of the most important commodities in the future market," says Pickett.

"So does it come from switching off a fridge freezer, shifting the charging of thousands of electric vehicles, or from a battery?

"All of that technology and flexibility at a granular level will become massively important to integrating renewables into the system. So we think that taking a total systems approach, and funding all the requirements, is important."

Power purchase agreements

In its traditional form, the corporate PPA "is a bit of a nightmare", says Pickett. "[The market] has not scaled globally in the last 10 years, so we have spent a lot of time trying to simplify PPAs and to make them more flexible for businesses."

Part of that is around contract length. "Not everybody wants a 15-year contract. At a supermarket, for example, anything longer than a year goes to board level. So you have to ask what is the right length of contract for the customer, not the investor or developer community.

"If we can design products that work for customers rather than big, complicated transactions, then PPAs will become an interesting and more scalable market." te

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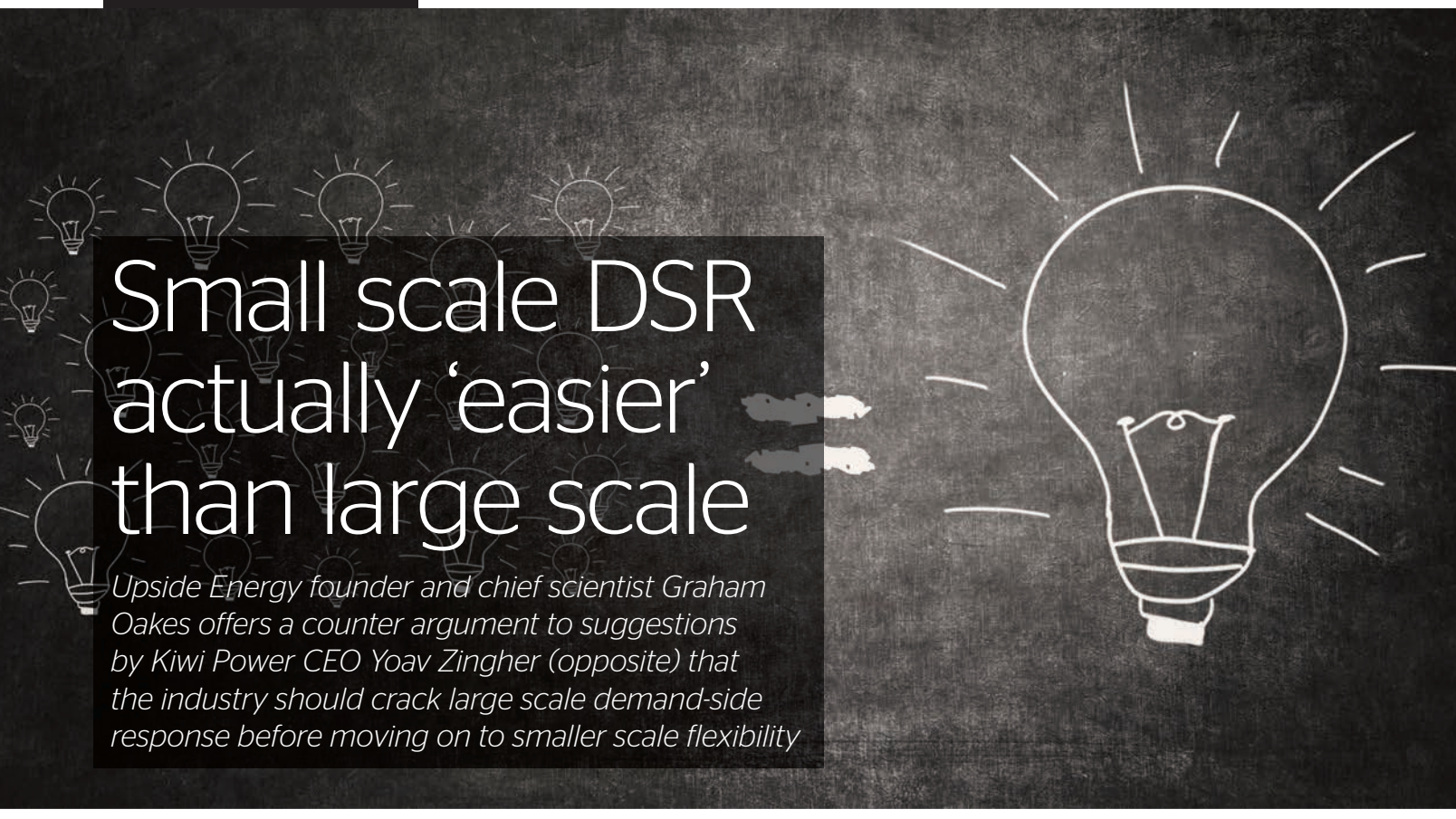


Small scale DSR actually 'easier' than large scale

Upside Energy founder and chief scientist Graham Oakes offers a counter argument to suggestions by Kiwi Power CEO Yoav Zingher (opposite) that the industry should crack large scale demand-side response before moving on to smaller scale flexibility

Many people think industrial and commercial demand-side response is easier than micro business or domestic DSR. You just need to recruit a few big big sites. They make a material difference to overall load, so National Grid welcomes them with open arms. So it is all an easy sell and you grow from there. But, as Kiwi Power boss Yoav Zingher says, it is actually a lot harder than that.

Graham Oakes

Two sided story

Going back to basics, the energy system has to buy it and the site has to want to sell it and be able to deliver it.

On the energy system side, it understands big sites. It is used to dealing with large power plants, big transmission lines, etc. So selling large commercial and industrial DSR to it is indeed relatively easy (it is a lot easier now than it was 10 years ago; all credit to players like Flexitricity and Kiwi for making this market).

But on the demand side, there are two huge barriers.

First, it takes a lot of work to encourage people to want to sell it – building awareness, persuading them that it is not snake oil, etc. That is particularly true on I&C sites: they have a lot of value at risk. If their industrial process is not worth more than the DSR value of their site, then they probably should not be in business anyway. So putting that process at risk for the sake of DSR revenue requires a lot of confidence that the DSR will work without a hitch.

Second, delivering that DSR is hard. Every I&C site is bespoke, built to the specific process and site requirements. So you need to do site audits, configure your kit to connect to the kit that's onsite, integrate to the company's information systems, etc. That is a lot of work, both for initial set up and for ongoing support.

Small means standard

The situation is very different for domestic sites. Yes, the initial awareness building is

Electricity North West picks Piclo ahead of tender

Electricity North West is trialling the Piclo flexibility matching platform ahead of a demand-side response tender.

Piclo, formerly Open Utility, has now signed up three distribution network operators (DNOs) to trial its services, with UK Power Networks using the platform to help procure flexibility.

Scottish and Southern Electricity Networks is also on board.

The Piclo platform 'matchmakes' those with flexibility to offer through load or generation with buyers of flexibility services. The ultimate aim is to become an online marketplace.

36MW

Amount of flexibility the distribution network operator is seeking for this winter

very hard. The energy system is (sometimes unnecessarily) complex and people really do not have time or inclination to get their heads around it. So there is a big barrier to getting started. That is why it has taken time.

But as you look at that barrier, you find ways to get past it. There are lots of firms out there that sell to consumers (that's why they are called consumers) so build the right channel partnerships, and you have a natural entry to begin building the story.

And the delivery story is very different. On domestic or micro business sites, you are installing standard kit – every Sonnen battery is essentially the same, every Powervault, every Daikin heat pump. So integrate one and you can connect to thousands. You can build operational processes for scale, automation and self-service. It is a totally different (and much lower cost) operating model once you get beyond the initial barrier – one that, we think, is a lot easier to make money from.

Big shift needed

Now we just need to get players like National Grid to buy domestic DSR, because they really don't understand it. They still need to make a big shift to their mindset to buy from small sites, but there are huge advantages to them to buy from small sites too.

The way I see it, the energy system is where IT was about 20 years ago. Then, if you wanted a large, fast, reliable disk drive, you bought a very expensive, bespoke bit of kit.

> ***We just need to get players like National Grid to buy domestic DSR, because they really don't understand it***

Then someone worked out that you could do better with an array of smaller, cheaper, standardised disks. They called it RAID – redundant array of inexpensive disks – because using cheap, standard parts meant you could use lots of them and hence let the statistics work for you. So you got higher speed, more reliability, greater size – and all at a lower cost. The energy system is just at the start of this transition.

Smaller is easier

So large industrial DSR is harder than small DSR. It can't exploit the standardisation, scale economies and statistics that domestic DSR can exploit.

We know, because we do both. And we are pretty well the only player that does. We started from a focus on domestic because that is operationally easy provided you get the technology and operating model right. We then realised that, having got the economics right there, it worked even better with I&C, so we have moved into that too. te

Forget small scale DSR until we get 'big flex' right

Kiwi Power boss Yoav Zingher has cautioned the flexibility industry against trying to run before it can walk.

Speaking at the 2018 Power Responsive conference, Zingher provided the sceptic's view on a panel that outlined opportunity and progress within flexibility markets.

Rules of engagement

Zingher was critical of the delay in the ADE's aggregator code of conduct and said the market badly requires some rules of engagement.

Speaking on the same panel, Ofgem's Louise van Rensburg said Ofgem had considered requiring aggregators to be licenced but had decided to wait and see how the code of conduct works.

The panel was asked what government, regulator and system operator were doing to bring small- and community-scale flexibility to market.

National Grid's Colm Murphy cited local energy market trials in Cornwall and the Power Potential programme as "exciting" projects that could help both distribution and transmission operators manage constraints via smaller scale assets.

But Kiwi's Zingher suggested SME and domestic flexibility may be some way off.

"I think when [small scale] flexibility picks up, it will pick up in a big way. But it needs to work in the larger space first," he said, suggesting that while the industry is right to celebrate successes at events such as Power Responsive, "we are also really bad at admitting failure".

The UK is "only scratching the surface of large scale DSR, and until we get that right moving the attention to [smaller providers] won't work", said Zingher.

Capacity overhaul

While applauding National Grid's work to open up ancillary services, Zingher was critical of the Capacity Market in terms of what it has delivered to date.

"The Capacity Market was designed to bring forward new conventional sources [of power] and unconventional sources. I am not sure it has done that. Prices have come down dramatically, and while that brings down prices for consumers, they are actually just paying more for what they already had," said Zingher.

"If we want to get new things built, what are we doing to do about it?"

Yoav Zingher

Electricity North West joined the platform ahead of its first DSR tender.

The DNO seeks 36MW of flexibility for the coming winter, and has outlined its forecast requirements out to winter 2021/22. It wants minimum flexible loads of 100kW from sites contracting directly, or 200kW minimum for aggregated portfolios.

Cara Blockley, central services manager at Electricity North West, said the firm is delighted to join the Piclo Flex consortium.

She commented: "An online platform could lower barriers and increase participation in this important new service needed by the industry."

Piclo CEO and co-founder James Johnston welcomed Electricity North West to the fold.

"We hope to demonstrate how better visibility of flexible assets and streamlining of procurement processes through our platform can lead to better outcomes and more efficient operation of the grid," he said.

Piclo Flex is being developed as part of a Beis-funded trial and has been running since September 2017. The firm has also worked with Good Energy.

Renewables poised to enter Capacity Market

Government seeks market views on host of potentially significant changes to its winter insurance policy

The government is considering how to bring unsubsidised renewables and hybrid projects into the Capacity Market.

If workable solutions can be found, it aims to lay enabling legislation ahead of the auctions in winter 2019/20.

Beis is seeking views on a wide range of potential Capacity Market amendments. It wants to know whether contract lengths (one year for demand-side response, three years for refurbished generation plant and 15 years for new build) are suitable and whether existing penalty regimes for non-delivery are strong enough.

Credit cover for non-proven DSR is £5,000/MW, half that required for new build capacity. Some market participants suggest that gives DSR an advantage. Beis wants to know if that is the case, but points out that DSR can only get a one-year capacity agreement.

The implication is that it may offer longer agreements for DSR were it to increase credit cover requirements.

The department thinks steeper

Triads may go by 2022, but flexible firms will only gain

Triad avoidance may cease to exist by 2022, according to Gridbeyond chief executive Michael Phelan.

The head of the flexibility provider also thinks Capacity Market prices will rise following the failed legal challenge to halt Ofgem's cuts to embedded benefits.

The High Court ruling means that the main embedded benefit, the TNUoS residual (or Triad payment), will now be cut. The result will be that embedded benefits will fall from £45/kW to about £3/kW over three years to 2020.

The upshot may be higher Capacity Market prices, because smaller generators, without Triad payments in their pockets will be less likely to submit low CM bids.

Phelan said such "artificially low bid prices ... fabricated a Capacity Market that is not indicative of the actual commercial value of capacity".

With Ofgem's cuts legally cleared, "a substantial proportion of volume in future Capacity Market auctions may not be able to bid in the low prices seen in previous auctions", he added.

As such, the firm expects to "see a gradual increase in the clearing price of the capacity market in the coming years".

Triad avoidance, where businesses reduce the power they draw from the transmission system over winter in order to avoid the three highest peaks and benefit from lower tranmsission charges, also looks likely to be scrapped in the mid-term, at least in its current form.

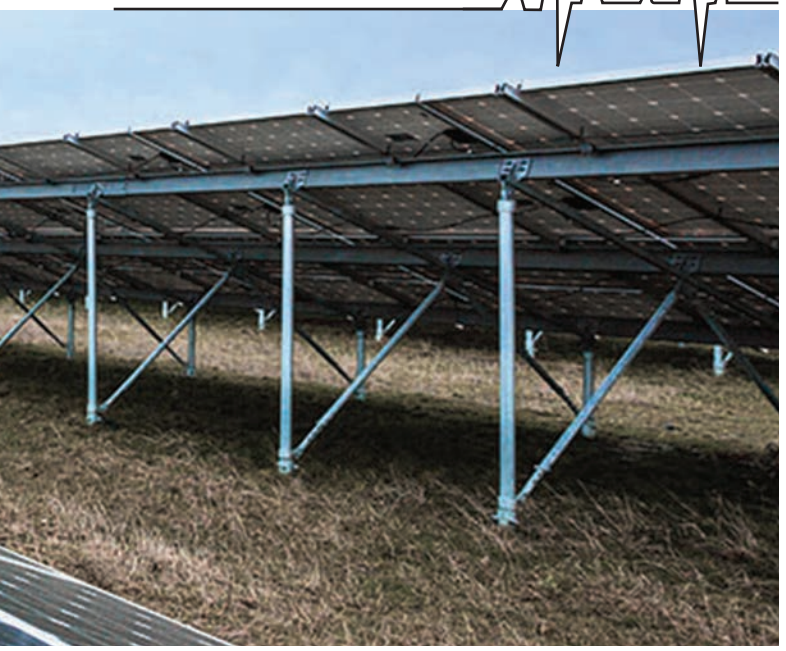
Ofgem is reviewing network charges more broadly, with wide-ranging changes likely to come out of its Targeted Charging Review and related work.

While industry has voiced concern regarding the potential impacts of charging changes, Phelan believes demand-side response providers are set to gain from the review.

"Ofgem is yet to set out which of the transmission system charging choices is its preferred option, but it is highly likely that Triad charging will not persist in its current form past 2022. A consultation is expected this summer, with a final decision on the future of behind-the-meter actions at some point in Q4 2019," he said.

Michael Phelan

"The result of any changes will make DSR participation more attractive for industrial and commercial electricity consumers, not less as many may believe. Since it is possible that avoiding Triad charges may become more difficult, large energy users will be further incentivised to explore the wider benefits of using the flexibility within their energy demand to take advantage of other opportunities in the balancing services or wholesale markets."



penalties might also sharpen signals for secondary trading.

Beis also seeks views on derating factors for different technologies – including DSR and interconnectors. Some market participants think new build interconnectors are at an advantage in the CM due to the cap and floor regime, which guarantees revenues.

It also wants to stop behind the meter batteries pretending to be DSR in order to escape the storage derating factors applied ahead of last year's auction.

Any thoughts on how overseas capacity could participate directly in the auctions are also sought.

As well, Beis would like views on whether there are too many bodies overseeing and administrating the CM, and how risk of fraud can be reduced. te

Tweaks to boost trading and ease DSR test burden

Ofgem agreed a number of changes to the Capacity Market ahead of government's major review of the policy.

The regulator will take forward most of the proposals it outlined in the spring. The changes will allow Capacity Market Units (CMUs) that had opted out as non-operational for that delivery year to now bid in to the T-1 auction.

More providers will also be able to participate in secondary market trading, including those that originally failed to prequalify and recently commissioned providers, said Ofgem.

The regulator said DSR testing would also be

simplified. Specifically, where a demand-side response CMU alters its metering configuration, a new DSR test will no longer be required for the same delivery year.

Ofgem said its amendments should be taken as official for the upcoming prequalification process. See details at ofgem.gov.uk

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The Balancing Mechanism: what it does and how it works

Paul Usher, business development director at Quorum, explains the complexities of the Balancing Mechanism and the opportunities it presents for companies with flexible processes and assets

At its Power Responsive conference in June, National Grid indicated that the Balancing Mechanism, already a vital tool used to balance electricity supply and demand in real time, is set to become the core means of managing system flexibility.

The Balancing Mechanism is unique as an enabler of a range of balancing services, ensuring that National Grid has sufficient reserve in the right places at the right time and playing a vital role in maintaining the health and stability of the energy system. That role is set to grow. However, limits on access due to licencing requirements under the Balancing and Settlement Code (BSC) mean that the mechanics and commercials of the Balancing Mechanism remain a mystery to many.

Under the terms of the European Balancing Guideline (EBGL) that came into effect in 2017, and resultant changes to the BSC and Grid Code expected to take effect in Great Britain by the end of 2019, wider participation in balancing services, including the Balancing Mechanism, will be made possible. Using the new arrangements, independent aggregators will be able to offer a route to market enabling (initially large) consumers and small generators to capitalise on the flexibility they can offer to the system.

The processes that underpin the operation of the Balancing Mechanism are highly nuanced, depending on the scale and nature of the assets operated by individual participants. In recent years the diversity of the BM fleet has increased considerably, moving from a relatively small number of large power plants to a much more varied range of assets, presenting both challenges and opportunities. And, as energy storage and demand-side flexibility play a larger role in the energy system, they will herald further changes in the way the system is balanced, and the processes and systems that underpin the effective operation of the BM.

How the BM works

Unlike other balancing services products that are contracted months, weeks or days ahead, the Balancing Mechanism operates on timescales measured in hours and minutes. Participants in the BM offer flexibility via their ability to vary the generation and consumption of their assets, known as Balancing Mechanism Units (BMUs)within 30-minute periods known as settlement periods.

Market participants are expected to submit a physical notification (PN) for each settlement period. This provides a baseline to National Grid of each BMU's expected operating MW level. Bid and offer data (which are prices and their associated variations in operating levels that lead to less or more MW on the transmission system compared to the PN operating level) for each settlement period for each BMU can be submitted to National Grid up to gate closure, a fixed point in time one hour before the start of a given settlement period.

National Grid publishes BM roadmap

National Grid has published a roadmap to enable all those with flexibility to sell it into the Balancing Mechanism, a key tool in balancing supply and demand close to real time.

Currently, the Balancing Mechanism is largely the preserve of licenced energy suppliers and transmission connected generation (there are means for distribution connected generation to participate, though the volume currently doing so is very small).

Aggregators without a supply licence cannot directly participate, which is why some, such as Limejump, and more recently Flexitricity, have acquired supply licences.

For National Grid, the imperative is to ensure it has access to all available flexibility, enabling greater competition and liquidity, therefore reducing costs to consumers.

Project Terre

At the same time, National Grid must enable access and participation within a cross-border flexibility market called Trans European Replacement Reserve Exchange, or Project Terre, by the end of 2019.

The aim is to ensure all sources of flex can bid into both markets on an equal footing by that time.

There are several strands of work that need to be aligned across wider BM access and Project Terre. These include better communications and dispatch systems, simpler data and metering requirements and accurate settlement behind the meter. Most of that work is in progress, and National Grid outlines delivery timetables for each aspect within the roadmap, available at: ngrid.com/2BSNyhN.

Values for other operating parameters that describe the flexibility and responsiveness of each BMU must also be provided. All of this data is submitted to National Grid via certified systems known as EDT and EDL.

Based on the prices and flexibility information received from participants, and their accompanying PNs, National Grid determines the best mix of actions that should be taken to meet its needs in terms of energy balancing, system stability and cost in each settlement period, and instructs the appropriate BMUs accordingly.

On receipt of BM instructions via EDL, the most common of which are known as Bid Offer Acceptances (BOAs), participants are expected to modify their output or consumption to reflect the MW profile instructed within two minutes and to follow that profile until the end of the instruction, or until it is superseded by a new one. Failure to abide by these instructions results in imbalance that must be compensated for elsewhere in the system and as such participants that create an imbalance are charged accordingly.

The task of settling the financial transactions associated with activity in the Balancing Mechanism falls to Elexon, the organisation responsible for the management and administration of the BSC. Elexon aggregates data relating to BM activity from a number of sources before calculating cash flows and charges relating to the actions of each BMU. In turn, these are aggregated to the accounts of each BM participant, generally generators and suppliers who must be licenced BSC parties.

The Balancing Mechanism operates in this way every minute of every day and as more flexibility providers beome involved, the infrastructure required to ensure its effective operation must evolve. However, this is nothing new. The business processes and systems used by BM participants have been changing continually since the BM first came into operation reflecting the rapid economic and technological changes that characterise this increasingly complex balancing act. te

Quorum provides software for BM operation and settlement

Access for firms with flexibility

Opening up the Balancing Mechanism to firms with flexible processes and assets creates an opportunity for them to share in a growing revenue stream worth hundreds of millions of pounds every year. The ability of processes and equipment to flex their demand for electricity up or down at short notice has high value as a means of supporting grid stability. While this has been possible for some time via a range of ancillary services, access to the Balancing Mechanism will enable providers to gain additional benefits by stacking revenues for delivery of complementary services.

Limejump enters Balancing Mechanism

Limejump has entered the UK Balancing Mechanism, a real-time market for flexibility.

The firm, which has a supply licence, will now compete with other licenced energy companies and large generators for a share of BM revenues.

"This is an important milestone in opening up the UK energy market," commented CEO Erik Nygard.

"We have shown how sustainable, dynamic and distributed assets can power the UK as consistently and efficiently as large power plants."

The Balancing Mechanism is seen as a deeper market than contracted ancillary services, where some products are under price pressure as more flexibility providers come to market. Currently the Balancing Mechanism is largely the preserve of licenced energy suppliers and transmission connected generation.

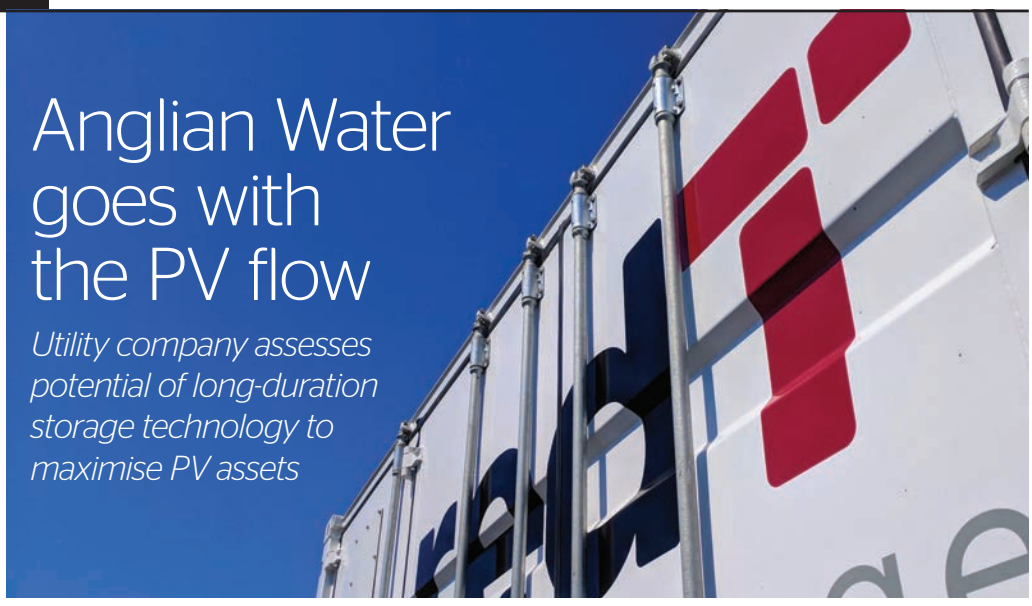
Erik Nygard

National Grid plans to open up the Balancing Mechanism to aggregators without supply licences next year, but in the meantime, Limejump hopes to make its advantage count by bidding in flexible assets to the BM and stacking revenue streams.

The firm also took a significant chunk of National Grid's latest firm frequency response tender, winning 89MW, roughly a third of the total contracted volume.

Anglian Water goes with the PV flow

Utility company assesses potential of long-duration storage technology to maximise PV assets



Anglian Water is to buy flow storage units from RedT to co-locate with solar PV at a treatment works. The water firm aims to work out the potential of longer-duration storage in maximising use of solar power.

The deal is for four of RedT's flow machines, totalling 60kW/300kWh. These will sit alongside 450kW of PV at a 'pathfinder' site in Norfolk.

While the main benefit of these kind of installations is to reduce power bills by being able to store and use solar instead of drawing from the grid at peak times, the technology also enables upside revenues from grid services, including frequency response, as well as arbitrage.

The firms will work with aggregator Open Energi to optimise consumption and stack revenues.

Because flow machines can provide power output for many hours, they also receive higher Capacity Market payments than shorter duration batteries, following derating to storage in the Capacity Market last year.

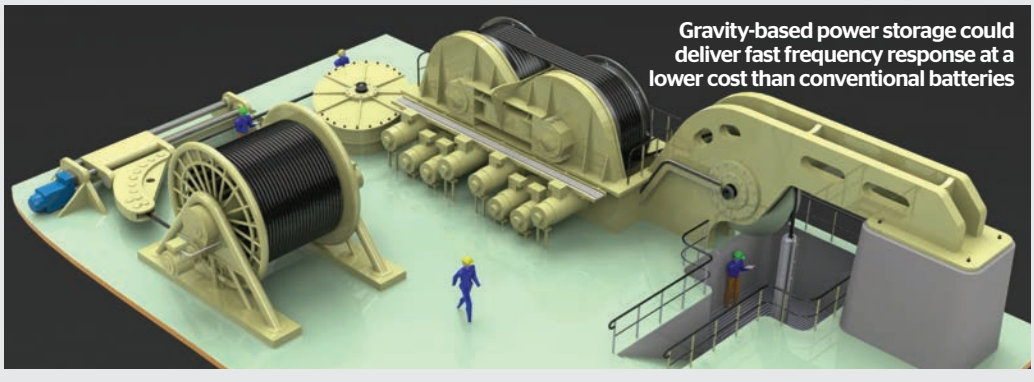
"This system will allow Anglian to harness more cheap solar on site and increase generation from 248kWp to 450kWp. Open Energi's intelligent software means these assets can be flexibly managed to deliver the best possible outcome for businesses, cutting costs, creating revenue and making the most of renewable power generated onsite," said RedT CEO Scott McGregor.

Jason Tucker, director of Alliances and Integrated Supply Chain at Anglian Water, suggested the project goes beyond co-location and to integration of the assets.

"Using RedT's flexible energy storage infrastructure alongside Open Energi's smart software will allow us to unlock more solar power, as well as allowing us to participate in grid services to further reduce our energy bills," said Tucker. "Most importantly, this collaborative project will provide us with invaluable insight to support our future energy strategy, as one of the largest energy 'prosumers' in the East of England."

Anglian has a £77m annual power bill. In order to cut it, and its carbon emissions, the firm plans to deploy a further 30MW of solar PV during the next 18 months via a 25-year PPA contract with HBS New Energies & Macquarie Principal Finance. te

Funding for 1.2MWh gravity storage prototype



Gravity-based power storage could deliver fast frequency response at a lower cost than conventional batteries

A consortium pioneering gravity-based power storage has received Innovate UK funding to develop a 1.2MWh prototype, which it says will be ready for testing next year.

The technology essentially drops a massive weight down a shaft, converting kinetic energy into power.

The idea is to hoist the weight back up when power is cheap, or when there is excess electricity on the system, and release it when required to support the grid.

As traditional sources of inertia (large power stations) become more scarce, National Grid is looking to find new forms.

Energy SRS, the firm behind the Genssis Project, believes its technology could deliver system inertia and fast frequency response at a lower life-cycle cost than batteries. Meanwhile, the company thinks it will deliver a higher energy-to-power ratio than flywheels and a greater efficiency and faster ramp-up rate than compressed air and pumped hydro.

Others in the consortium include UK Power Reserve, PR Marriott Drilling, Caley Offshore Systems, Bayliss Consulting and the University of Bristol.

Energy SRS chief executive Brendan McGrath said the funding "will give the project the cash injection it needs to prove this is a viable technology".

"The UK is a world leader in the storage market and delivering new and innovative solutions will be key to unlocking its full potential. Intermittent renewables give the grid new challenges and I believe our innovation will give the system a new solution to this problem," he added, thanking partners and Innovate UK for bringing the project to its next phase. te

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New PPA platform for I&C firms

New power purchase agreement platform aims to connect I&C and public sector firms direct with renewables developers – and make the process easier for both sides of the deal

The free Re-search platform aims to improve liquidity and transparency

A new portal connecting industrial, commercial and public sector energy buyers with renewables developers claims it will make the PPA market more transparent.

The consultancy behind the platform represents some large users, such as Liberty Global Group (Virgin Media), Pizza Hut and the Mexican government.

Juan Pablo Cerda, managing director at Almach, says work with such clients "demonstrates a need to provide a clear, transparent view of renewable energy projects available around the world, while helping corporates reduce costs and complexity".

Long touted as the next big driver of renewables projects, a lack of transparency has limited the uptake of corporate PPAs to date, according to consultants.

Deal or no deal

Launching the free Re-search platform, Cerda explained that to date, identifying suitable projects has been, complex, lengthy and often ends up with no deal being struck.

He said the portal enables users to filter out projects that do not meet their requirements, effectively creating a shortlist of suitable projects, saving time and effort.

Corporates can then use the platform to issue a simplified RFI to start market tenders.

Cerda added that enabling renewables developers to group all of their projects in one place should increase liquidity and transparency, while helping them to better connect with corporates to fund projects in a post-subsidy environment.

"We're keen to shake up the way corporates and projects get connected in a very positive way, for both sides of the deal," said Cerda.

"With more and more large-scale corporates moving to 100% renewables, we will see increased investment in the sector worldwide that will help contribute towards global climate objectives."

Serious callers only

For renewables developers, the platform is designed to cut out "window shoppers" and present them with genuinely interested parties.

Almach has partnered with consultancies South Pole and Cornwall Insight to provide data, access to Renewable Energy Certificates and future energy price benchmarks.

The firm said those partnerships will enable businesses to quickly build the business case for renewable energy procurement. te

Inspired Energy buys fellow TPI Squareone

Inspired Energy has acquired fellow third party intermediary Squareone in a deal worth nearly £1.4m.

Squareone, based in Boldon, Tyne and Wear, provides energy and water services to clients in the I&C and education sectors.

The business makes a healthy margin: revenues in the year to 31 March 2018 were £500,000. From that, earnings before interest, taxes, deductions and amortisation were £250,000.

Inspired Energy CEO Mark Dickinson (pictured) said Squareone was "highly complementary" to its corporate operation.

"The Squareone team are well respected within the sector, and were deservedly recognised as such at the 2018 Energy Live Consultancy Awards," where the company won the customer service award.

"The acquisition enhances our customer base and strengthens our sector specialisms," added Dickinson.

Flogas plans electricity supply market entry

Flogas is expanding into business-to-business electricity supply. The company, which already supplies mains gas as well as off-grid fuels, has hired Andy Beasley (above) to lead its expansion into the commercial power market.

Beasley has almost three decades worth of energy experience, including senior roles at Flow Energy, Microgen and Utilita. He recently served as a board director of trade association Energy UK, as well as chairing its Retail Committee and being part of its Strategy and Policy Committee.

Beasley said he was joining a firm that is "serious about expanding its mains energy portfolio" and said the company will "evolve to provide a more rounded energy service" that minimises customer bills and carbon footprint.

Flogas Britain managing director, Lee Gannon, said providing both gas and electricity to businesses was a "natural next step" and that Beasley is "just the right person to lead our expansion".

Independent energy consultant Bob Foley will help Beasley prepare for market entry and Flogas Energy is also looking for further staff to support growth.

Yü Group hires former Engie Energy Solutions CEO

Business energy supplier Yü Group has hired Paul Rawson (pictured) as chief financial officer.

Rawson was chief executive of Engie's Energy Solutions division until April. Before that he held roles as finance director at Engie and at Cofely prior to its acquisition by the French utility.

While Yü Group stated earlier this year it has "no intention" of entering the domestic retail market, Rawson's hire may signal its intent to develop further services outside of selling a commodity.

Alongside business energy retail, Rawson at Engie oversaw provision of low carbon generation, energy software as a service and smart building technologies as well as Engie's launch into the domestic retail market.

Yü Group chief executive Bobby Kalar said he and Rawson's "financial and sector experience, together with his operational skill sets, will prove immensely beneficial to the Group as it continues to pursue its growth agenda".

Energy Heroes

What do you like to read before turning in for the night? Do you prefer a page-turning thriller? Or would you rather delve deeply into the classics? Some of us, though, find that there's nothing like a UK government energy report to send us to sleep, *writes Dylan Crompton, head of corporate sales at British Gas Business.*

Each summer, the UK's energy department (BEIS) publishes the previous year's energy statistics. The recently released figures for 2017 fall into two reports.

If you find the UK's energy network fascinating, these reports tell a compelling tale. In fact, through expert eyes, you can see a narrative complete with heroes and villains – and a nail-biting finale.

This year's plot revolved around rising renewable energy and falling consumption. In our story, the traditional baddies – those troublesome fossil fuels and no-good carbon emissions – are on the run.

- In 2017, the UK used less fossil fuels than ever before
- We generated almost 30% of our electricity from renewables (30% is the UK's 2020 target for renewable electricity generation.)
- Overall carbon emissions fell by 12 million tonnes.

You may think that we're all heading for 'happily ever after'. But let's be wary with that conclusion. Rather than wrapping up a long novel, we're in the middle of a chapter.

Strong winds and a mild winter helped create 2017's outstanding results. But if winds and temperatures drop this year, we're likely to see a different story next year. Luckily, there's a twist. You're not just the reader in this story. You can be one of the key characters.

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Protecting your assets: the importance of battery testing

Megger's Antony Wills discusses the need for battery testing to ensure the resilience of mission critical facilities as sites cannot afford to become complacent

Standby batteries sit unused for 99% of the time and, as the UK has quite a reliable power supply, it is easy to become complacent. Yet battery failure is a leading cause of load loss. There are some myths and misconceptions in the market that need to be dispelled and the quality of testing still varies widely throughout the UK.

There is a tendency to fit and forget batteries but it is critical that your assets work when called upon, so testing is essential to prevent any costly downtime. Some people believe that batteries, that are advertised as being 'maintenance-free', do not need to be tested, but this simply means that you cannot perform maintenance on the battery – it can still fail before the end of its designed life. Battery capacity can drop significantly long before its calculated life expectancy is reached, and the battery can have weak cells that can cause costly service interruptions.

Capacity testing

A reliable way of measuring battery capacity is to conduct a discharge test, which can be done with a series of test instruments that enable sites to perform discharge tests at constant current, constant power or constant resistance, like our Torkel range does; users can even test the batteries on-line and get extra load units if they need a higher load current.

Our BVM, a battery voltage measurement device that is used for individual cell voltage measurement of large battery banks, can also be used in conjunction with the Torkel to perform a completely automated battery bank capacity test.

Impedance testing

To complement this, impedance testers are also available. The battery impedance test helps to identify weak cells before they cause problems. However, taking the battery off-line for testing is time-consuming and risky – but you don't need to do this if using the online testing capabilities of Megger's battery test equipment.

For example, the BITE line of battery testers will perform online testing that will determine the health of lead-acid batteries up to 7000 Ah. The BITE range of battery testers measures cell impedance, cell float voltage and inter-cell connection resistance, as well as ripple and float current.

Key testing considerations

End users need to consider the practicalities of the test. If they are going to use a discharge tester and remove most of the energy from the battery system, they must ensure the operation is not left vulnerable in the event that the battery is called upon towards the end of the discharge. Impedance tests are very quick and give you a good level of confidence that the battery is going to be ok, but it is good to correlate this with discharge tests – at intervals – so that you can decide when to swap out the entire battery.

Some sites may have their own built-in diagnostics and reporting systems. However, in general, it is recommended that batteries are tested at: delivery, to get a baseline value; when they have reached a quarter of their life; half way through; and then at 75% of their life. After this, you will need to conduct more regular testing to verify that the battery will be in good condition towards the end of its life. Even a single cell failure may mean that the battery cannot deliver its power anymore, so it is important to identify if any of the cells are going to fail towards the end of the battery's life.

Ultimately, regular capacity and impedance testing is essential for predictive maintenance and protection of assets, and it must not be time-consuming or expensive. Megger supplies a range of easy to use testers designed to provide either a full test or just a quick check of the battery's condition.

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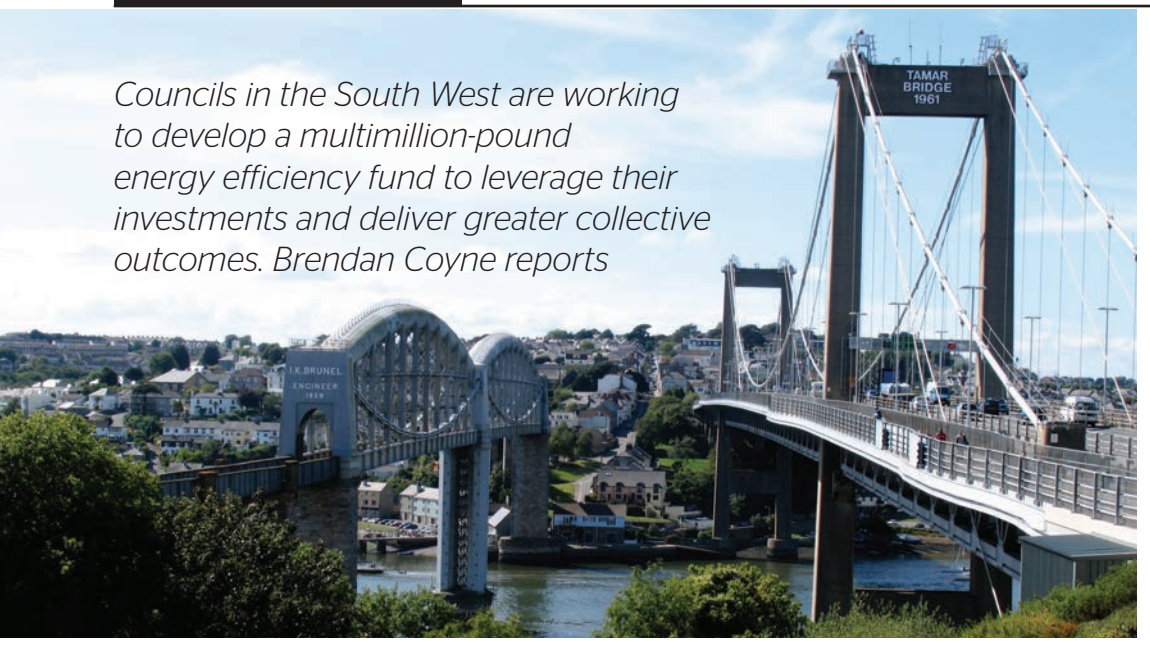

Councils in the South West are working to develop a multimillion-pound energy efficiency fund to leverage their investments and deliver greater collective outcomes. Brendan Coyne reports

Local authorities plan £100m energy fund

Local authorities in the South West are collaborating to create a £100m fund to invest in energy projects.

The South West Low Carbon Fund aims to improve energy efficiency of local building stock but also invest in distributed generation, storage, demand-side response and EV infrastructure.

As well as cutting carbon emissions, the aim is to create jobs and enable local authorities to earn a return from the savings enabled by funding investments – savings that in most cases will be guaranteed via energy performance contracts (EPCs).

By packaging up viable projects across the South West, they hope to also attract private debt funding, which usually requires aggregated, bankable projects to deploy capital at scale.

Alex Midlen

Plymouth City Council has led the development of the South West Low Carbon Fund through a EU-funded project, Finerpol.

It will work with Bristol, Devon and Exeter City councils and Local Energy Partnerships (LEPs) in the South West to create the South West Energy Hub and a pull-through mechanism for viable projects across the region.

A crucial part of that work will be led by Bristol, which has European Local Energy Assistance (Elena) funding to create a project development unit (PDU). That unit will develop projects from feasibility to investment-ready stage, at which point the fund can invest in them.

The idea is that the returns from projects will ultimately fund the project development unit and an independent fund manager once the three-year Elena funding expires.

But the councils are approaching the stage where they have to test the modelling in practice, says Alex Midlen, Low Carbon City Officer, Plymouth City Council.

"We are working out how to set up a kernel of a fund – not necessarily the full £100m, maybe half or a third of that – to kick start projects and to understand the relationships between delivery and finance," he says.

Delivering real projects and returns also gives the fund a better chance of attracting investment from both public and private sectors.

> ***If we are successful and can draw in private investment, that is more money for local projects***

"Part of our rationale is to develop a case for local authorities to invest into the fund themselves, but there are some big questions about why they would do that," says Midlen.

"The obvious one is that they are local authorities with their own energy efficiency projects that need their money. They could use their own reserves or the Public Works Board without going to a fund," he accepts.

"But there are some interesting benefits in local authorities getting together and supporting the development of a fund by direct investment and getting access to finance for their own projects."

One benefit is leverage, says Midlen.

"If we are successful and can draw in private investment, that is more money for local projects – not just council projects – which means better progress towards [broader] policy goals."

Another is the commercial returns that can be made by councils from investing in the fund. However, Midlen admits that case must be proven. He says there is also "a fundamental problem in the energy efficiency market, which is that there are better returns to be had in other sectors".

As such, those working on the South West Low Carbon Fund must establish a compelling case for local authorities to invest. "But when we have that [case] it will work for the private sector as well," says Midlen.

The Elena funding provides three years to make the case stack up. For now, there is an identified project pipeline worth about £50m that Bristol's project development unit can start to work through.

It will be interesting to see the level of appetite local authorities and the private sector have for those projects – which will likely decide the success or failure of the fund. te

Very healthy savings

A major energy overhaul at Oxford University Hospitals NHS Foundation Trust is on track to save £2m and 10,000 tonnes of CO_2 in its first year. Brendan Coyne reports

Last November, *The Energyst* reported that a new energy centre and upgrades at Oxford University Hospitals NHS Foundation Trust had saved almost £250,000 in its first month.

The remarkable figures prompted us to invite Claire Hennessy, head of the trust's operational estates and facilities management, to speak at The Energyst Event in April, alongside energy project manager Mark Bristow.

The project delivered a 4.5MWe combined heat and power (CHP) plant, heat network and HV link between the John Radcliffe and Churchill hospitals, which are 2.2km apart. It also included new boilers, heat exchangers, chillers, a new building management system and some 6,400 light fittings – all of which had to be undertaken without disrupting patient care.

The plant room before and after the energy centre upgrade

Risk transfer

Hennessy and Bristow explained that the project was conceived back in 2012 but took several years to come to fruition. That was partly because the required investment was deemed too large to undertake as a capital project. Eventually a funded energy performance contract model was found that would guarantee savings – enabling the trust to transfer the risk to the private sector.

Aviva provided the investment and Vital Energi delivered the package, with the total project costing £14.8m. The 25-year contract guarantees savings of £462,000 per annum.

Claire Hennessy

Mark Bristow

However, said Hennessy, "six months after the project went live, we have actually seen savings of £1.5m, far beyond what we originally dreamed of".

Moreover, said Bristow, "where projected savings are exceeded, Vital Energi and the trust share savings, which helps ensure the project continues to be efficient and deliver savings long into the future".

Savings for the year to October are set to hit £2m. The upgrade is also on track to cut the trust's carbon footprint by 10,000 tonnes a year, reducing total CO_2 emissions by a third.

Crucially, said Hennessy, there are no more breakdowns from 40-year-old heating plant. "That has cut backlog maintenance by £11m over three years. It means my maintenance teams can focus on other areas that require attention."

Meanwhile, an optimised building management system is providing much more detailed consumption data. "That allows us to target key areas to undertake further energy efficiency work," she added.

Off grid, on tap

The Churchill hospital is now "completely off grid and fed 24/7 by the CHP," said Hennessy, with any extra power used to feed the John Radcliffe hospital. That has "significantly reduced" their combined £5.9m energy bill, she added.

The waste heat generated by the CHP is also used to heat the hospitals' water, said Bristow. The heat network between the two sites means "any heat we do not need in the John Radcliffe goes to Churchill, so we are throwing away very little energy".

> ***We have actually seen savings of £1.5m, far beyond what we originally dreamed of***

The upshot of the upgrade is that the trust now has the infrastructure to underpin healthcare services for the next 25 years – as well as significant energy bill savings.

Hennessy added that the new lighting also makes a positive difference to the environment for both staff and patients. "It's a much brighter place to be," she said, which succinctly sums up the whole project. te

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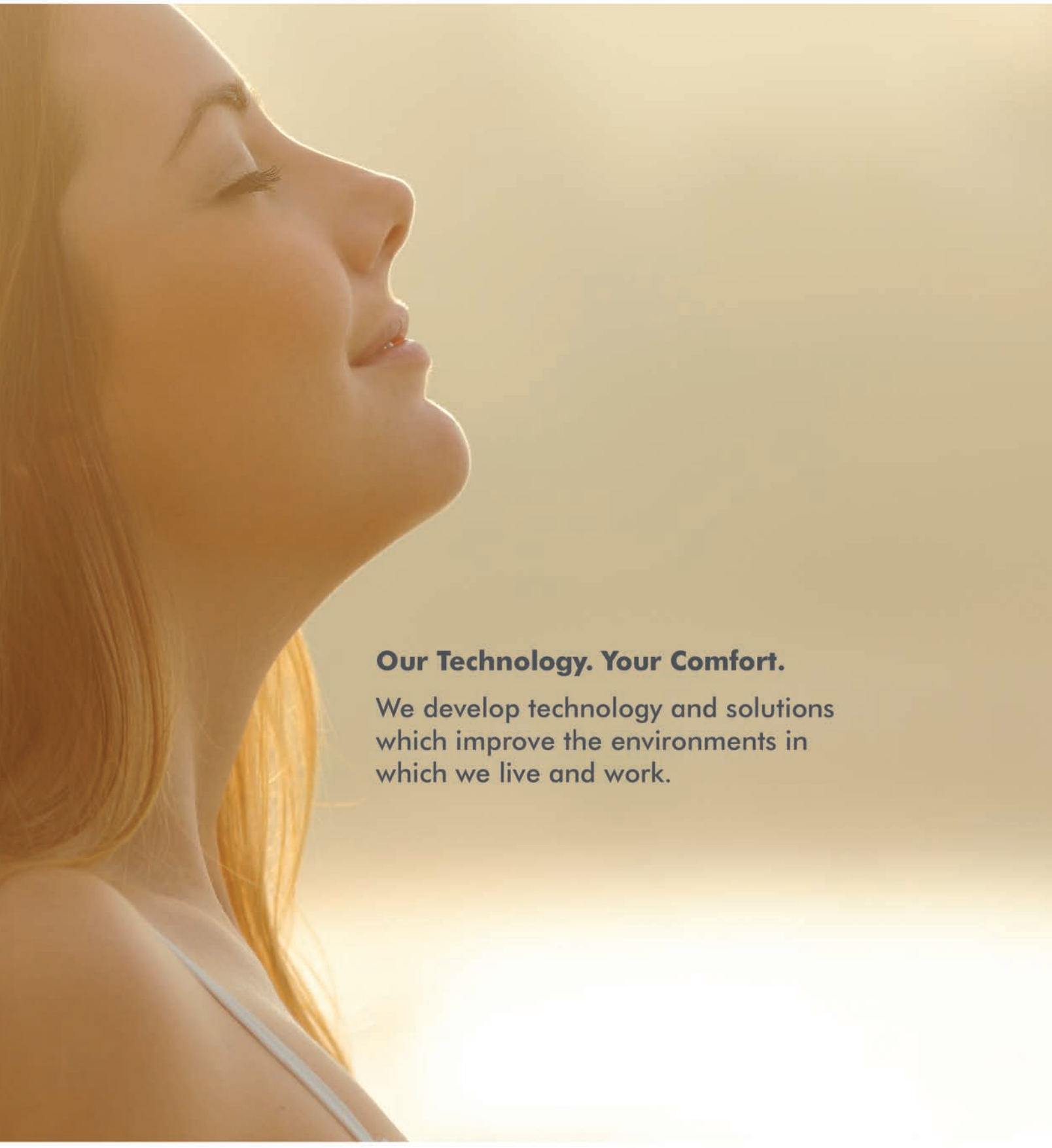

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More beef for energy efficiency

Mayor's Energy Efficiency Fund makes £500m available for public sector and SME energy projects in London

London mayor Sadiq Khan has launched a £500m fund for energy efficiency projects in the capital. Like its forerunner, the London Energy Efficiency Fund (LEEF), the Mayor's Energy Efficiency Fund (MEEF) is run by Amber Infrastructure.

The largest public-private energy efficiency fund in Europe, it will provide lower cost finance (rates start at 1.5%) to help deliver viable low carbon projects across London.

The minimum amount of funding – available to local authorities within the capital, NHS trusts, education, charity, voluntary and SME sectors as well as Escos – is £1m, with senior debt, mezzanine debt and equity sources available.

While an energy efficiency fund, it can also support decentralised and renewable energy generation projects as well as storage, electric vehicle infrastructure and low carbon data centres.

MEEF can fund up to 100% of the capital cost of a project but could also part-fund large scale regeneration projects with low carbon credentials.

Established by the Greater London Authority, with funding from the European Commission, the fund aims to help deliver London's ambition of being zero carbon by 2050. te

Robin Hood Energy in black after just three years

Council-owned Robin Hood Energy has made a trading surplus three years after launch - and notched up 115,000 customers.

The not-for-profit company said it would use the £202,000 to voluntarily enter the Warm Home Discount scheme, which helps older people and those on low incomes to pay their fuel bills.

Small suppliers are exempted from schemes including the Warm Home Discount until they reach 250,000 customers, a source of irritation for larger suppliers, which claim it enables smaller rivals to undercut their tariffs. Robin Hood Energy said it will also procure all of its energy from wind and solar power.

Chairman Steve Battlemuch said operating a trade surplus after three years was "a big achievement", suggesting most energy companies "take at least five years to reach this stage".

Robin Hood Energy also supplies business energy contracts and has recently launched a channel for brokers.

Anesco wins West Sussex photovoltaics contract

West Sussex County Council has appointed Anesco to provide operations and maintenance across its solar photovoltaics portfolio.

The authority has a mix of commercial and domestic PV as well as solar farms and plans to install panels at a further 60 schools. It has also recently developed a large scale battery storage project – and runs a not-for-profit energy supply business under the Your Energy Sussex brand.

The contract, which includes performance monitoring, maintenance and panel cleaning, went live this summer.

AI: Data centres today, industrial firms tomorrow

Artificial intelligence developed by DeepMind is delivering 30% energy savings at Google data centres just a few months after going live – and it is learning all the time. Google data centre staff and DeepMind engineers outline the story so far. By Amanda Gasparik, data centre engineer, Google, Chris Gamble, research engineer, and Jim Gao, team lead, DeepMind

Many of society's most pressing problems have grown increasingly complex, so the search for solutions can feel overwhelming. At DeepMind and Google, we believe that if we can use AI as a tool to discover new knowledge, solutions will be easier to reach.

In 2016, we jointly developed an AI-powered recommendation system to improve the energy efficiency of Google's already highly optimised data centres. Our thinking was simple: even minor improvements would provide significant energy savings and reduce CO_2 emissions to help combat climate change.

Now we're taking this system to the next level: instead of human-implemented recommendations, our AI system is directly controlling data centre cooling, while remaining under the expert supervision of our data centre operators. This first-of-its-kind, cloud-based control system is now safely delivering energy savings in multiple Google data centres.

How it works

Every five minutes, our cloud-based AI pulls a snapshot of the data centre cooling system from thousands of sensors and feeds it into our deep neural networks, which predict how different combinations of potential actions will affect future energy consumption. The AI system then identifies which actions will minimise the energy consumption while satisfying a robust set of safety constraints. Those actions are sent back to the data centre, where the actions are verified by the local control system and then implemented.

The idea evolved out of feedback from our data centre operators who had been using our AI recommendation system. They told us that although the system had taught them some new best practices – such as spreading the cooling load »

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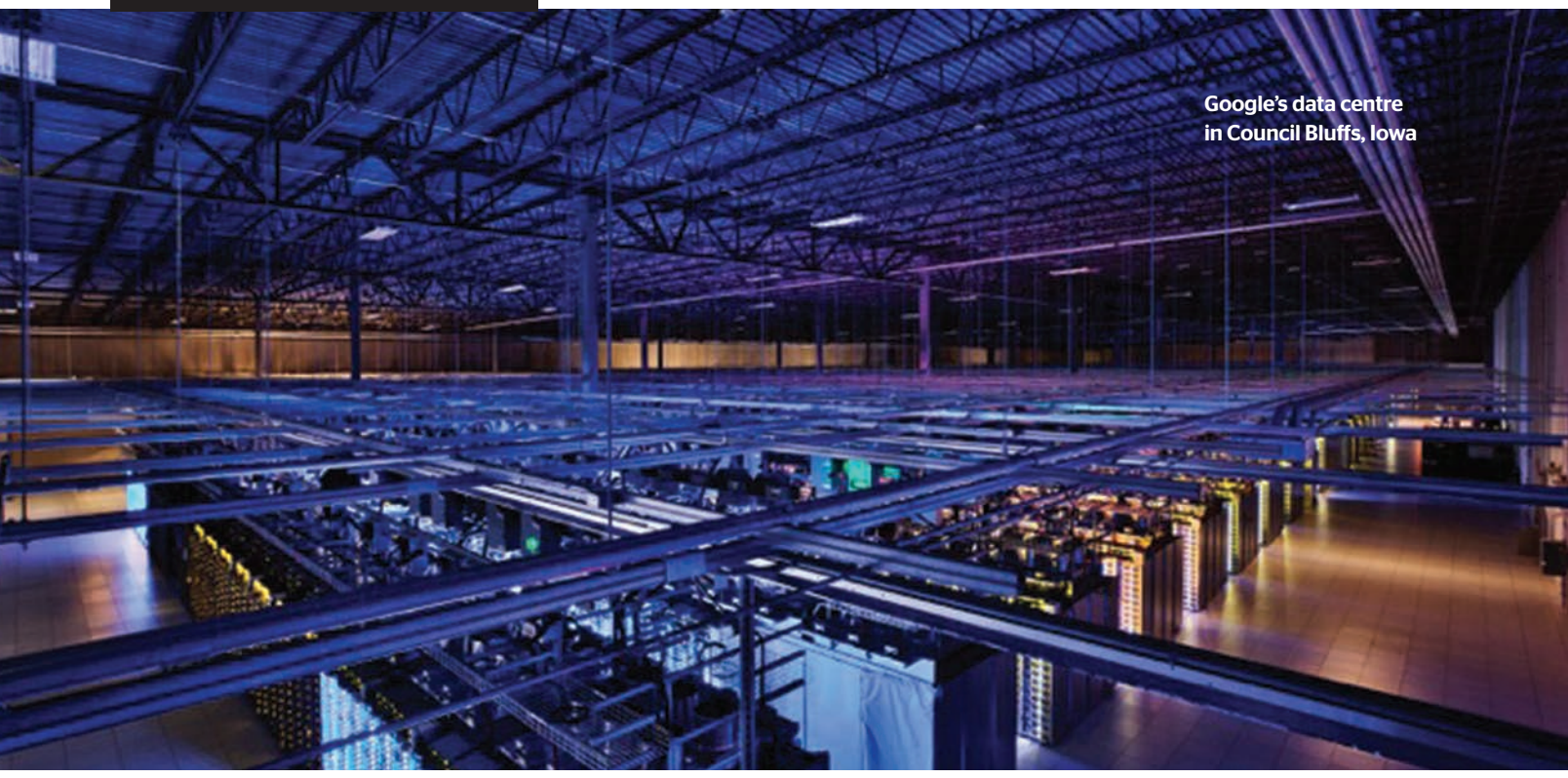

Google's data centre in Council Bluffs, Iowa

across more, rather than less, equipment – implementing the recommendations required too much operator effort and supervision. Naturally, they wanted to know whether we could achieve similar energy savings without manual implementation.

We're pleased to say the answer was yes!

Designed for safety and reliability

Google's data centres contain thousands of servers that power popular services including Google Search, Gmail and YouTube. Ensuring that they run reliably and efficiently is mission-critical. We've designed our AI agents and the underlying control infrastructure from the ground up with safety and reliability in mind, and use eight different mechanisms to ensure the system will behave as intended at all times

One simple method we've implemented is to estimate uncertainty. For every potential action – and there are billions – our AI agent calculates its confidence that this is a good action. Actions with low confidence are eliminated from consideration.

Another method is two-layer verification. Optimal actions computed by the AI are vetted against an internal list of safety constraints defined by our data centre operators. Once the instructions are sent from the cloud to the physical data centre, the local control system verifies the instructions against its own set of constraints. This redundant check ensures that the system remains within local constraints and operators retain full control of the operating boundaries.

Most importantly, our data centre operators are always in control and can choose to exit AI control mode at any time.

The AI system is delivering consistent energy savings of 30% on average, with further expected improvements as it gets better with more data over time

In these scenarios, the control system will transfer seamlessly from AI control to the on-site rules and heuristics that define the automation industry today

Increasing energy savings over time

Whereas our original recommendation system had operators vetting and implementing actions, our new AI control system directly implements the actions. We've purposefully constrained the system's optimisation boundaries to a narrower operating regime to prioritise safety and reliability, meaning there is a risk/reward trade off in terms of energy reductions.

Despite being in place for only a matter of months, the system is already delivering consistent energy savings of around 30% on average, with further expected improvements. That's because these systems get better over time with more data, as the graph below demonstrates. Our optimisation boundaries will also be expanded as the technology matures, for even greater reductions.

Our direct AI control system is finding yet more novel ways to manage cooling that have surprised even the data centre operators.

"We wanted to achieve energy savings with less operator overhead. Automating the system enabled us to implement more granular actions at greater frequency, while making fewer mistakes, says Dan Fuenffinger, one of Google's data centre operators who has worked extensively alongside the system.

"It was amazing to see the AI learn to take advantage of winter conditions and produce colder than normal water, which reduces the energy required for cooling within the data centre. Rules don't get better over time, but AI does."

We're excited that our direct AI control system is operating safely and dependably, while consistently delivering energy savings.

However, data centres are just the beginning. In the long term, we think there's potential to apply this technology in other industrial settings, and help tackle climate change on an even grander scale. te

This article was first published at deepmind.com/blog

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How to make EPCs better?

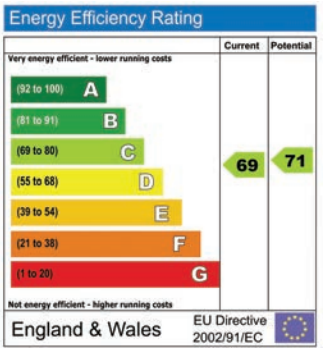
Views sought on how to make Energy Performance Certificates more effective tools

The government is planning to reform Energy Performance Certificates (EPCs) in a bid to make them more effective drivers of energy efficiency investment.

It is seeking industry views on how well the current EPC system is working and how it could be improved across both domestic and non-domestic sectors.

Beis is looking for views across the whole process for gathering, generating, storing, using and making available the information found on an EPC.

The call for evidence outlines the government's intention to improve the quality and consistency of EPC data and make it more widely available to third parties.



Beis wants to know how reliable and accurate current EPCs are. See the call for evidence at: bit.ly/2we7Ddd

To do that, the document outlines Beis' ideas regarding the core elements of a 'good' EPC and asks whether it has the right criteria.

Beis wants to know how reliable and accurate current EPCs are, given evidence suggests ratings can vary significantly for the same property when carried out by different assessors.

The call also seeks ideas on how to stop people trying to cheat the system, which some people may have done to ensure they can receive higher subsidies for solar generation, for example, which require a minimum energy performance rating.

Beis also wants ideas on how it might combine new data sources – such as smart meter data with temperature sensors and data analytics to inform key aspects of the EPC, such as the building heat transfer coefficient. However, the department admits it does not have a clear understanding of how such products work, how reliable they are and therefore whether they are suitable to be used to factor into EPCs.

Beis is also keen to hear views regarding when new trigger points could be introduced to require an EPC to be updated. If they have to be issued more frequently, people will have to become more familiar with them, and therefore may start to engage and act, the department suggests. te

£10m boiler scrappage scheme for London firms

SMEs in London are being incentivised to replace older boilers for cleaner, more efficient heating systems under a new £10m scheme launched by mayor Sadiq Khan.

Under the Cleaner Heat Cashback programme, small firms are entitled to at least 30% cashback if they replace existing working heating systems. If they are gas, oil or LPG, they must be at least 10 years old. If boilers are coal or biomass, they can be any age, as the scheme is intended to help reduce air pollution.

Systems must be a minimum size of 70kW. Replacement systems must be at least 90 per cent efficient gas or LPG boilers or connect to a heat network or renewable technologies such as solar thermal, air or ground source heat pumps. They must have NOx emissions of 40mg/kWh or less.

To qualify for cashback, replacement heating systems need to be installed by accredited installers on the system manufacturers approved list.

The scheme is open to any type of SME, though they must own their premises, be a tenant with building maintenance responsibility or have their landlord's permission and pay commercial rates.

The Cleaner Heat Cashback will run until 2020, or until the £10m is used up.

Boiler manufacturers welcomed the scheme and urged government to rollout a national version to speed decarbonisation of heat.

Greene King saves 676,000 pints a day

Pub retailer and brewer Greene King has cut its carbon intensity by 26.7% year on year, according to its annual report.

Tonnes CO2e per £100k turnover fell from 12.546 in 2016/17 to 9.197 in 2017/18. Total gross emissions fell 21% year on year, from 253,141 to 200,208 tonnes of CO2e.

The company, which has a water licence, says it has saved 676,313 pints of water a day since commencing self-supply, cutting water consumption by more than 140,000m^3 since 1 April 2017.

Greene King said it has trialled a system that will reduce the energy used by its main cellar chillers by up to 30% and plans to roll it out in 2018. The firm made other incremental efficiencies: modifying a main refrigeration plant compressor to reduce electricity, water and chemical usage, and introducing a system to reduce compressed air usage during filling of casks, saved more than 50MWh per annum, according to the report. The company said it would roll out further energy saving measures next year.

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University challenge

B.E.G. has installed an intellegent lighting solution at St John's College, Cambridge, meeting its demands for cost reduction, architectural sensitivity and minimum light pollution

St. John's College in Cambridge, which has parts dating back to the 13th century, required a lighting control solution as part of the refurbishment of its New Court building. The controls would be used to reduce operating costs, while also having to meet the needs of its architectural sensitivities and minimise light pollution.

Cambridge-based Baulogic, which specialises in the design, installation and maintenance of building control solutions, in conjunction with B.E.G, carried out a detailed site survey. Taking into consideration the building's unusual design, the company selected the B.E.G wall-mounted Indoor 180 KNX detector.

Mark Gedrych, director at Baulogic, said: "Most of the lobby spaces on either side of the central spiral staircase have tall cathedral ceilings, with archways between each area, neither of which we were allowed to touch.

The detectors blend into the renovated 1830s neo-Gothic spaces while still providing excellent coverage

"That's why we selected the B.E.G. wall-mounted KNX 180 detectors for these areas, mounted at 2.4m off the floor, and chose frames that were colour-matched to the paint colour, which had been selected by interior designers Eve Waldren Design.

"The overall effect is very pleasing because the detectors blend nicely into the renovated 1830s neo-Gothic spaces while still providing excellent coverage."

In a few areas, B.E.G. was able to employ the ceiling-mounted detector PD4 KNX SM, which gives coverage of up to 24m diameter. When fine tuning the detection areas, the strategic decision was made to fit some detectors with lens shields. This prevented lights being triggered when people are just walking past, as opposed to entering an area.

The shields can be modified to give clearly defined detection areas, meaning lights come on only when needed. te

Cross-fit for purpose

A south London gym is set to make energy savings of up to 70% after replacing its old fluorescent lighting with long life, energy efficient G5 LED Battens from Goodlight. The return on investment is expected within 18 months

CrossFit Perpetu, a dedicated, hybrid gym in London's Battersea, has recently undergone an extensive refurbishment. Situated in the railway arches near the famous power station, the facility provides a 'cross-fit' training programme that builds strength and conditioning through extremely varied and challenging workouts.

Michael Price, founder and CEO of CrossFit Perpetua, said: "As part of the refurbishment programme, we were keen to adopt LED lighting, not only for the obvious reduction in energy costs but we wanted a light that resembled natural daylight which is exactly what we have achieved. We chose Goodlight LED lighting because we loved the design and the G5 LED Battens are sleek and fit well into a modern space."

He continued: "We've received great feedback from our clients and have been very impressed with the light quality, which is evenly spread across the facility."

The G5 LED battens deliver up to 110Lm/W. They were a drop-in replacement for the 5ft twin fluorescent tubes and installation took just two days. The G5 is a glass-free LED batten that features a 120° beam angle for optimal light spread. They require no ongoing maintenance and have a lifespan of 50,000 hours over a five year guarantee. te

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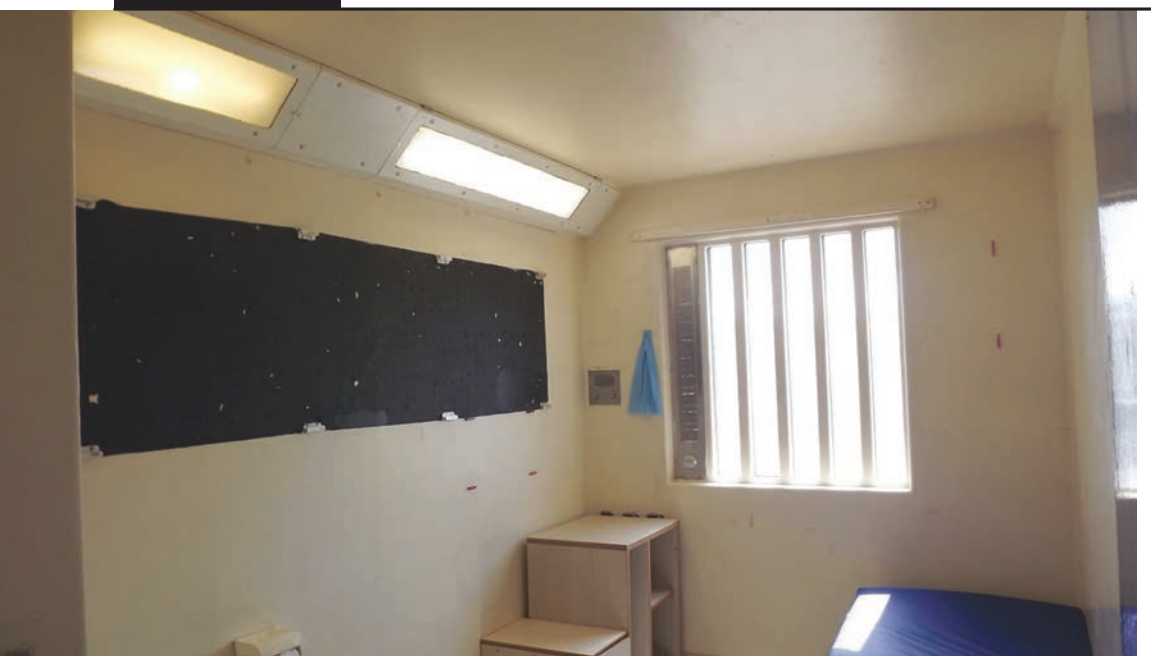


Three-month stretch no sweat

Amey completes £1.3m LED transformation project at prision in quick time

Amey's Prisons Facilities Management Team has completed work to retrofit 5,500 existing light fittings with a LED solution within the highly secure FM environment of HMP Risley, a Category B prison in Warrington, Cheshire.

The £1.35m LED upgrade was part of a series of energy and operations efficiency improvements identified by Amey's Energy Services Team on behalf of the Ministry of Justice (MoJ) and is anticipated to save HMP Risley an total of approximately £169,251 on its annual energy bills and reduce CO_2 emissions by 583 tonnes per annum.

The three-month project, funded by the MoJ, was part of a project to enhance and improve the operations and contribute towards the ministry's carbon reduction targets of 38% within the custodial estate by 2020.

HMP Risley was selected as the preferred test site as much of the building fabric within this establishment is similar to a large percentage of the custodial estate throughout the UK and could be easily replicated as best practice.

As the facilities management provider, Amey provided a full end-to-end solution that included building and asset surveying, design solutions, project management and supply chain expertise.

Working closely with client Governor and supply chain partners PHS, CEF and Tamlite, Amey developed a installation plan and a retrofit solution to minimise disruption to the operation of the prison.

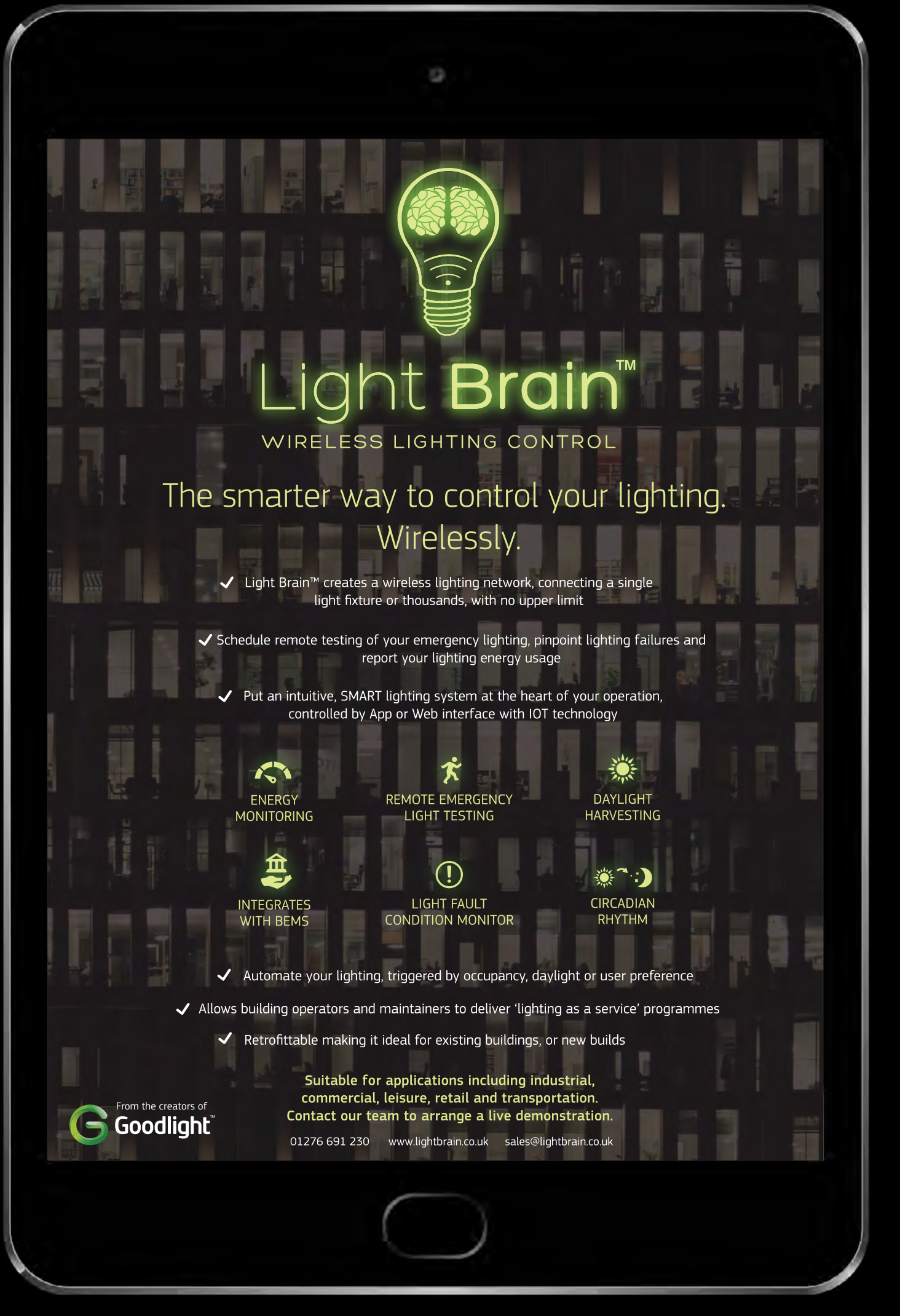
This bespoke solution meant the prison's existing 5,500 existing metal halide, fluorescent and sodium SON fixtures could be retrofit with energy efficient LED lighting.

This approach reduced the lead time and overall programme timescale, enabling the project to complete to desired three-month timescales and limit the capital cost of the project, while still complying with the ministry's technical standards (to ensure anti-ligature and anti-vandal fittings are installed in all prisoner facing areas).

Aside from energy and carbon other benefits to HMP Risley include: reduced maintenance costs (anticipated to be 50% less), improved safety and security through increased light levels and a reduction in vandalism cost as the new LEDs are significantly harder to damage and tamper with.

John Cole, the MoJ's head of sustainability, said: "The work undertaken at HMP Risley by Amey now provides us with a cost-effective model that we can use across all our custodial estate with minimal disruption to operations. The environmental impact this project will have in helping us reduce CO_2 emissions isn't the only benefit.

"The new LED lighting system will also help to reduce the cost of utility bills and maintenance within our prisons portfolio, as well as providing a safer, healthier and brighter environment for both prisoners and prison staff due to the increased quality of light." te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Coming home to roost: where the RHI went wrong

The government has had to reduce expectations regarding the success of the Renewable Heat Incentive. Remeha CHP's general manager, Mike Hefford, looks at the reasons for its failure to meet expectations and calls for incentives for 'stepping stone' technologies, such as CHP and efficient condensing boilers

The Renewable Heat Incentive is a UK government energy scheme set up in 2011 to encourage an uptake of renewable and low carbon heat technologies among businesses and organisations through financial incentives. It was extended to domestic buildings in 2014. The scheme, which provides funding to help meet the cost of installing renewable heat technologies, is the first of its kind in the world.

Which products are eligible?

Under the non-domestic RHI, the renewable heat technologies eligible for funding are solar thermal and solar panels, ground source heat pumps, water-source heat pumps, biomass boilers and biomethane. Air to water heat pumps and deep geothermal were added to the list in 2014.

The tariffs have been set by the government and depend on the technology used and the amount of renewable heat generated.

How successful is the scheme?

The RHI has come under criticism for failing to meet its target. The government expected the RHI to contribute towards the 2020 goal of 12% of heating coming from renewable sources, and to meeting its binding carbon reduction target of 80% by 2050. Unfortunately, its forecasts for take-up were over-optimistic. As of December 2017, less than 80,000 installations had been delivered by the RHI, well below Beis's target of 513,000 by 2020. As a result, it has had to reduce its expectations of how much renewable heat the scheme would produce by two-thirds and carbon reduction by nearly half.

What went wrong?

An innovative approach to encouraging the uptake of renewable technologies, the RHI was rolled out for the right intentions but lacked clear, strategic planning, implementation and monitoring.

Firstly, tariffs were over generous, set at more than the cost of the fuel, with participants continuing to receive payments for 20 years after accreditation. Secondly, there was no cap on the usage, so eligible applicants were able to make profits simply by heating properties. And the more heat generated, the greater the subsidy paid.

This led to manipulation of the scheme with businesses »

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heating previously unheated buildings to benefit from the funding. In one extreme example of abuse, a farmer in Northern Ireland reportedly aimed to collect £1m over 20 years by heating an empty shed. While the RHI scheme is separately managed and policed in Northern Ireland, I personally witnessed vacant poultry houses being heated in summer on the mainland, even though the chickens had been moved outside.

Overpayments to participants as a result of non-compliance with the regulations in 2016-17 alone amounted to £3m, according to the National Audit Office, or 4.4% of the non-domestic scheme (source: Ofgem).

Air pollution

Air quality is high on the environmental agenda today due to the detrimental impact it can have on public health, but the RHI failed to take into account the contribution of certain eligible technologies to air pollution through high emissions of NOx and particulates.

Instead, the government focused on carbon reduction, favouring low carbon and carbon neutral equipment in its product mix to meet its targets. Here too it came short, neglecting to consider the embedded carbon involved in the production process. With biomass boilers, for example, making and delivering the fuel involves a carbon process, so can this be defined as carbon neutral?

At the start of the scheme, the list of eligible technologies was arguably too narrow. Given the higher tariffs for biomass, nearly all of the initial incentives were paid for this technology. This led to a fall in demand for technologies such as heat pumps and solar thermal which had the effect of stifling rather than encouraging innovation in renewable technology.

The RHI was scaled back in 2015 to focus on off-grid properties, and only has a budget for new applicants until March 2021.

Total payments will rise over the lifetime of the initiative to £23bn, according to the National Audit Office. It concludes that the scheme has not delivered value for taxpayers or the predicted carbon savings.

Where to go from here?

If we are to achieve our carbon reduction targets, there needs to be a higher priority on energy efficiency moving forward, to reduce energy demand and support decarbonisation of heat.

How to achieve this? Shifting the focus to incentivise practical, cost-effective energy-saving technologies might be one solution.

And if we take the pragmatic approach, we need to take a fresh look at natural gas. Gas is a fossil fuel but, used highly efficiently, it has been, and can continue to be, the bridging fuel to a low carbon future.

Incentivising bridging technologies

Innovation is not restricted to renewable technologies. Take gas-fired combined heat and power, for example. This highly efficient technology has the ability to reduce energy costs by as much as 30% compared with using electricity solely from the grid and traditional heating equipment.

As such, it offers compelling financial, environmental and strategic advantages in communal and standalone heating systems, providing lower bills and improved energy resilience and security.

Then there is the humble gas condensing boiler. The latest models of condensing boilers achieve near maximum efficiencies with ultra-low NOx emissions. In the many UK commercial buildings still relying on dated, inefficient and polluting boiler plant, upgrading to more energy-efficient condensing boiler technology could literally transform their energy performance.

To put this into perspective, our clients have seen gas consumption fall by up to 48% after retrofitting high-efficiency condensing boilers, with one customer achieving an annual saving of £35k, equivalent to a carbon reduction of 217 tonnes.

Mike Hefford

Small step for big changes

The clock is ticking. We need to make energy efficiency an integral part of current and future plans for heat in buildings. The RHI has reportedly cost the public purse almost £500m to date. It is time now to go back to the drawing board and include the adoption of practical, affordable solutions to reduce energy consumption and emissions from heat.

Small steps, such as incentivising greater uptake of bridging technologies like CHP or introducing a UK commercial boiler scrappage scheme (along the lines of the £10m London Cleaner Heat Cashback programme) would go a long way to ensuring cleaner heat.

London alone expects to reduce NOx emissions by 80 tonnes and carbon emissions by between 20,000 and 70,000 tonnes annually from the initiative, while shaving up to £7m off business bills. Just consider the energy and emissions savings potential if the government was to roll out a commercial boiler scrappage scheme on a national level.

Approaches such as these are low-cost stepping stones to the holy grail of the low carbon future – but providing even relatively small financial incentives can have far-reaching effects. te

I personally witnessed vacant poultry houses being heated in summer on the mainland, even though the chickens had been moved outside

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Embedded power: market barriers heading for a fall?

Aditi Tulpule, legal counsel, Elexon and UKAEE member, discusses the difference between selling and supplying power for small scale generators and the challenges and opportunities inherent to incoming new market participation options

The growth of decentralised energy, flexible generation and government policy on reducing regulatory barriers to market participation have cumulatively offered small-scale low-carbon generators new and exciting options for revenue generation. Since 2010, government renewables policy has favoured the growth of embedded small-scale low-carbon electricity generation. This has helped to create an innovative power sector – one composed of small businesses as well as larger players.

The growth in renewable generation has seen a majority of the generation assets being connected to the distribution network and more and more electricity being generated at the distribution level. Also, the increase in solar and wind generation has meant an increase in intermittent power generation at a time when coal-fired baseload generation is being actively retired. This has led to a reduced ability to predict how much power will be available on the network at any given time. This is quite important as electricity cannot be stored and must be balanced second to second to ensure that the lights stay on.

The ability to predict demand and generation not only has an impact on security of supply but also affects energy prices. Simplistically, the higher the predictability, the lower the price and vice versa.

In summary, the GB electricity system has undergone a fundamental change – not only has the type and mix of generation changed, but the size of generation activity has also changed (from large to small scale generation).

Progress towards the 2009 Renewable Energy Directive	2004	2010	2015	2016	2017
Percentage of electricity from renewable sources (normalised)	3.5%	7.4%	22.1%	24.4%	27.9%
Percentage of heating and cooling from renewable sources	0.7%	2.8%	6.3%	7.2%	7.7%
Percentage of transport energy from renewable sources	0.2%	3.3%	4.4%	4.8%	4.6%
Overall renewable consumption[1,2]	1.1%	3.8%	8.4%	9.2%	10.2%

[1] Measured as a percentage of capped gross final energy consumption using net calorific values
[2] Cannot be directly calculated from the three separate measures

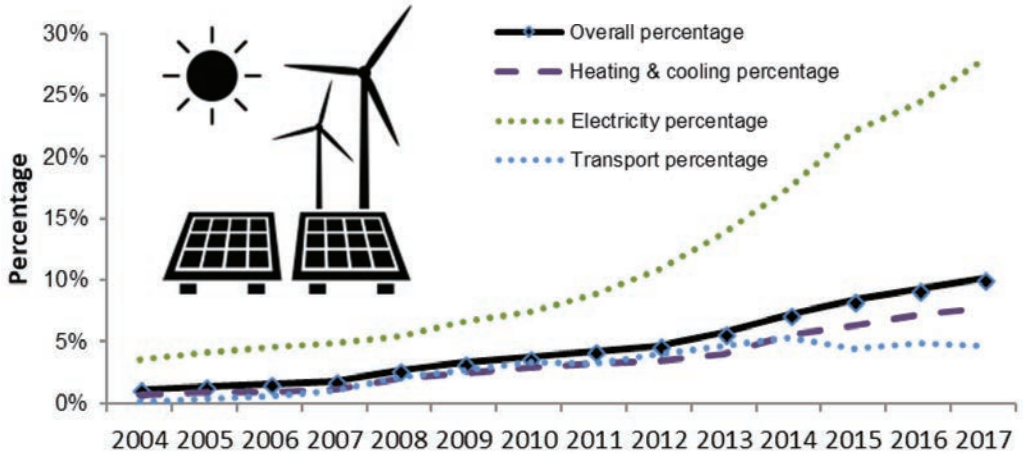

Figure 1: Increase in renewable electricity generation

A new generation

While the switch to lower-carbon generation is welcome, the market participation opportunities available to smaller players have not been the same as those available to larger players. This is mainly because the market has been designed to serve a centralised power network with a uni-directional flow – ie large power stations generate electricity that is then transported through high voltage transmission network to the lower voltage distribution network and then to the consumer.

However, the creation of the 'prosumer' (a consumer who is also a producer of electricity) has created a bi-directional flow of electricity that has fundamentally challenged the network structure.

Old structures

The GB electricity market is comprised of a wholesale market (where bulk of the electricity consumed is bought and sold between generators and suppliers on a long-term predicted demand basis) and the retail market (which involves the supply of electricity to large and small consumers). This is supplemented by the balancing mechanism (which allows National Grid, as the GB system operator, to buy or sell electricity on a very short term basis to enable it to balance the network) and the reserves procurement.

Electricity prices per MWh tend to be the highest in the balancing mechanism as power is bought and sold on an immediate basis.

Participation in either of the markets requires the acquisition of the appropriate licences from Ofgem (generation, distribution and/or supply) and becoming a signatory to a number of industry codes including the Balancing and Settlement Code administered by Elexon. This is a high compliance threshold to meet for most small-scale generators, which tend to be exempt from the requirement to have a generation license (exemptions regime).

Market barriers

As a result, embedded generators have tended to typically 'sell' generated electricity to licenced market entities via power purchase agreements without engaging in the market directly.

Participation in the retail market is also heavily regulated and exempt generators wishing to supply electricity to local consumers are required to meet the requirements of the exemptions regime – not just in respect of supply but also for distribution, where a private wire network is to be installed to facilitate offtake.

This is rendered more challenging in circumstances where there is an existing electricity network servicing consumer demand from the licensed distribution grid, as there is currently no mechanism that allows unlicensed suppliers to access licensed distribution networks without entering into a bilateral agreement with a licensed supplier.

The perceived complexity of the exemptions regime has meant that small-scale generators have been unable to benefit from revenue streams available to large scale players.

A level playing field looms?

However, government policy has recognised the need to ensure that the electricity market structure changes to keep pace with the new network structure – and a number of changes are afoot.

These policy initiatives are focused on lowering the threshold for market participation by non-traditional players and the key changes include: the creation of virtual balancing mechanism units, which will enable non-signatories to the Balancing and Settlement Code to participate in the balancing mechanism; the start of Ofgem and Elexon's 'Sandbox' programme designed to enable new market participants to enter the market with innovative solutions on a time-trialled basis to identify specific barriers to entry; Elexon's white paper enabling consumers to receive electricity supply from more than one supplier which will make way for grid connected consumers to also receive supply from a local generator; and the issuance of guidance by Ofgem on the use of the exemptions regime.

The above are but a few of the significant changes currently under way. te

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Unmetered means unmanaged

Paul Akrill, business development director at energy data collection and meter operator firm IMServ, says metering all low carbon assets is key to delivering the smartgrid

Innovation in energy resilience and the UK government's drive for net zero emission targets is creating a growth in the deployment of electric vehicle (EV) charge points throughout the UK. If growth in EVs continues as expected, it will create 2.6GW to 8.1GW extra net peak demand by 2030, according to latest National Grid projections.

The transmission system operator has indicated it can handle this kind of boom. However, deployment of EV charge points, battery storage and other low carbon assets such as heat pumps, is creating concern among at least some of the distribution network operators (DNOs) as a direct result of there being no mandate to individually meter these assets. Without the metering of these 'pseudo assets' (assets that do not belong to the DNOs) their demands or delivery to the grid is considered invisible to the DNOs.

> ***Metering...will instantly remove the issues and concerns surrounding the 'invisibility' of these pseudo assets and the potential impact of the 'unseen demand and supply'***

The network operators have a drive to improve customer services and increase operational efficiency through meter data. The smart meter roll out, albeit hindered with issues around the SMETS1 connectivity to the Data Comms Co and SMETS2 delays on delivery due to technology still being tested, will aid in this drive.

The visibility and connectivity that the smart meter network will provide, will enable them to factor in a number of issues from power outage management to checking power quality issues, plus enabling them to deliver visibility to the customer and manage the grid and systems for reduced electricity downtime.

Invisible supply and demand

What isn't part of government's smart meter rollout is the metering of this growing part of the grid: the metering of EV charge points, battery storage and heat pumps on commercial, public or private land. But should the deployment of meters, whose data delivers valuable insights to both the network operators and the end customer, need to be mandated by legislation?

Ultimately, by deploying metering across EV charge points, battery storage, heat pumps and other currently unmetered assets, the DNO would have the full visibility they require. At a stroke, that removes concerns surrounding the 'invisibility' of these pseudo assets and the potential impact of the 'unseen demand and supply' on their ability to balance the grid and the desired service provided to their customers.

The benefits of metering of EV charge points, battery storage and heat pumps does not start and stop at the DNO and their customer service proposition; they also benefit the consumer and commercial businesses adopting and investing in these technologies. As reported in May by Smart Energy GB, EV adoption could be significantly increased if customers are able to charge their vehicles at times when the energy is cheapest. Metering technologies provide the visibility of pricing movements to facilitate such automation. te

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Prefab energy centre sprouts in Barking

Vital Energi provides temporary solution for brownfield regeneration

One of the largest brownfield regeneration projects in Europe, Barking Riverside London, now has a temporary energy centre designed and installed by Vital Energi.

Some 10,800 homes, 65,000m² of commercial space, a new train station and seven schools are being constructed on the 180ha former power station site.

Vital is providing the energy solution for the entire development, with the construction of the temporary energy centre one of the first milestones.

Generating 4MW of heating capacity, the temporary energy centre was built off site in Birmingham and delivered in two parts to the development, enabling faster installation.

The energy centre consists of four 1MW condensing boilers, sensorless variable speed pumps, side stream filter, degasser units and water softener. Expandable by up to 1MW, it will serve the first 1,263 homes until the main energy centre comes online in 2021 and the equipment can be reused in the main energy centre or within other projects.

Vital also designed the accompanying district heating network – which it says has the potential to be the largest in the UK if all 10,800 homes are connected. The network is a weather dependent scheme, with flow temperatures adjusted according to season via a bespoke heat interface unit to boost efficiency.

Vital Energi's Rob Callaghan, regional director for the South, explains: "This is a major project and we are immensely pleased to be a part of it. We have designed a modular energy solution to cater specifically for the development's implementation schedule, with new buildings being connected as and when they are constructed."

Matthew Carpen, managing director at Barking Riverside London, comments: "The installation of our new temporary energy centre marks a major milestone for the project. We are committed to implementing innovative solutions to help drive energy efficiency, reduce the development's carbon footprint and therefore cut monthly costs for our future residents." te

Bosch invests in UK fuel cell firm Ceres Power

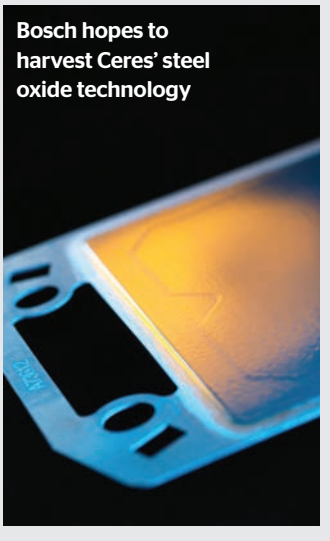
Bosch has taken a minority equity stake in Horsham-based Ceres Power. The German manufacturer signed an agreement with Ceres in January, which has now been made public, and will invest an initial £9m for a 4.4% share.

Ceres said the collaboration will see Bosch start low-volume production of its fuel cells, which will enable scale up and mass manufacture of its steel oxide technology. The firm said its units, currently 5kW, can be used in multiple applications, including small power stations to be used in cities, factories, data centres and charge points for electric vehicles.

The company, which is backed by FTSE 250-listed IP Group, also has agreements with firms including Weichai Power, Nissan, Honda and Cummins.

As part of the Bosch deal, the manufacturer will also pay licence fees, which Ceres says will total about £20m over the next two years.

As well as business and transport applications, Ceres has also conducted household trials. The company believes its technology, when operated as a CHP plant, could help decarbonise both heat and power.



Bosch hopes to harvest Ceres' steel oxide technology

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

Onsite renewables business case builder

Arbnco has launched a software platform that provides a first-stage feasibility study for the deployment of renewable energy systems at any site, based on location, geometry and consumption of heat and power.

The Arbn Renew software considers seven renewable technologies: PV ground mounted solar; PV roof mounted solar; wind; biomass heating; biomass CHP; gas CHP; and battery storage to determine which would be the most beneficial for a specific building.

The firm claims its online feasibility tool produces high-quality financial assessments to support a business case, identifying energy cost and carbon savings.

"Volatile energy prices, tight supply margins, grid constraints and environmental legislation mean that there has never been a more appropriate time to consider onsite renewable energy generation," said company co-founder Simon West.

"Arbn Renew has been designed to reduce an organisation's total cost of energy consumption, and therefore, reduce their carbon footprint."

Free energy risk forecaster

Energy services and smart metering company SMS has launched a free energy risk management tool that allows firms to project their potential electricity and gas costs for up to ten years in advance.

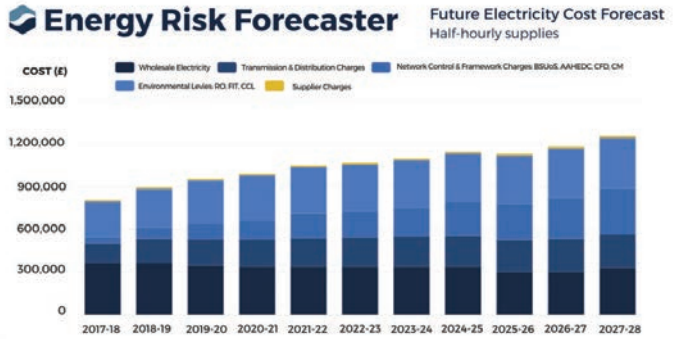
The company says its Energy Risk Forecaster highlights the effect of rising non-commodity charges and accounts for harder-to-predict wholesale energy prices using a model that examines the underlying fundamentals of supply and demand, the economics of generation and the expected impact of legislation.

SMS says it expects electricity costs to rise by 55% in the next decade, driven by subsidies and taxes to decarbonise generation. It forecasts gas prices to increase by 21% during the same period.

"We created this tool in response to the demand from energy users who need to better manage their long-term price risks. As it provides a complete picture, building up both non-commodity costs and wholesale price forecasts, it's been extremely well received by our clients," said Paul Jarvis, head of energy markets at SMS.

"The UK energy market will see dramatic changes over the next decade as we plan for grid decentralisation and decarbonisation in line with increasing demand. These factors have all been taken into consideration in our models."

Use the forecaster at sms-plc.com



New transformer in town

Powerstar has launched a new transformer. The firm says SO-LO's amorphous core means it is super low loss, and can provide a reduction in core losses of up to 75% compared to traditional CRGO transformers. Customisable to suit a variety of applications with numerous fixtures and fittings, Powerstar claims it surpasses the 2021 EU Ecodesign Directive.

In addition to the benefits gained from its amorphous core, its remote monitoring capabilities provide visibility and insights into the transformer's operations and performance, ensuring it operates optimally and identifying opportunities for further optimisations.

Robert Labinski

REstore's UK senior business development manager on being a Viking, playing rugby for England and why he's not in love with reality TV

Who would you least like to share a lift with? The individual who invented *Love Island* (or the reality show genre, for that matter). These shows just perpetuate self-absorption and egocentrism and I don't understand our cultural obsession.

You're God for the day. What's the first thing you do? Create a tree that converts CO_2 from the atmosphere 10,000 times faster, that grows quickly in any climate, has antibacterial properties in its bark, produces an abundance of cheap avocados and can be used to build sustainable housing – a sort of "supercharged avovera oak".

If you could travel back in time to a period in history, what would it be and why? I think I'd have made a great Viking... Maybe I don't have enough hair though.

> *I think I'd have made a great viking. Maybe I don't have enough hair though*

Who or what are you enjoying listening to? I inherited a love of acoustic rock music and blues from my parents, but the albums that make me nostalgic are Bloc Party's *Silent Alarm*, anything by The Rolling Stones and The Streets' *Original Pirate Material*. Nowadays, I use the commute to catch up on Monocle 24s pod cast *The Entrepreneurs* on SoundCloud, just quietly gaining the confidence to one day start out on my own path.

What unsolved mystery would you like the answers to? Why do we continue to vote for celebrities and not policies? #fakenews

What would you take to a desert island and why? I'd take a telescope. It's difficult to find out where you are going unless you understand everything about where you are. Plus, I'm praying this island is far enough away from London light pollution and emissions to get a view of the sky.

What's your favourite film (or book) and why? *The Inside Man* directed by Spike Lee. I could watch it on repeat.

If you could perpetuate a myth about yourself, what would it be? I'm known within the inner circles of the London hip hop dance scene as "Crazy Legs" Labinski.

What would your super power be and why? Endless stamina and regeneration. Breaking bones, bruising limbs and tearing ligaments costs me time out from kite surfing and playing rugby. Just being able to walk out of the door and be at peak fitness after two weeks in the car would be fantastic.

What would you do with a million pounds? Invest in five energy technology start ups and ride the wave all over again.

What's your greatest extravagance? I want to say kite surfing equipment, but that's not true any more. We do love a city break or a "date night" at the Labinski household.

If you were blessed with any talent, what would your dream job be? My dream job is, and for as long as I can remember has been, playing rugby for England (that or presenting *Countryfile*).

What is the best piece of advice you've ever been given? You are the average of the three people you spend the most time with. Make sure one is smarter than you, one is more compassionate and the other is your wife, because she is both.

What irritates you the most in life? Litter. It's just everywhere.

If you invented this show, maybe avoid lifts with Crazy Legs

What should energy users be doing to help themselves? Businesses will see the energy market open up in the next 6-12 months, so responding to real time system needs will be key. Access to the Balancing Mechanism, the DNO/DSO challenge and pan-European projects will create an opportunity for organisations to revolutionise their energy consumption and procurement strategy.

By focusing on existing, real time flexibility and adopting technologies that create a 'buffer' in processes, firms will be able to take advantage of this shift in market needs and maximise the value of these changes to their businesses.

What's the best thing – work wise – that you did recently? I had the privilege of working with a very innovative team at a manufacturer, who agreed to step back from day-to-day production pressures to look at the broader picture of their energy future with open minds. This resulted in a huge shift in their energy strategy and has seen them radically change the way they generate and procure energy.

They will now be able to stack revenues and savings from the Capacity Market, Triads, frequency and balancing reserves within multiple different processes; shape flexible parts of their production cycles in line with day ahead prices automatically; and respond in real time to imbalance price forecasts and availability of renewable generation, to drive down the cost of every tonne.

As a result of their mindset, they will most likely become the most advanced industrial energy consumer in the UK. te

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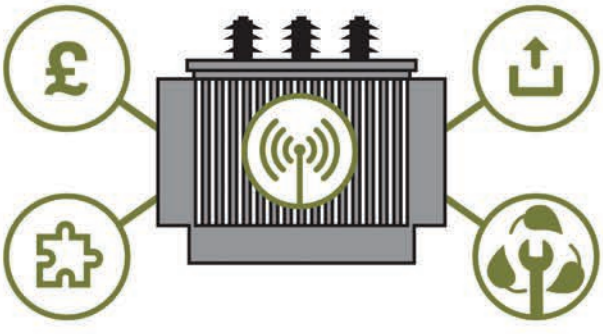
THE SUPER LOW LOSS, SMART TRANSFORMER

The super low loss amorphous core present in the UK manufactured Powerstar SO-LO smart transformers delivers high efficiencies and reduces the amount of unnecessary losses which equates to cost savings and reductions in CO_2 emissions.



The integrated remote monitoring capabilities of Powerstar SO-LO provide 24/7 online visibility of your assets to understand how they are performing, including where efficiencies can be made to obtain the best return on investment.

- Significant energy cost savings over transformer lifetime
- Greater supply efficiencies with a super low loss core
- Simple HV infrastructure upgrade for enhanced energy consumption savings
- We guarantee to buy back and dispose of your old transformer
- Integrated remote monitoring provides intelligence for traditionally offline assets

Meets and surpasses **2021 EU Ecodesign Directive** standards set by the European Commission

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powerstar®