New Power REPORT

MAY 2020

'There ought to be areas where industry players can collaborate and vulnerable consumers is one of them'

Jonathan Oxley, Attricia Archer, UKRN

DEMAND SIDE

can the System Operator win a step-change in the new market?

CCC

exploring the Net Zero route out of lockdown

HEAT

a balancing role for non-half-hourly metered customers?

PROJECT PIPELINE

what is the role of community energy?

'I can't imagine myself ten years ago lobbying for anticipatory investment. But we are in a different world now.'

Tom Glover, RWE Renewables

CV19

Lockdown power issues

'Distributed ledger could form a key component of an as-built asset information model'

David Price, Black & Veatch Management Consulting

Expert information for all those invested in the UK's energy future

Power inside a pandemic

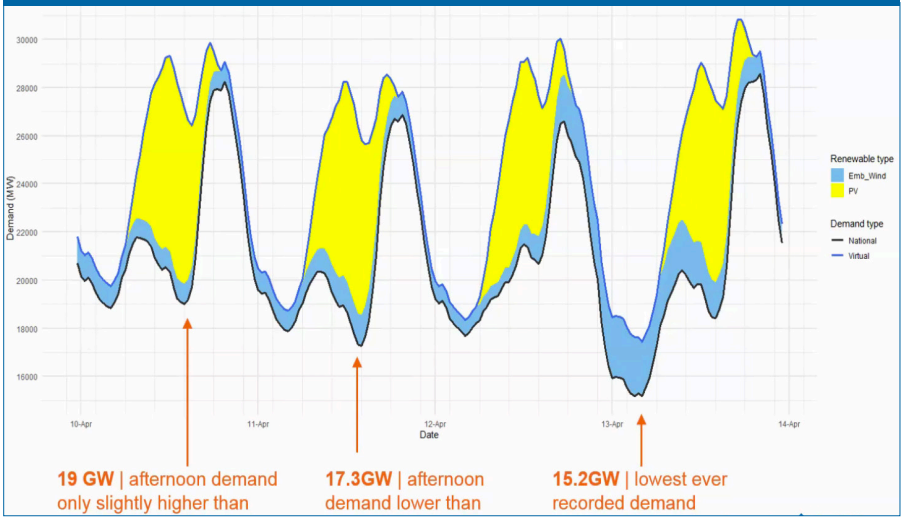
The energy industry has largely won plaudits for its response to the new needs of customers during the pandemic. Internally, the industry faces its own problems. Ofgem says, "The 'lock down' of non-essential sectors of the economy, the re-purposing of some sites, and changes in consumer behaviour means energy consumption is varying from season normal patterns to an unprecedented extent. This is having a consequential impact throughout the energy supply chain at an unprecedented pace." There is concern over customer indebtedness and the ability of network companies to gain access to complete work and maintain a safe environment for staff and customers. Below we summarise some of the impacts and some industry responses.

NGESO grapples with record low demand

National Grid ESO will start procuring a new 'footroom' product, 'Optional Downward Flexibility Management', on 7 May to help it manage the system during periods of very low demand. In addition, it has sought an urgent modification (GC013) to operating rules that would ensure it can disconnect embedded generation if ODFM and other tools are insufficient to manage supply at times of extreme low demand. GC013 will be in place until October but it is targetted initially at the 8 May Bank Holiday, when NGESO anticipates that oversupply will present 'significant operational risk'.

ODFM will pay providers to increase demand or reduce generation so that NGESO has enough generating assets in operation to maintain frequency and voltage control. Providers of the new service must be able to turn up demand or curtail generation in tranches of 1MW, and be able to do so for a period of three hours. Crucially, they must be able to do so on bank holidays and weekends, when supply is most likely to exceed demand. Assets cannot participate if they are already in the Balancing Market, holding 'active network management' arrangements with the local DNO or in other flexibility markets. They have to be able to respond to an email notification that they are being called on, including on non-working days.

ESO NATIONAL DEMAND, GOOD FRIDAY TO EASTER MONDAY 2020



Source: NGESO

NGESO is also looking for power operators who can offer so-called 'SuperSEL' (stable export limits) services to help it keep the grid stable at times of very low demand. It has already taken advantage of assets with existing SuperSEL contracts and it has written to hundreds of asset owners to ask about plants' reactive power, inertia and response characteristics. It said it was likely to call on transmission-connected plant that would support system inertia and voltage.

The products are part of the system operator's response to managing the system through periods of record low demand while few

industrial and commercial customers are drawing power.

On Easter Monday, demand fell to15.2GW, compared to the previous record of 15.8GW (see chart, left). The system operator admitted it had not predicted such low levels: its prediction was 17.4GW, but it had overestimated consumer demand and underestimated the effect of warmer weather and embedded wind generation. With such low levels of demand, NGESO brought 17 generating units on line to maintain system stability, a level of intervention it would not normally expect until the June or July during summer lows. It said that the cost of the day's balancing actions meant Monday was "more expensive than average". It expects demand will go even lower in the bank holidays in early and late May, while embedded generation soars - especially PV - although that depends on weather conditions.

It expects to have more, and longer, periods of very low demand if the lockdown continues - a glimpse into the future, as the system evolves to include more renewables and distributed generation.

The system operator is continuing to investigate whether it can source inertia from "non-traditional sources" – it usually calls on thermal plant with large rotating masses to provide the service – but said that work would not be implemented this summer. NP

BEIS agrees emergency loan for LCCC as demand reduction hits CfD levy

The dramatic reduction in electricity demand for business customers has left the Low Carbon Contracts Company (LCCC) facing a £120 million gap in funding to pay generators under the government's Contracts for Difference (CfDs) support scheme. The Department for Business, Energy and Industrial Strategy (BEIS) is consulting on an interest-free loan for LCCC to cover the shortfall.

The CfD payments to generators are funded by suppliers via a per MWh levy on customers. The levy is calculated on a quarterly basis on predicted generation, and paid per MWh of customer demand. The levy is calculated in advance, using assumptions about generation and demand.

Despite the lockdown, the total generation in operation with CfD contracts is still increasing, as the UK build-out continues more or less on schedule. The total has risen from 4,937MW in Q1 and is expected to reach 5,486MW in Q3, due to the startup of one onshore and one offshore wind farm, as well as an energy from waste plant and a biomass plant, all expected in Q2 and Q3. That requires levies to increase in any case (see table, below).

But in the Covid-19 crisis two factors have come into play since the Q2 levy was calculated. The reduction in demand means power prices have fallen from seasonal norms and as a result the cost of 'top up' payments that bridge the gap between market reference price and the guaranteed 'strike price' in the CfD has increased. Meanwhile, customer demand during Q2 has been very different to that predicted before the lockdown was announced. Since customer demand is lower, the levy amounts that are being collected by suppliers and passed to the LCCC will be insufficient to cover the generator payment.

Generators have to receive £540 million in support payments for Q2, but the levy will raise only £420 million. Some will be covered by a reserve fund. BEIS has agreed a loan to cover the shortfall.

Customers are expected to pay back the BEIS loan via a hike in the levy in Q1 of 2021. How that falls on customers depends on how quickly consumer and business demand reverts to a more familiar mix. If business has not recovered its former demand pattern, more of the cost will fall on domestic users. The additional levy will coincide with the peak winter hearing period, when domestic demand increases, especially for those who rely on electricity for heating, and those users may carry more of the loan reimbursement than they would have done, for example, if it were recovered in Q2 2021.

Higher levies to underwrite renewables in the coming quarter will fall much more heavily on domestic users, if business remains in lockdown. In a further twist increasing the burden on domestic consumers, most commercial and industrial businesses – those most likely to be shuttered during the lockdown – would pay CfD levies on their entire energy usage. In contrast, energy intensive industries are relieved of the cost for 85% of their energy use.

Placing more of the payment burden on domestic customers raises an issue for suppliers. For large business customers the levy may be a 'pass-through' cost and business bills rise with the levy. >

CFD INTERIM LEVY RATES IN 2020

Period	Levy rate, £/MWh	CfD payments, £M	Eligible demand, MWh
Q1	5.848	479.49	81,986,095
Q2	7.469	468.01	65,068,0079
Q3	8.532	541.98	63,523,494

Source: LCCC

But the cost is absorbed in bills for domestic and small businesses users, which means suppliers bear the immediate risk if the levy increases. Although they may be able to claw back additional costs later, small companies will have to manage unexpected hiccups in cash-flow. That, with other uncertainties, could contribute to driving suppliers who are low on working capital out of business.

Meanwhile, BEIS has consultated on how to temporarily reduce compliance burdens on the Capacity Market around issues such as metering and testing, because the Coronavirus crisis has made it impossible to gain access to many sites .

That scheme is also administered by the LCCC. It was previously suspended for a year while EU competition authorities re-examined its clearance under State Aid rules and payments. NP

Settlements: codes have to change fast

The Balancing and Settlement Code, administered by Elexon, is fundamental to the industry's financial framework. The volume of supply in each half hour, confirmed in the settlements process, is also used to determine network charges, Capacity Market charges, CfD payments, and other value transfers around the industry. That means accuracy is key: the power supplied by generators has to be reconciled with that transmitted across the networks and supplied to individual homes and businesses.

During the Covid-19 crisis the accuracy of that data has to be maintained as strictly as possible, although suppliers are in many cases unable to gain access to customer sites, either to read meters or to repair them.

Elexon and the BSC parties have taken action in four areas to maintain that accuracy while reducing the administrative burden on the parties, explains chief executive Mark Bygraves.

Where metered data is missing, the BSC provides for the use of historic data – but in this case, where

PRICE REDUCTIONS HIT POWER AND COMMODITIES

The lockdown has cut power demand by 10-20% across Europe and across the continent average power process have fallen by 30-40%, reports consultancy Aurora in a report 'Impact of Covid-19 on European Energy Markets'. It says commodity prices have fallen further.

Aurora suggests that on average, power assets hit hardest by the price movements will be merchant renewables. Merchant thermal plants will be hit by low power prices but can also benefit from lower fuel prices. But the outcome varies according to national power market frameworks. In the UK, that means less profit for power assets across the board. Renewables projects supported by Contracts for Difference will have some shelter from price movements, while those supported by the Renewables Obligation will be more exposed. Thermal plant will be more heavily affected in the UK because of the UK carbon price floor. Elsewhere in Europe falling carbon prices will benefit thermal generation.

But Aurora also notes that system operators will have to manage lower system inertia, by calling on spinning reserve and other response services. These services have traditionally been provided by thermal plant and in the UK the system operator has called on thermal plant to fulfil this service.

In mid-April Aurora put price falls at 25-40%, and projected they would recover by 2022 (if the crisis results in 'mild recession') or remain at least 20% lower until 2025 (in the event the crisis prompts a depression in the EU and worldwide).

OIL PRICE FALLS

Oil prices have fallen dramatically, with some prices negative late in March when delivery coincided with the start of the lockdown. That is far from the only issue affecting fossil fuel markets – up to and including price wars between Saudi Arabia and Russia – that at one stage resulted in negative prices for immediate oil deliveries.

Low oil prices have not favoured green power generation in the past as they have allowed fossil generation to undercut renewables. But commentators suggest that recent price movements represent a sea change. In a discussion paper, Bloomberg NEF said, "Historically, a plunge in crude prices has tended to undercut costlier clean energy, prompting companies to divert dwindling financial resources into their core business of fossil fuels. What's different this time is that the cost of renewables and natural gas has broken away from oil, weakening crude's influence on the price of electricity."

It added, "…While the coronavirus has destroyed demand for oil and transport fuels, power use has dropped less sharply. And importantly, energy companies are now painfully aware of the mounting pressure from consumers -- and investors -- to clean up their output, rein in emissions and prepare for a future beyond oil."

It did not discount the possibility that, "investment in clean energy could suffer collateral damage". But it supported comments from Fiona Reynolds, chief executive of Principles for Responsible Investment, who said of oil majors that: "Having made green commitments, the risk to their reputations from scaling these pledges back would be too big".

In a blog for ECIU, comparing the recent fall with one in 2016, Jonathan Marshall summed it up: "When back in 2016 it was low carbon energy sources that seemed the riskier option, it is now fairly safe to say that this is no longer the case."

businesses are shuttered, that would mean volumes were put in that were higher than the known usage. Using existing powers, derogations have already been agreed which will allow suppliers to provide their own estimated data instead – with evidence to ensure those estimates are robust. “It was all about ensuring that accurate estimated volumes were in settlement,” says Bygraves.

Secondly It has agreed changes with the Performance Assurance Board around automatic penalties where data management falls outside set limits, such as the number of meter reads. That generally imposes a charge on suppliers who fall outside the limits, but “We recognised that in this world that would be everybody”, says Bygraves. A modification suspends that charge from March.

Other changes aim to accelerate any provisions that will help smooth the crisis for BSC parties. For example, the Credit Assessment Price is used to determine the amount of collateral that parties have to lodge. The value depends on market prices, which are falling, “We therefore looked at how we could accelerate introduction of the reduced CAP to reflect that into lower collateral requirements as soon as possible. We cropped days off various procedures,” Bygraves says. Against a power price falling from £36/MWh to £30/MWh, the amount of collateral lodged could be cut by around 20%. That will ease the cash flow burden on BSC parties who may not be seeing expected payments from customers.

Other changes tidy up the process – for example allowing electronic signatures instead of ‘wet ‘ones. Industry changes and rule modifications are being prioritised so those required to cope with Covid-19 and those related to industry changes with a fixed deadline take priority.

GAS CHANGES

Meanwhile, gas shippers and suppliers also have to react to the lockdown.
Gas settlements have to calculate gas use by by reconciling volumes input to and taken from the network. Ofgem says “routine meter reading has ceased” during lockdown. It has agreed to treat as ‘urgent’ four modifications to the Unified Network Code (UNC) rules that govern the gas industry. One (UNC722) allows estimated rather than real reads to be used, and will allow shippers to reconcile sites and energy used more quickly. Another (UNC722) gives gas shippers more leeway in revising the ‘annual quantity’ (AQ) of gas consumed at a specific meter. This is a key measure that feeds through to fundamental industry calculations such demand estimation, consumption and allocation (of gas used). A third (UNC723) makes it easier for shippers to discount supply points where gas usage is close to zero due to ‘lock down’ restrictions from allocation, nomination and application of certain charges.

The fourth (UNC724) would lessen the effect of so-called ‘ratchet’ charges that are intended to incentivise shippers to closely predict demand. Those charges should be amended with regard to industrial sites that shut down without warning and others (such as emergency medical facilities) that started up at short notice, it says. That mod would be backdated to 23 March to align with the lockdown announcement.

The ‘urgency’ decision allows the modifications – if agreed by the code body and passed by Ofgem - to take effect at the end of April. NP

CCC wants a ‘net zero’exit from CV-19

The Committee on Climate Change (CCC) is preparing to set out advice to ministers on ensuring that rebuilding efforts after the CV-19 crisis support a ‘just transition’ towards Net Zero emissions and strengthen the UK’s preparedness for climate change.

It will write to ministers with advice and will refocus its annual Progress Report to Parliament, due in June, to include advice on supporting a resilient recovery alongside its statutory assessment of the UK’s progress in reducing emissions.

The plans came in changes to the CCC’s 2020 work programme to respond to the global Covid-19 pandemic announced by chief executive Chris Stark.

The CCC plans to publish its ‘advice to government’ on the level of the Sixth Carbon Budget (2033-2037) in December, instead of September. “This provides additional time to complete the analysis and reflect on the impacts of the crisis,” Stark said.

The Third UK Climate Change Risk Assessment evidence report, which the CCC’s Adaptation Committee will deliver to government next year, is still scheduled for publication in summer 2021, but this date will be kept under review.

Chris Stark said: “Responding to the pandemic is, rightly, the immediate priority for everyone. Eventually, thoughts will turn to the need to rebuild after coronavirus – the climate priorities can help shape these efforts. The Committee will offer advice to government on constructing a resilient recovery. Coronavirus is teaching us all the value of prudent planning for global shocks.” NP

DSR success in Capacity Market auction gets little help from Delivery Body efforts

Ofgem plans to remove an incentive for the EMR Delivery Body (run by National Grid ESO) to increase how much demand side response (DSR) participates in the Capacity Market auction. The incentive won the Delivery Body (DB) £113,890 last year, but Ofgem said, "we do not see a strong correlation between any efforts of the DB to improve DSR participation and participation itself".

In its annual review of Delivery Body performance, Ofgem said that NGESO's IT system "continues to be the area of greatest concern". It said that in 2018/19, "We continued to receive feedback from many stakeholders on the poor performance of the EMR Portal, and its failure to meet the needs of its users," especially during the Prequalification window.

Ofgem noted that the DB still faces a significantly higher volume of Prequalification Applications and Capacity Agreements than originally anticipated when the CM began. In September the regulator agreed to allow additional funding to deliver a replacement IT system. It agreed additional allowances of £2 million to deliver the replacement IT administration system by April 2021 - that brings the DB's total additional allowances for spend on the existing IT administration system and the Portal between April 2016 and March 2021 to £9.81 million, to add to the £33.7 million initial estimate.

There is still work to do on "responsiveness and ease of participation, particularly in relation to the IT system (EMR Portal) used to participate", the regulator said. It wants the DB to make sure its IT systems allow user functionality in order to minimise the potential for errors.

CHECK THE RULES

In considering disputes over qualification, Ofgem did not question the process in place. Tier 1 disputes have fallen significantly, from 620 in 2017/18 to 283.

But the regulator received 68 Tier 2 disputes, and having grouped them into 21 'themes' it overturned five of the themes. It said this was a result of the DB's misapplication of the Rules and due diligence when assessing the application and it said, "The DB should be more considered and balanced in the application of the CM Rules and taking into account information provided by the Applicants within their Prequalification Application."

The total of overturned Tier 2 disputes meant the DB paid a £100,000 penalty. NP

Power Responsive sees more action from demand side participants ...

Demand side flexibility (DSF) has been winning market share in National Grid ESO's ancillary service markets, according to the Power Responsive annual report.

Product evolution has seen some settle to 'natural price points', the system operator said, but it indicated there would be more changes to products. The application of the EU's Third Energy Package mean some familiar products will change, because the package requires ESOs to procure reserve one day ahead for a contract length of no more than one day. As a result STOR and Fast Reserve tenders have been suspended while NGESO determines, along with Ofgem, whether it can comply with the new requirement.

NGESO already has new products in development, including a competitive market for 'restoration' services that would use alternative routes for 'black start', rather than calling on a few large fossil plant. It was also expecting to launch procurement of 'dynamic containment' services this year but this has been delayed (see following report). Meanwhile, as a result of the Coronavirus lockdown the system operator has launched a new 'foot room' product to manage low demand (see p2). The lockdown brought that need forward. An EU consultation could also see more requirement to call on renewables to provide DSF.

The Energyst's DSF report, Shifting Value, found that the majority of DSF providers – who are most often large companies that spend more than £1 million on electricity annually – remain broadly satisfied that DSF is worth their while. However, revenue and confidence have been eroded by changes to products, new regulations and the suspension of the Capacity Market in 2019.

Several products have both an availability and a utilisation fee. Last year, according to the report, although the Short Term Operating Reserve (Stor) market has been shrinking, DSF has retained its share >

of contracts and availability prices centred on a 'natural price point' of £2/MW/h for 2019. But DSR contracts offered lower utilisation fees so they have been called on to respond "substantially more" than traditional providers.

In fast reserve, NGESO accepted 75% of DSF tenders in late 2019, compared with 30% the year before, which is thought was becsue it had increased the capacity sought and halved the entry level, from 50MW to 25MW. It said that relatively high prices bid for availability payments and low prices for utilisation was a sign that "providers are seeking more certainty" over the revenues.

In firm frequency response the picture was complex because some volumes moved in to the market, from the old 'mandatory market', while some volumes moved out to a new auction market, which NGESO is trialling in 2019 and 2020. But there were more and larger providers from the DSF sector over the last three years. Traditional providers participating were smaller, and fewer won contracts. The ambition is to move to day-ahead auctions, which NGESO says will provide investors with clearer pricing signals than the current pay-as-bid tendering process. But there is no firm timetable for this at present.

In the Capacity Market DSF continues to win contracts in the T-4 auction but volumes have contracted in the T-1 auctions as prices have collapsed. In future, DSF should be able to bid for multi-year contracts in the CM auction.

REACHING INTO DISTRIBUTION

NGESO notes that DNOs are now starting to procure demand side flexibility directly to manage issues on the low voltage networks, and it noted that local energy market platforms were being developed to trade or sell flexibility across distribution and transmission. But it warned that "the minded-to position to allow DNOs to provide network management services could be viewed negatively, as this is likely to compete with demand side customer opportunities".

The relationship between flexibility markets is still uncertain; for example National Grid ESO said its solutions for managing the system during low demand may include "accessing resources" at the distribution network level to raise demand. NP

... but CV-19 hits NGESO's product plans

National Grid ESO has delayed several projects planned for the next few months as the Covid-19 crisis has required it to re-deploy expert staff to its control rooms.

In an update the system operator said it had a "finite pool of people who can take on control room roles." The SO has had to take a precautionary approach, saying "This is not a fixed crisis and we do not know how it will evolve".It has set up parallel teams housed on site, changed shift patterns to ensure teams do not come into contact, and reduced staff inside the control room so it can maintain social distancing.

As well as losing expert staff who have returned to operation roles, more staff have been absent and the 'new product' team has lost access to the control room to test and trial new products. That affects new products such as 'dynamic control'. NGESO said delivery of that product will not happen in as planned in June and the project team will engage with industry on a revised timeline.

CV-19 also affects the SO's forward planning work and the SO said its annual Future Energy Scenarios, a key scoping document, would be produced and presented to industry in a different form.

Meanwhile, lack of access to operational sites has slowed other programmes. Power Potential, a project in partnership with UK Power Networks that would test the use of distribution-connected assets to help maintain voltage stability, has been delayed. It requires visits to third party sites to commission the necessary resources and hook them into NGESO's system. "UKPN can't do that in lockdown," the SO said. It is now hoping to do trials from September and complete them by April next year. Similarly, a project to adjust settings on thousands of small plant so they 'ride through' grid disturbances has been delayed by lack of site access.

The SO said Project Terre, an operating reserve platform that would allow GB to access Europe-wide resources - and allow GB providers to offer reserve to neighbouring markets - would slip from its planned go-live of June 2020. Earliest go-live is now the end of October 2020. Industry members responding to the change raised concerns over whether GB would ever join the platform, noting that the go-live date was slipping towards a point at the end of the year when the UK will have left the EU.

The system operator promised to set new project timelines with industry, saying "We recognise you are all making business decisions depending on where we are in the plan". It added, "Lots of what we are learning, especially around low demand, will help secure the transition" to a low-carbon system. NP

Shifting heat strategies: how domestic heat companies are making the link with power balancing needs

The Coronavirus emergency has thrown into sharp relief National Grid ESO's plans to operate the electricity system without the use of fossil fuels by 2025.

In New Power's April issue we discussed the effect of the 'lock-in' across Europe, which has seen fossil plant out of action and the proportion of wind and solar increases. That reinforces the need for the system operator to have new tools for managing the supply and demand balance. Sunny warm weather in April saw 69% of power coming from renewables at times, and negative pricing on wholesale markets, and it created some buzz when customers on innovative flexible tariffs, like those of Octopus Energy, saw some zero or negative pricing. That is a useful tool to help system operators manage periods when supply exceeds demand, but so far the numbers on such tariffs remain small, and the users are typically 'early adopter' individuals who have already been able to invest in solar PV and potentially boost it with domestic batteries.

A big prize in balancing would be to expand it from electricity only, to encompass the heat side of energy use. This is far from unknown in the industry. Altering the balance of production in combined heat and power plants is one option that is already used and large scale options have been proposed that would see excess power used to heat water or another medium ('hot rocks', in one proposal put forward by Siemens) and tapped later to provide power or heat.

> "Customers on innovative flexible tariffs... saw some zero or negative pricing

Is heat balancing an option for domestic users? The solution is an attractive one. It would give domestic users a way of managing their use so they can take advantage of flexible tariffs, and if individuals cede control to a 'virtual power plant' aggregator their combined usage would offer the system operator powerful management tools. What is more, it is an option that may have a relatively low barrier of customer familiarity to overcome. Up to 10% of UK households have used Economy Seven-type tariffs that offer cheaper power at night, often in conjunction with storage meters, and the idea of 'off peak' pricing periods is well entrenched. Using heat alongside electricity for a 'whole system' approach for managing supply got a boost from the successful 'Nines' project, led by SSEN, which provided a smart energy system in Shetland.

The question has been how to tap into and – crucially - control domestic heat storage so it can be harnessed at large scale. Ivan Castro, co-founder and chief scientist at AI and storage specialists Levelise, thinks that the nine million hot water cylinders already existing in domestic properties have a combined thermal storage of 100GWh.

His company is providing software and AI for a new trial, known as the USER Project, that will set up a virtual community of homes across the country. Key to the project is a device that allows the immersion heater to be used, and switched on or off, at a time that meets system needs.

The project was rolled out to the homes of 50 Social Energy customers in April. The project also aims to see the device installed in 300 other properties by September, so that data can be gathered through an entire winter season. That should see the devices installed in a variety of properties including old and new (hardware supplier Baxi expects to roll it out in new hot water cylinders as part of a new development) and both houses and apartment blocks. The technology is agnostic as to whether the heat is initially supplied by gas boilers, heat pumps or solar thermal.

The rollout is uncertain while the country is in lock-down as a result of CV-19, but Castro said the project team still hoped to see the units installed by September.

LEVELISE WILL BE ADAPTING

Castro said 350 homes would be "enough to have an impact and prove the business model". What is the business model he refers to? It might seem that the option of timing the 'heating up' part of the cycle so it coincides with periods of low prices, reducing the user's bill directly, is the most obvious option. But historic choices made by the industry make that problematic.

Electricity wholesale prices are determined in half-hour windows between which the prices vary dramatically. Economy Seven relies on the fact that in the past prices could be relied on to fall during the night, rather than responding to live price signals, and special meters recorded use in the 'day' >

and 'night' time windows. But responding to real half-hourly market signals requires customers to have meters that record their usage every half-hour and charge them accordingly. Smart meters now being rolled out do take the readings – but in most cases that is not yet used to determined their bill. Instead customers are assumed to fit into one of just a handful of usage profiles and charged on that basis. Customers can request individually to be 'half-hourly settled' but an initiative to roll that out to all customers will take several years to be implemented.

> These services ...do not require the users to have half-hourly meters

However, there are other opportunities to use aggregated domestic users to gain revenues. Levelise is modelling its approach in the USER Project partly on similar services it already offers, which aggregate customers who have home batteries and PV, as 'business as usual' to National Grid ESO.

Those units are being used to bid into the Balancing Market and offering dynamic fast frequency reserve. They are also being used in so-called 'imbalance chasing'. In that case the aggregated units deliver or take more power than planned with the aim of being on the 'right side' of imbalance at the point of dispatch. If they succeed, they receive the 'cash out' price, which varies according to the price NGESO pays to the units it calls on to balance the system.

The key point about these services is that they do not require the users to have half-hourly meters to be able to access revenue. Levelise, as aggregator, will adjust usage at participants' properties as required by the system operator and will be paid by NGESO for its services. In some cases end users will receive payment directly. In others, like those who are Social Energy customers, it will be reflected as a discount on the bill.

THE HEAT BATTERY

The device that enables these actions to be taken is relatively simple and in commercial operation is likely to pay for itself in energy bill reductions or ancillary payments in around three years, say the developers.

A business model similer to the USER Project is also in view for a new startup, Pumped Heat (PHL) that sees its main market as homes currently off the gas grid. Founder James Macnaghten says his heat battery is just "bigger than most hot water tanks".

The heat battery is a standalone unit that operates at high temperatures. The heat storage material cycles between 200 and 500 degrees – so it can be used for central heating - and remains solid throughout operation. The material is the company's key technology and MacNaghten says it is, "Slightly more expensive than concrete, but has a thermal conductivity that is the same as steel." Thermal losses are kept low by using a vacuum vessel. The battery can be charged from the mains, standalone solar PV or a combination.

> We expect utilities to offer a low tariff in exchange for ... deciding when to charge

The technology is at an early stage, with a 50kWh prototype and plans to install two 100kWh full size versions during the coming year.

To roll it out, PHL plans to supply the heat core as a component to boiler manufacturers who will package it and sell it as their own, through normal distribution channels.

MacNaghten believes there are 500,000 properties with enough external space and an 80A or 100A electrical supply, and for those that currently rely on LPG or oil, the lifetime cost of a heat battery will be lower.

"We expect utilities to offer a low tariff in exchange for the owner of the house letting the utility decide when to charge the unit. As there is effectively 24 hours of heating in a unit (for a large house) the owner will not know when it is being charged. The utility's responsibility will be to always supply heat and to keep it above the minimum charge level." He says it has "exactly the same logic" as the USER Project.

Heat has been the elephant in the room as regards decarbonisation and the choice between decarbonising the gas grid or converting entirely to heat pumps has appeared to be a stark one. Heat pumps offered high efficiency, but with a potentially high cumulative load at peak times, whereas the gas grid offered the ability to store energy in the form of molecules – gas now, but potentially hydrogen in the future.

These technologies are not, individually, going to solve that problem. But they indicate a shift towards whole-systems thinking that addresses both the problems of managing the electricity grid and of supplying green heat at the lowest cost. The key is innovation, and new technologies that have enough familiarity to be readily accepted by the consumer, allowing them to be rolled out at scale and get the benefits of replication. NP

SUPPLY

Centrica seeks bids for social impact grant

A new social impact energy grant scheme opens today for applications.

Centrica says its 'Energy for Tomorrow' scheme aims to support and empower entrepreneurs, particularly those from underrepresented groups, who have concepts and innovations to tackle climate change and lower energy bills for people and communities.

From today, EfT is calling for applications that focus on the scheme's inaugural theme: 'Innovations that help make people's lives easier and more sustainable'. The aim is to partner with between six and ten organisations who have innovative ideas to help deliver affordable, accessible and reliable clean energy. Each organisation will receive a grant of between £100,000 to £500,000, provided over a period of up to three years. Priority will be given to smaller organisations with turnover of less than £1 million and to projects focused on the UK. And Centrica says it wants to encourage diverse groups and non-mainstream thinkers to come forward.

EfT wants applications from charities, CICs and not-for-profit and for-profit companies and enterprises with a clear social mission. These include organisations that are:

- Innovators – creating new solutions to reduce carbon emissions and changing the way society uses energy
- Helping people – to engage with their individual energy use, understand how their behaviours can impact the environment and demonstrate how things can be done differently
- Supporting communities – especially hard to reach groups - to collaborate and use energy in a more sustainable way, delivering real benefits to their local area

EfT said, "Regardless of the structure, we require the enterprise to demonstrate a financially sustainable business plan by the time our funding stops and have a sustained commitment to a core social impact."

The scheme's revenue is derived from the feed-in-tariffs of solar panels installed on over 250 schools across the UK.

HEAT

'Immediate and substantial' need

Legal & General Capital has acquired 36% of ground source heat pump company The Kensa Group.

Legal & General said the acquisition complemented its clean energy investment portfolio, which recently included an increased stake in vehicle charging company Pod Point. It highlighted its "fast-growing housing platform" with build-to-rent, build-to-sell, later living and affordable housing, saying it wants to make all its new housing stock operationally net carbon neutral between now and 2030. As part of this, its later living business, Inspired Villages Group, is in advanced discussions with Kensa to put in place ground source heat and has rolled out Pod Point electric car chargers.

The company said that there was a "significant and immediate opportunity" for low carbon heating solutions because new building regulations are set to outlaw fossil fuel heating systems for new build homes. In addition, retrofit represents "a significant market opportunity, with around 23 million homes in GB using mains gas (carbon intensive) as their heating fuel, two million homes electrically heated (high running costs) and the remaining two million using heating oil or other fossil fuel systems (carbon intensive and high running costs)".

Legal and General Capital said it invests in sub-scale industries that it can use its platform to grow rapidly in the post-crisis period.

The Kensa investment "supports Legal & General's ambition to form part of the UK solution to reaching net zero carbon emissions by 2050". It will also use Kensa with a low carbon heating solution to create scaled solutions with local authorities, government and other industry players.

Simon Lomax, chief executive of the Kensa Group, said: "This significant investment will allow the Kensa Group to strengthen its market-leading position by accelerating Kensa Heat Pumps' research and development programme, expanding Kensa Contracting's district heating shared ground loop array activities, and providing zero-cost ground arrays via innovative funding programmes through Kensa Utilities. The investment also provides the opportunity to install our systems at scale at sites being developed by Legal & General's property business portfolio."

Legal & General's partnership with Kensa coincides with the completion of new manufacturing premises in Cornwall, which will enable the production of up to 30,000 ground source heat pumps every year.

POWER PURCHASE

Platform expands

Zeigo has closed a £800,000 Seed Funding Round led by Naruhisa Nakagawa, founder of Caygan Capital.

Zeigo is an energy tech platform that connects corporate energy buyers (private and public sector) with renewable energy generators and suppliers.

It allows customers to promptly come to grips with the market and build a business case. The company will use the new capital to scale strategically and develop its tech platform.

The company said that as a tech-driven platform it can be used for corporates to gain visibility on local clean energy markets and connect with generators without the need to be 'on the ground'.

It also attracted a second round of investment from angel investors including Green Angel Syndicate, a London syndicate investing in the Green Economy, investment bank ClearlySo, UK online equity investment platform the Syndicate Room and family investment office Earlymarket.

Business partners include Aurora Energy, Cornwall Insight and law firm Bryan Cave Leighton Paisner. Zeigo's early customers include CBRE and Gatwick Airport.

PPA for Race Bank

Nestlé's UK subsidiary has signed a 15-year indexed fixed price agreement with Ørsted to buy part of the power from the Race Bank offshore wind farm. Nestlé UK will buy the output of 31MW of the offshore wind farm's 573MW total capacity, making it Ørsted's largest fixed-price corporate power purchase agreement (PPA) in the UK.

From 1 May, Nestlé UK will start purchasing 125GWh of green power per year to cover half its power consumption. The agreement, along with Nestlé UK's existing PPAs, means all of Nestlé UK's consumption will be covered by PPAs from renewable energy backed by certificates.

For Ørsted, it stabilises revenues for the wind farm and reduces merchant power price exposure across the portfolio.

TIDAL

New interest

North Wales tidal stream energy project, Morlais, has signed up three new turbine developers.

French firms Sabella and HydroQuest, and Spanish developer Magallanes, all aim to deploy devices on a commercial scale at the Crown Estate-designated zone off the coast of Anglesey, north Wales.

Morlais is run by social enterprise, Menter Môn. The first stage of the project, aims to secure consent for the development of the zone. The second stage will put the necessary infrastructure in place so that developers, including the three new partners, can implement their devices at the site.

Sabella, based in Brittany, has already completed sea trials for its 1MW D10-1000 turbine and is targeting marine applications for remote grids. The company's Marlène Moutel said: "Anglesey's waters have a great deal of tidal resource and Morlais will enable us to commercially deploy a pilot tidal array, a crucial step toward the development of the tidal industry."

HydroQuest, based in Grenoble, develops turbine technology for rivers and the sea and aims to deploy its1MW tidal turbine OceanQuest in the Morlais zone.

The Magallanes project, launched in 2009, in Galicia, Spain has previously tested its first commercial scale tidal platform carried on at the European Marine Energy Centre (EMEC) in Orkney Islands. It is aiming for larger scale deployment at Morlais.

Morlais is part funded by the European Regional Development Fund through the Welsh government.

Developers say the project has the potential to scale up over time to generate up to 240MW of electricity.

GENERATION

Spare units on offer

Temporary power units that were earmarked for summer events like the Glastonbury festival have been offered 'pro bono' to power planned Covid-19 testing sites across the UK. But government would have to cover freight costs to move the units to site, as well as fuel.

Aggreko, which supplies power units on a temporary basis, has offered the government up to 1,300 of the engines. It says they can be used for temporary testing facilities planned for sites such as retailers' carparks and unused theme parks.

Aggreko says that for sites without easy connections to mains electricity temporary units will be required and its units can be remotely monitored so engineers are not needed on site.

Chris Rason, managing director at Aggreko Northern Europe, said: "The need for more COVID-19 testing sites across the country is clear, and our generators can be deployed very rapidly to ensure consistent and stable power to temporary venues.

"If we can be of service, we are ready and willing to help. As many of these units had been earmarked for outdoor events, such as Glastonbury, that have largely been cancelled or postponed, we are offering them pro-bono. All that's needed is fuel and freight costs to start providing power."

New assets for Alpha

Alpha Real Renewables has acquired operational wind and solar assets located across Wales and the North West. >

ENFORCEMENT

InterGen to pay £37M for power market manipulation

Generating company InterGen has to pay £37,291,000 in restitution and fines after Ofgem found it had manipulated the power market during 2016.

An Ofgem investigation found that InterGen made £12.8 million when its staff manipulated the market during four days in the winter of 2016. They deliberately sent misleading signals to National Grid falsely claiming that some of the company's power stations would not be generating during the critical 'darkness peak' evening period when demand is highest. To boost profits further, the company also deliberately sent misleading signals to National Grid about its power plants' capabilities.

The misleading signals provided by InterGen staff made demand/supply margins appear even narrower than they were during a 'tight' supply period and pushed National Grid into paying high prices in the balancing mechanism for the InterGen to generate electricity during those hours.

As well as the £12.8 million in extra revenue, the investigation found weaknesses in InterGen's procedures, management systems and internal controls with respect to complying with trading (so-called 'Remit') regulations.

InterGen will make a restitution payment of approximately £12,791,000, to pay back the money it achieved through its manipulation and recompense those affected.

Ofgem is imposing a penalty of £35,000,000, but as InterGen has admitted the breaches and taken responsibility this is reduced by 30% to £24,500,000.

The overall sum to be paid by InterGen comprises the money to be paid back (£12,791,000) plus the penalty (£24,500,000), which totals £37,291,000.

Jim Lightfoot, InterGen CEO, said: "We deeply regret and sincerely apologise for the behaviour of former traders in these 2016 incidents. We take this matter incredibly seriously and have cooperated with Ofgem's investigation. None of the traders involved in 2016 are still with the company.

"As acknowledged by Ofgem we have undertaken a thorough overhaul of our people, processes and systems since 2016, so that nothing like this happens again. This has included detailed compliance training, strengthened management oversight processes, an internal restructuring, and experienced hires being made to the trading desk.

"InterGen is proud to have been an important part of Britain's power system for more than 20 years. We apologise again for these historic incidents and look forward to continuing to help the UK keep the lights on and transition to a net zero economy."

The transaction, with TLT as adviser, comprised a portfolio of mixed clean energy technologies from individual operators, including wind farms with private wire power purchase agreements (PPAs), wind farms which export power to the grid, and a 1.2 ROC accredited solar project.

Alpha's Wind Renewables Income Fund invests predominately in sub 5MW onshore wind assets in the UK, predominantly backed by UK Feed in Tarif ("FiT") with 20-year "grandfathered" incentives.

SUPPLY

Free power?

Startup energy supplier Neo Energy has offered new credit customers free electricity for up to two months over the summer if they sign up to the deal before the end of April.

It says it will not bill customers who switch during June and July, which could allow for up to 61 days of free power from the date of switch (which will be around two weeks after a customer signs up). Dual-fuel customers will be billed for gas.

The offer is only available to customers with a credit meter. Neo cannot support customers with pre-payment meters, however it says it does allow customers to pay their energy bills via crypto currency.

The new company is targetting residential and SME customers and says it "strives to provide" 100% green energy. It is also seeking 'angel' investors to fund the company, claiming that it currently supplies over 1200 meter points.

FUEL

Ammonia on test

Wärtsilä has begun combustion trials using ammonia fuel. The aim is to explore the potential to use ammonia instead.

In the test, ammonia was first injected into a combustion research unit to investigate its properties. The tests will be continued on dual-fuel and spark-ignited gas engines. These will be followed by field tests in collaboration with ship owners from 2022, and potentially also with energy customers in the future.

Although it is derived mainly from fossil sources today, in the future ammonia's greenhouse gas footprint can be nearly eliminated if it is produced using electricity from renewable sources.

However ammonia has a number of properties that have to be managed. It ignites and burns poorly compared to other fuels and is toxic and corrosive. Burning ammonia could also lead to higher NOx emissions unless controlled either by after-treatment or by optimising the combustion process.

Wärtsilä says it is investigating several future fuels, including

synthetic methane, ammonia, hydrogen and methanol, because internal combustion engines can be adapted for different fuels. Dual-fuel or spark-ignited engines can burn liquified natural gas – from fossil, biomass or synthetic sources – while diesel engines can run on liquid biofuels, biodiesel or e-diesel.

FINANCE

Green bond

E.On has successfully issued a €750 million green bond with a tenor of 5.5 years.

The company said that despite the significant market disruptions caused by Covid 19, it secured favourable interest terms: the bonds have a coupon of 1%. "The comparatively favourable terms stem from significant investor demand leading to eight-times oversubscribed orderbooks," it said.

The transaction was executed by an international bank consortium. Goldman Sachs International, ING and UniCredit served as active bookrunners.

E.On's CFO Marc Spieker: "We very much appreciate today's successful placement. The strong investor demand for E.On's bonds underpins capital market's trust in our strategic direction and our resilient business model."

STORAGE

New battery

Gore Street Energy Storage Fund's new 10MW battery has gone into operation using Origami's smart grid technology. The battery is in Brentwood, Essex.

SSE Business Energy is the licensed supplier and power off-taker for the battery, which uses batteries supplied by Japanese engineering giant NEC.

Alex O'Cinneide, chief executive of Gore Street Capital, the energy storage fund's investment adviser, commented: "We are delighted that Lower Road, our 10MW project in Brentwood, is now operational and directly contributing to our company's revenue."

Peter Bance, chief executive, Origami, said: "New battery projects provide much needed flexibility, which is critical if we are to make a success of renewables. Our technology enables asset owners to generate value from a number of different energy markets.

This is one example of how Origami's intelligent technology enables our customers to generate optimal financial returns across a range of dynamically changing opportunities."

INQUIRY

MPs open inquiry on green innovation

The Environmental Audit Committee has launched a new inquiry, Technological Innovation and Climate Change, considering how British innovation could tackle climate change, and is inviting written evidence.

The UK is expected to exceed the target set out in the third Carbon Budget due to phasing out coal and moving towards renewable energy sources. However, the committee highlighted that the fourth and fifth Carbon Budgets "will be much more challenging to meet, and the need for innovation will be of greater significance".

The committee said that the UK has taken a leading role in the development and deployment of some low-carbon technologies, but some technologies, such as nuclear, have fallen short of expectations on performance or cost.

The first session of the inquiry will look at offshore wind power. The UK has the largest market in the world for offshore wind, and, following the Government's Offshore Wind Sector Deal in March 2019, the Committee will consider the opportunities that will maximise the industry's potential, and the challenges it faces in delivering greater capacity.

Environmental Audit Committee chair, Philip Dunne MP, said: "From wind to tidal, solar to hydrogen, there are scientists and engineers who are at the cutting edge of unearthing what could be part of the solution to a greener future. Supporting these innovators and industries is crucial if the UK is to reach net-zero carbon emissions by 2050.

"During this inquiry, my Committee will be considering a number of different technological innovations and whether the government is grasping this potential and offering the support they need to succeed."

The committee is inviting written submissions on questions including:

- How effective has the Government's offshore wind sector deal been?
- What level of output can the sector deliver in the UK, and what government support would be needed to achieve this?
- How might the UK take advantage of further technological advances in offshore wind technology, particularly in relation to floating arrays?
- What support does the sector require to keep pace with the most cutting-edge innovations, such as in blade technology?
- What is the UK industry doing to promote the sustainability of offshore wind arrays throughout their entire life-cycle?
- How well is the UK industry managing the environmental and social impacts of offshore wind?
- How well is government policy supporting innovation in transmission technology to improve the efficiency of electricity transmission?

Written submissions close on 15 May

MEETINGS

@ **"Decarbonising' UK industry: Towards a cleaner economy, London**
IET
Online
4 May

@ **Innogrid**
CANCELLED
Brussels
5-6 May

@ **EUA & IGEM Gas Industry Awards 2020**
POSTPONED to 18 May 2021
London
6 May

@ **Hydro conference and exhibition**
POSTPONED Organiser seeks feedback on online version
Scottish Renewables
Perth
6 May

@ **Wind Turbine User Group 2020**
POSTPONED date tbc
Institution of Mechanical Engineers
London
6-7 May

@ **The regulatory landscape post Brexit: opportunities, threats and the 'what next' question**
POSTPONED to 10-11 September
Regulatory Policy Institute
London
7 May

@ **Heating without the hot air: Principles for smart heat electrification**
Regulatory Assistance Project
Online
7 May

@ **Achieving net-zero emissions by 2050 - policy frameworks and collaboration, decarbonisation in key sectors and local areas, and encouraging behavioural change**
WEETF
Online
12 May

@ **All-Energy DCarbonised**
POSTPONED to 14-15 September
Glasgow
13-14 May

@ **Hydrogen and the natural gas network**
CANCELLED
IGEM
Kegworth
14 May

@ **Next steps for energy storage in the UK - expansion, commercialisation, innovation, and policy developments**
WEETF
Online
15 May

@ **Standard contract for flexibility procurement and implementation**
ENA
Webinar
15 May

@ **Connected customer summit**
POSTPONED to 21 September
Marketforce
London
18 May

@ **Wind energy in the UK - offshore development, finance, innovation, and policy priorities**
WEETF
Online
19 May

@ **Utility Week Live**
POSTPONED to 10-11 November
Birmingham
19-20 May

@ **Annual conference**
POSTPONED to 1 October
POWERful Women
London
20 May

@ **Next generation solutions for electrical grid monitoring**
CANCELLED
IET
Cambridge
21 May

@ **Power Summit: On to Zero**
SUSPENDED
Eurelectric
Dublin
25-26 May

@ **Commodity Trading Week**
Online
26-28 May

@ **Smart Island Live**
Future Isle of Wight Community Interest Company
Isle of Wight
28 May

CONSULTATIONS CLOSING

BEIS consultation
@ **Heat networks: building a market framework**
Closes 1 May

National Grid ESO consultation
@ **C16 Additional Review: Additional Industry Consultation for Procurement Guideline Statement for 2020-21**
Closes 4 May

DEFRA consultation
@ **Environmental land management: policy discussion**
Closes 5 May

NGESO consultation
@ **Structure of the electricity ten-year statement**
Closes 15 May

BEIS consultation
@ **Contracts for Difference for Low Carbon Electricity Generation**
Closes 22 May

NGESO consultation
@ **Modelling de rating factor ranges for interconnected countries in the CM in the 2020 Electricity Capacity Report**
Closes 6 May

DfT consultation
@ **Consulting on ending the sale of new petrol, diesel and hybrid cars and vans**
Closes 29 May

Electralink consultation
@ **Consultation on a DNO data provision and standardisation service to facilitate the energy market transition**
Closes 29 May

OTHER DATES

NGESO product launch
@ **Optional Downward Flexibility Management**
7 May

@ **Joint European Stakeholder Group**
12 May

Environmental Audit Committee inquiry
@ **Technological Innovations and Climate Change: Offshore Wind**
Deadline for written evidence 15 May

BEIS Invitation to tender
@ **Invitation to Tender for Beyond Off Street Smart Meter Electric Vehicle Charging Trial**
Closes 15 May

@ See more events, consultations and other key dates for the year ahead at: www.NewPower.info/Agenda

JONATHAN OXLEY

Making the the most of networking

In the April issue of New Power Report we discussed new initiatives in the UK's regulatory lanscape intended to promote flexibility and innovation. The UK's National Infrastructure Commission recomended a stronger role for the UK Regulator's Network. Janet Wood discussed the UKRN and its current and future role with its chief executive Jonathan Oxley and director Attricia Archer

The UK's National Infrastructure Commission recommended a stronger role for the UK Regulator Network (UKRN), which was set up in 2014 by its members to facilitate co-operation and communication, in its October 2019 regulation study, titled *Strategic Investment and Public Confidence*. The 12 sector regulators that make up the UKRN (see box, right) encompass many of the hard and soft infrastructure on which the UK relies.

When I meet chief executive Jonathan Oxley it is remotely, thanks to the Coronavirus crisis, and so the regulators' response is an example of his thinking about the organisation. He explains, "What we are trying to do as UKRN is bring some consistency of approach between regulators and facilitate best practice. That has never been more important than during CV-19 crisis, when we have seen HR directors from all the regulators sitting down to discuss approaches to workforce management. I will shortly be holding a round table of chief executives of all the regulators to facilitate best practice."

> "Regulation needs to be flexible and change with the times but you have to balance that for investors

UKRN has just published its work plan for next year and Oxley summarises its two main pillars as investment and consumer vulnerability. He says, "The CV-19 crisis has in my mind validated that plan."

He explains, "There is a need for a big step change in investment – [the investor sector] want to know there will be a framework that provides them with some certainty for that investment and that is what we are focused on helping utilities and regulators to provide. But that has to go hand in hand with a recognition that there are different consumer groups who have to be protected and in CV-19 we have seen how utility sectors have stepped up to do that."

Oxley became chief executive at UKRN in December 2018 from his role as competition group director and executive board member at Ofcom and the mutual reliance between telecoms and energy is his example of how growth in different sectors has to advance together – the CV-19 crisis, for example, has required an increase in the data and communications capacity that both underpins and depends on the power sector. "We need to redouble our efforts on that [investment], because it comes down to resilience and investment in resilience is what the country needs. We are going in the right direction on that, but there is a lot more to do in terms of convincing investors - we need to provide the right certainty to investors to commit funds to the UK."

I ask whether the major developments in infrastructure – like the energy industry's decentralisation and digitalisation - places the UK's regulatory structure under strain.

He denies that is the case, citing research from the University of East Anglia that said the UK is still a world leader on economic regulation. He says, "Britain is still a place where people feel that investment >

is protected, in the sense that property rights are respected and there is a degree of certainty when investors are committing capital. We are coming from a position of strength."

New entrants in the energy sector ask for a more flexible regulator and Ofgem itself has set out plans to be more agile, but Oxley sounds a note of caution: "Regulation needs to be flexible and change with the times but you have to balance that for investors. They like certainty and pivoting regulation very quickly can create a great deal of uncertainty.

"Regulation has to move with proper deliberation, proper evidence and a proper consultation approach. That does take a bit of time but it is better to get the right answer than to move hastily and if you asked investors what they would prefer - speedy but hasty, or a more deliberative and fact-based framework - I think they would always choose the latter."

UKRN MEMBERS

Civil Aviation Authority
Financial Conduct Authority
Financial Reporting Council
Information Commissioner's Office
Ofcom
Ofgem
Ofwat
Office of Rail and Road
Payment Systems Regulator
Single Source Regulations Office
The Pensions Regulator
Northern Ireland Utility Regulator

That does not mean being inflexible – he says that during the Coronavirus crisis regulators have adapted very quickly, implementing rule changes and getting guidance out to industry quickly. But innovation may challenge customers. "If you bring in new business models and then see how they are playing out with older, more established models it can be quite tricky for consumers to understand what is going on. In financial services we have done quite a lot of sandbox work and we found it really useful, typically for digital and data financial institutions to be able to innovate in the market quite quickly. We have found things that are really useful for consumers, so things like ID checks have been very easy to implement. But it does still have challenges around how quickly you can get it into the mainstream."

TAKING THE LEAD?

The National Infrastructure Commission suggested an expanded role UKRN. How does Oxley see that opportunity and, as a 'network' how much should it lead its member regulators? Oxley says UKRN shares many objectives with NIC but says it is industry that should be the focal point for change. "Facilitating change is what is important here. Taking the lead sounds positive, but to effect change, in the end you need the companies to do it and you need the regulators to do it within their regulatory frameworks.

"We focus on internal challenge – from me and the team to the various regulators – but ultimately effecting change must come from those industries and using the powers that they have."

> To effect change, in the end you need the companies to do it

He says that fundamentally, "The crucial and precious thing we have in the UK is independent regulation and we should always cherish that. I wouldn't want to see anything supra-organisational imposed that in any way threatened that. That's what investors cherish most about the UK system and is the thing that is going to facilitate greater investment in the UK.

"We are very keen to work with NIC and we think there is a role for a higher profile UKRN and our members support that. But effecting change must come from inside the industries."

Some industry commentators in the energy sector complain of a lack of direction from government, noting that we have had several changes of government since the last 'strategic direction statement' in energy. But Oxley believes that the regulators have enough direction – and that is less important than maintaining independent regulation.

INTERNAL CHALLENGE

How can UKRN foster internal challenge between its members? Oxley says, "One of the strengths of the system is that you have a lot of expertise residing in the regulators and they are able to talk the language of their industries. That is very positive. The flip side is that sometimes they can be very focused on their own sector and not see the work being done elsewhere.

"We have more than 20 internal networks that are not necessarily visible [externally]. As well as HR directors, for example, we have an ICT round table; we have approaches to cyber security and network resilience; we have a lawyer's network; and one that is important to investors is our economists' group that looks at cost of capital." The latter tries to ensure there is a common approach to investors, who are >

WORKING ACROSS THE SECTORS ON VULNERABILITY

Attricia Archer (pictured) has taken over as director at UKRN on secondment from FCA. She talked to New Power Report about UKRN's work on vulnerability, which was highlighted at a conference earlier this year.

There are some pan-sector issues, for example UKRN is undertaking research on categorisation and on what consumers want to give over when disclosing their vulnerability. Archer says, "We used our vulnerability network to discuss that, but we felt we could do more so we got some high-level people together. It is a good example of where we leveraged that understanding to give something back to the industry they can use."

One piece of work that will be done at UKRN is around data sharing for the Priority Services Register (PSR). "We are looking from water to energy, and potentially further down the line telecoms. But you can see that there are potentially some interesting models there from the banking sector where they share certain data in the open banking environment. You might learn from that example."

Jonathan Oxley adds, " We want to maintain competition but there ought to be areas where industry players can collaborate and vulnerable consumers is one of them, and so is the PSR. The industry ought to be able to keep that register up to date collectively with the proper rules in place to protect privacy. That requires co-ordination but there is a prize to be had. It is plainly not appropriate that consumers have to approach lots of providers and it is not beyond the wit of industry to do it directly."

often investing across several sectors.

Among his aims is to raise the external profile of the organisation, for example swapping an annual members' conference for smaller events that are more topic-focused and bring in more external input. Meanwhile, he says, "The other part of my job is to get round and see many of the ministerial and political leaders so they understand more about the UKRN and what regulators are doing. It was incredibly difficult to do that in the last two years because we either had a general election or there was a rotation of people in post, but I think we have a platform now to have a really good dialogue with government and with officials to bring about a more consistent and joined up view.

"One silver lining of Covid-19 is that we have seen much more collaboration between companies, who were often rivals, and between ministers and officials. I suspect that will be quite a profound change going forward beyond Covid-19 and I am looking forward to us using that to get better outcomes for the UK."

One difficulty he notes is that with a large number of different sectors within the network, "It's not easy to synthesise and put into a form that can be easily communicated to stakeholders. Trying to do that is a very important part of what we do."

PLACE-BASED REGULATION

As energy networks undertake their price review, Ofgem has been keen to promote a whole-system approach from them, rather than too closely on their own network. Meanwhile, place-based initiatives such as the Northern Powerhouse or Midlands Engine – and even individual local authorities – want to look at infrastructure in its totality, perhaps taking a different approach from their neighbours to reflect local priorities. I suggest that agenda fits with UKRN's cross-sector network and ask whether it is par of its future thinking. Oxley says UKRN recognises that geography matters and it is also very aware of the devolved administrations. He draws on his experience at Ofcom, where, "We take a 'geo' approach and look at the competitive conditions at a postcode level. We divide into three geographies and vary to reflect local conditions."

> "Ultimately, economies of scale do matter

But the localisation agenda is not simple, he says. "To effect change you need to do things at scale and sometimes if you try to do it at a micro level you can't get things done. For example in telecoms you can have lots of small providers doing stuff at local level but it is not really moving the gauge. If you are Sky it is very difficult to integrate with a small provider in a small town, it is too expensive to build the software to integrate. But if you can get lots of [the small players] together you can use that.

"So we want bottom-up entrepreneurialism, but equally they have to co-operate at some level to make it easier for a scale player to use them. You need that symbiotic relationship, because ultimately, economies of scale do matter." NP

Grab the community lever

As the government searches for ways to build consumer support for its Net Zero ambition, community energy organisations argue that it has missed a trick in not promoting their sector. They say the sector can deliver local support and expertise – and possibly even a pipeline of investment projects. Is now the time to pull the community lever?

Community energy has often taken a back seat, while government focuses on scaling up the renewables industry to deliver at a rate that a will enable the country as a whole to meet net zero targets. But the community sector has strengths that policymakers, and the industry as a whole, can draw on to tackle the next, more challenging, phases of decarbonisation.

For example, in the Coronavirus lockdown, a group of community energy projects showed how quickly they could take action when needed, mobilising funding to support local crisis organisations. Although many other energy and utility groups have continued to provided support of all kinds, the community groups made their cash available within the first week. Community energy projects are often slow to be realised but the initiative shows that, once up and running, the groups can be very fleet-footed within their location.

> "Inhabitants have seen their heating costs fall by 40-60%

They can also deliver projects. In the Isle of Wight, Vince Ward has been working with housing associations since 2008 to deliver 'holistic' home energy efficiency projects targeted at consumers who are not connected to the gas grid. With Southern Housing Group and grant funding he installed air source heat pumps, solar thermal, A-rated windows and water saving technology in local properties. Aseries of upgrade projects have now been completed totalling 2000 properties on the island and some inhabitants have seen their heating costs fall by 40-60%.

These are initiatives that Ward would like to see extended across the 45% of Isle of Wight homes -around 95,000 properties – that rely on electricity for heat. So, no doubt, would Scottish & Southern Electricity Networks (SSEN), which manages and maintains three subsea cables that transport power to the island and a grid on the island that is constrained and inflexible.

THE COMMUNITY AS TEST BED

Lower - and more flexible – heat demand would help manage the islanders' supply at least cost. That demonstrates another key opportunity that

resides within the community sector: using projects as test beds to see how consumers respond to new energy options and how the power of the crowd can be harnessed.

> Resource should be targeted at local authorities because they are at the blunt end

Data from Ward's projects is available to organisations such as Newcastle University and the Energy Systems Catapult. The island is already a potential follow-on test bed that takes lessons learned in SSE's Northern Isles New Energy Solutions ('Nines') active network management approach – which, incidentally, should also help avoid the need to discard power from PV installations on the island at times of peak generation.

In 2017 Ward founded Future Isle of Wight (FIOW), is a community interest company that brought together a broad mix of talents and interests around the renewable energy sector. The CIC wants to become more influential in the IoW's sustainable thinking. Once again acting as test-bed, FIOW will investigate Citizen Energy Community models alongside E-On and Aachen University, to explore ideas around self-consumption and larger profile communities. These models have already proved popular in Germany.

COULD WE MISS THE OPPORTUNITY?

If these are the opportunities for leverage from community energy, can they be accessed?

Duncan Law, policy and advocacy manager at Community Energy England, fears that the UK could miss the opportunity. Speaking to New Power Report soon after the Coronavirus lockdown, Law said, "If nothing else after this emergency, I hope the government will see and understand that the community is hugely capable of pulling together where it matters and can do the heavy lifting." He was disappointed that in March's budget announcement, "As far as I can see in the budget - not a single mention is related to communities.

> It delivers local expertise, local networks and a track record of raising money

"It is a huge and surprising blind spot given the emphasis on localism and devolution."

Who can deliver a step change for the community sector? The impetus towards localism is a broad one and organisations like Local Enterprise Partnerships are intended to bring together local government and business in a way that responds to local needs and draws effectively on local resources. Their local authority members are clearly there for the long term, and organisations like UK100 see them as important agents for delivery – in fact, each LEP has now produced an energy strategy tailored to its region. But Law does not see them as at the right level.

He says, "The problem with the LEPs' energy strategies is that they have been a long time in being produced.

"Talking to community energy organisations who have engaged with them, there is a huge variation. In some areas there is engagement, in some areas they are not in touch [with the community sector] – they are too macro".

Law describes local area energy planning as, "a phrase that is recognised in BEIS but I don't see a takeup of it at a very high-level policy level.

"Energy Systems Catapult [ESCatapult] pointed out that it is very varied even in what 'local' means. There are micro needs and micro resources that are in much smaller areas than the LEPs and planning has to take that into account. The local authority is much closer to the area where that has to happen and there is a curious disconnect there."

The government should have set up a central resource for local authorities, sharing best practice, he says, and "Resource should be targeted at local authorities because they are at the blunt end, they have declared climate emergences and are in touch. They have primary responsibility for their own emissions but also important influence over emissions in their borough."

He was very disappointed that the budget did not provide resourcing that would allow local authorities to plan for the climate emergency, or central resources to help local authorities do that. "This is a huge gap and the Local Government Association (LGA) has been in dereliction of its duty in not co- ordinating activity around local authority climate emergencies," he says.

ARE WE UP TO STANDARD?

Community energy can be varied to meet local needs. But that variability has a sting in the tail when it comes to rolling out projects: losing the benefits of standardisation. For example, Law says, "The other issue with local authorities is that they have varying relationships with community energy groups".

I ask about the balance between replicating standardised projects – which typically reduces capital cost over time – and developing a bespoke project for the location and users.

Solar PV for schools highlights the issue. The opportunity to reduce energy bills long term is clearly of interest for the Department for Education (DfE) and Law says, "The DfE is getting requests for leases on the roof of buildings." He wants to see that happen, but fears a centralised approach, >

including negotiating for zero interest loans from BEIS. He says that central approach is slow and does not have extra benefits in raising awareness.

Law says on standardisation is notthe only cost issue: "You can buy solar panels in bulk and you may get them cheaper, but what you don't get is volunteer time. A lot of school projects are in danger of not getting the feed in tariff and they have benefitted from hundreds of hours of volunteer time. If you do that [development] with DfE, every one of those hours will have to be paid for."

> "There is no-one who is going to make sure the meter is read

In contrast, he says, community energy delivers local expertise, local networks and a track record of raising money from the community with engaged investors. And when it comes to building local awareness, "The DfE may send out a leaflet out to parents but that is all," he says. Worse, he recalls occasions in which, "Community groups have gone to survey for solar and found it is already up there and no-one knows. That's an example of what happens when you do a big bureaucracy installation, where there is no-one who has skin in the game and no-one who is going to make sure the meter is read because they have to pay their investors and their reputation is at stake."

> "We have the information, the knowledge and the contacts

When I ask how to get the best of both worlds – standardisation and local support – Law says, "Getting solar panels on a roof is something most community energy groups can do in their sleep. It is designing of the business model [that is difficult]. We need enough government support to get over the threshold to market. At the moment there is barely any business case."

Law says the government-mandated 'Smart Energy Guarantee (SEG), which requires many energy suppliers to offer an export tariff to domestic renewables generators, is not reliable as a funding stream. "We need just a bit of support to get us through the next five or six years by which time a genuine post- subsidy regime will be able to make a business case.

"But SEG is not smart, it's not a guarantee, it's not something you can build an investment case on," he says.

Community Energy England has been pushing hard for the government to allow community energy producers to access Social Investment Tax Relief (SITR). This would effectively give investors 'cash back' against their investment at an early stage. "It would de-risk to enable us to get investment in," says Law. But electricity generation has been excluded from that scheme, as it is not seen as a risky investment. Alternatively, Law says, "A community CfD for five or six years would work".

OFFERING A PIPELINE

The Isle of Wight's Ward sees the problem in a similar way, saying that the barriers to replicating his energy efficiency projects are time and money. But he has an alternate suggestion to get over those barriers that uses community organisations like his as the route to standardisation.

He would like to attract small projects from across the region so that he can package them up in a way that offers an attractive pipeline to an investor. "We have the information, the knowledge and the contacts," he says, "We've done the community legwork." Future Isle of Wight hopes to bring organisations together in an annual event (unfortunately this year on hold due to CV-19) that will create this kind of relationship, backed by Solent LEP, Innovate UK, Isle of Wight Council, Chamber of Commerce and Knowledge Transfer Network.

As the UK's Climate Assemblies start to feed citizens' views more directly into the climate change agenda, and we start to grapple with tough decarbonisation issues like home heating, it is surely time to look again at the community sector and give it the tools and investment it needs. It seems clear that delivering community energy projects provides important leverage to deliver a net zero society. NP

The New Power Leader

JANET WOOD EDITOR, NEW POWER

A new world is coming

This month, while renewables continues to grow, it is the fossil sector that has hit the front pages. The effect of Coronavirus hit oil demand so badly that on 21 April prices were negative (a great birthday present for New Power Report's editor). You could not give the stuff away.

It has to be said that Coronavirus has also had unfortunate effects on the renewables supply chain, closing factories in China that are supplying the world with PV and disrupting project delivery across the world as the 'stay home' message hit construction. In reality, both of these situations are a result of the unprecedented measures taken during the pandemic. Both are temporary. But only one has hit the headlines in a way that will reset the world view of a global industry and change its public perception forever.

Renewables disruption is well known to the industry; it is to be hoped that it will bounce back as industry revives and in the public sphere the news about slowdowns is matched with other news about projects that are moving forward. The oil price shock, however, hit the front pages and led news bulletins, along with public discussion of the potential destruction of the US shale industry.

OIL CHANGE

The North Sea is the best example – the UK's prize asset and energy supplier for so many decades. Its wind farms continue to expand: construction continues and new leasing rounds, at the time of writing, are extended to allow for remote working but certainly continued. The discussion over the oil and gas industry, meanwhile, asks whether areas due to be opened for abstraction will ever be used. The narrative - which had already changed to using new techniques to abstract less accessible resources – is now moving to discuss an asset that is commercially in its last phase.

This change in the narrative on oil and renewables could not be more important for the UK's – and the world's - Net Zero agenda. There was a period in the early 2000s when renewables seemed like a good bet because scarce oil and gas would become so expensive that an alternative would be necessary. That was a useful argument - whether you agreed with the climate science or not, renewables were worth pursuing. As a result, the early renewables rollout was big enough to see some dramatic price falls. Since then the climate argument has only got stronger, but huge natural gas discoveries and the advent of shale extraction provided an alternative.

Negative pricing on 21 April changes all that. The picture is more complex for the expert investor, but the public perception is: no-one wants your oil. Even as prices rebound, that will scar the public view of oil and gas as a safe haven investment and correspondingly strengthen the attraction of renewables. It's a different world.

THINK AGAIN

Back in the UK, it is clear from remarks in this issue by RWE's Tom Glover that the place for fossil generation is also changing. He suggests the UK will not build another CCGT – relegating that workhorse of the industry (and an initial reason for the Capacity Market) as less and less relevant to the industry as the years pass. And while he suggests we may build more small gas engines he also notes a change in pricing outcomes that could cause investors to pause. A change in the price curve that has far fewer upward spikes at peak times, instead seeing downward price spikes – down to negative pricing – presents some fundamental problems for gas engines whose model is to stay offline until they can respond to price spikes.

Where are we going? Clean energy. We have some way to get there. But the changes wrought by Coronavirus – practice at managing a high-renewables grid, as well as major damage to the view of fossil as a safe haven – have placed that transition in a new, and more favourable, landscape.

Energy sector applications for blockchain are getting real

Distributed ledger applications are moving from potential to reality and – much like the internet – users are finding they can use a technology without necessarily understanding how it works, says David Price

While crypto currency – most notably Bitcoin - is the most widely known application for blockchain, the concept is now starting to prove their worth in other spheres - including the utility sector.

Blockchain is a distributed ledger technology (DLT). Rather than using a single entity or company to undertake record keeping, DLT is a decentralised approach that uses multiple computers – belonging to multiple organisations, in multiple locations - working in concert to produce and govern a shared ledger.

In some DLTs all the parties are involved in every aspect of the 'chain', with a heavy energy demand for computing and slow transactions. In contrast, in the energy industry most models being evolved do not involve a complete absence of trust among parties, so it can use a more economical and faster approach to verification.

DLT's spatially diffuse, multi-nodal structure has echoes of the distributed power grids being created by combining small renewable solar and wind arrays, coupled to battery storage and smart distribution. In this model, the growth in fleet and personal electric vehicle ownership enhances the role of the prosumer and is full of potential for the peer-to-peer energy trading transactions for which blockchain is ideally suited.

Building smart contracts into the blockchain offers a more efficient way to manage transactions between entities engaging with a grid operator to buy and sell power. With the terms of the transaction written directly into the blockchain code, smart contracts self-execute when contractual terms are met. The code controls the execution and the transactions – which are irreversible – can be tracked by all of the distributed ledger's users. This simplifies transactions and removes the need for intermediaries.

> "Blockchain offers a credible supply chain audit trail

Blockchain is also enabling more unconventional energy trading models. US company Brooklyn Microgrid, for example, aims to create self-sustaining microgrids using blockchain to manage local energy trading between commercial and domestic consumers and prosumers.

Blockchain's ability to record transactions, and verify them in doing so, means its utility applications extend beyond energy trading. A distributed ledger offers a new way of recording and facilitating transactions across complex supply chains.

JPMorgan Chase has committed to source renewable energy for 100% of its global power needs by 2020 on all of its buildings, branches and data centres. Across North America alone this requires rooftop solar photovoltaic arrays at more than 1,000 sites. The bank has partnered with swytchX, a company which uses blockchain, among other digital tools, to manage and verify clients' energy transactions. By tracking the bank's energy output, usage, environmental indicators and other metrics, the swytchX partnership allows JPMorgan to demonstrate that the shift to renewable power is genuine and auditable.

TRADEABLE ASSETS

Of greater long term significance, perhaps, is the fact that the work with swytchX also has the potential to help the bank develop financial instruments. These data-rich tradeable digital assets are based upon the digitisation of the bank's entire energy production and consumption portfolio.

As the need to prove corporate social responsibility grows in importance, blockchain offers a credible supply chain audit trail.

JPMorgan Chase is using blockchain to verify and track its sources of power in much the same way grocery brands and supermarkets are using the technology to verify the provenance of the food they sell. As organisations make carbon reduction or 'net zero' commitments, this application of blockchain may grow in significance.

Developing utility-scale power generation assets, whether conventional or renewable, is another area

that involves highly complex supply chains. They comprise thousands of individual components, sourced from across the globe and there is a web of contracts between providers of services, materials, knowledge and equipment.

BUILDING MANAGEMENT

Blockchain offers clients and 'engineer, procure and construct' (EPC) contractors an alternative to the traditional way of verifying, executing and managing supply chain transactions, increasing transparency. In addition, smart contracts have the potential to offer savings by enabling just-in-time deliveries and swift payments.

Looking forward, building information modeling (BIM) is an interactive, inviolable digital record of all of the elements which go into creating a built asset, accessible to multiple entities and live throughout the asset's lifecycle. This is another area in which DLTs can contribute.

For power utilities, this will have benefits that extend beyond a project's capital delivery phase. The distributed ledger could form a key component of the client's as-built asset information model. The component data built into the ledger, for example, means the client could receive a master asset management schedule as part of the handover process.

Confidence in DLT will grow as - much like the fledgling days of the internet - organisations realise that they do not need to understand precisely how the technology works in order to be able to use it as an effective tool.

It is an indication of how DLT is maturing that work is well underway to develop an open and standard architecture, and open interoperability standards that include data, integration and security. These are essential steps to taking blockchain mainstream and giving critical infrastructure operators like power utilities the confidence to adopt it.

David Price
Chief technology officer
Black & Veatch Management Consulting

NEWS

Set to scale up? DLT company aims at countrywide rollout

Blockchain company Power Ledger claims its POWR token distributed ledger technology (DLT) is set to serve thousands of customers in Europe. At the start of April it announced an agreement with France's green energy retailer ekWateur to roll out the energy trading platform to 220,000 electricity meters across the country. The link follows a February agreement to test integrating the technology into smart meters destined for Italian green energy supplier Alperia. The Italian programme will look at uses of the product for the supplier's 280,000 customers.

In the first stage of the ekWateur project, buyers can customise their energy mix for the first time, choosing what type of renewable energy they want to purchase, as well as the location from where it is sourced. The 220,000 electricity meters across France will gain access to Power Ledger's new blockchain-enabled product Vision, which certifies the origin and source of the energy. Households will be able to choose their own energy mix and track it in thirty minute intervals, as well as choose a certified source and origin of the renewable energy purchased.

In a second stage the project will enable residents to buy and sell excess renewable energy via peer-to-peer energy trading using a feature of Power Ledger's new product Vision.

"Power Ledger has proven the technology works and now we're ready for a full scale country rollout in what will be our largest project to date. This also marks a world-first in energy trading, with customers able to select their energy mix, knowing it's certified via an immutable blockchain platform," said Power Ledger executive chairman Dr Jemma Green.

Power Ledger has several large scale projects with utilities and governments worldwide in countries including Thailand, Japan, Australia, Malaysia, India, Austria and the USA. NP

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The New Power Interview

TOM GLOVER, RWE RENEWABLES

When it comes to reaching Net Zero, "If RWE can do it, anyone can do it," says RWE Renewables CCO and UK country chair Tom Glover. He spoke to Janet Wood about how a company that has been generating fossil electricity for over a century can take a new direction - and whether we have seen the last gas turbine built in the UK

RWE's Tom Glover has followed a similar trajectory to the industry – and the company – where he has spent nearly two decades; from a focus on fossil in the early years, to join the new RWE Renewables as chief executive.

The new company, like RWE's other new business units, has been refashioning itself from a scattered group of interests in RWE and E.On – part of a wholesale restructuring between what for years were twin pillars of Germany's power industry.

RWE Renewables is in a growing part of the industry, but coming from the fossil end of the industry what does it have to offer? Glover says it is scale – the company has interests in 18 countries – and history. For some companies it may be new, he says, but "We think our business is generating electricity," he says, and renewables, "is just a new way of generating electricity that is more future-proof". The company can go from gas to renewables in the same way it went through the transition from oil to coal to gas. In fact, he says, RWE's history of being a high carbon emitter puts it in "a unique position of being able to make the most change. We have set ourselves an ambitious target of being carbon neutral by 2040 and my strapline is that if RWE can do it, from our starting point, then anyone in the electricity industry can do it."

He says RWE's target date of 2040 to be carbon neutral is "ambitious" but "if electricity can get there by 2040 the other sectors [heat and transport] can aim at 2050."

He says the company will have a tight focus, "because we have sold our distribution business to Eon, they can focus on that part, we can then focus on upstream electricity." Glover says the company will have scale to bring to bear. "After the merger we will be no three in Europe and number two globally in offshore wind, so we are very well positioned with a great pipeline of assets." It has 10GW of offshore wind installed to date and is committing to be at 13GW wind and solar by the end of 2022. He adds, "We are really well positioned" because it has been able to pick the best from the Innogy renewables business and E.On renewables, along with their management teams, engineers and projects".

BIOGRAPHY

Tom Glover's career has mirrored the industry's route from fossil to renewables.

He began his energy career in UK Power and Gas at Enron Power Operations UK and joined RWE as commercial director at RWE Trading in 2003.

He has been RWE's UK country chair since 2017 and is interim CFO at RWE Renewables until Innogy integration is complete, when he will become CCO.

OPERATING UNDER CORONAVIRUS RESTRICTIONS

The Coronavirus crisis has seen major changes in both power demand and operation at RWE, as with other companies. I ask Glover how it is affecting the company. He says that in power markets, "We are seeing demand reduction across all our markets. For renewables it is not just the reduction in power demand, it is the very steep reduction in commodity prices and the volatility of them. We have seen massive decreases in gas and oil prices and in carbon prices which all drives a decrease in power prices, which is exacerbated by the decrease in demand.

"For a renewable generator with any kind of merchant power exposure that is a negative trend. For us, we are predominantly hedged for this year and we don't expect it to have a negative effect on our earnings. We are quite heavily hedged going forward as well. If it continues, it will have negative impact on the merchant side of our revenues."

Longer term, "There are as many views on how quickly demand recovers as there are people in the market. Because we are predominantly hedged for 2020 and the National Grid model shows recovery towards the end of the year it will have a limited impact." The company is looking hard at knock-on effects such as Renewables Obligation income. Other risks come from the supply side: if customers,cannot pay their bills, "Obviously there is a risk that the supply sector, which looks relatively fragile, has an inability to pay things like the Renewables Obligation and if the mutualisation is not fully paid up it has an effect – it's a second order effect." Technical issues around system management, such as inertia, "Could be a bit tricky but that is one for National Grid... we keep an eye on it.

Practically, "We have restricted all onsite activity to critical activity only, we have about 10% of staff in the office. We haven't had any serious issues about people not being able to get on site. We had quite a lot of people absent with self-isolation but that is gradually coming off now."

I ask whether the CV-19 restrictions have affected formation of the new RWE but Glover describes a very stately process, saying, "Because of the timescale for merger clearance these days we have had quite a lot of breathing space and our integration plans are very well developed. Each team and each sub team knows exactly what its integration plan is and how to achieve it. … The management team is appointed, we are ready to go as soon as the clearance is completed."

Cultural integration is more difficult. "Things we would normally do on integration like the big day-one party and management team meetings. We had a plan for the board to go to all the 18 countries we are in, and introduce ourselves: that will now be done virtually." But there are implications for the future: "I think we will learn, around our carbon-neutral target, that post this event we will be able to reduce our business travel."

But "importantly, our balance sheet allows us to invest a lot in renewables" and the company is targeting gross investment of around €3 billion a year and net investment – after co-investment and recycling capital - a net investment around €1.5 billion. That will not be in 2020 , because of the restructuring under way, but "2021 looks as though it will way exceed it". The "chunky" offshore projects result in some very high and some lower capital years.

> "I can't imagine myself ten years ago lobbying for anticipatory investment. But we are in a different world now

Offshore the company already has Triton Knoll and Sofia (a Dogger Bank project) in its pipeline and four of seven extensions – to Rampion, Gwynt y Mor, Greater Gabbard and Galloper. Glover says, "Offshore we are one of the leading partners. We'll also be taking part in the Scot wind lease".

He is very much in step with the rest of the industry when he says the UK process could be improved by having annual auctions Contracts for Difference allocation rounds. "It would just help the whole process, from building the supply chains to having a clearer line of sight not having to time everything around every two years, it would give us more flexibility." It would smooth issues like the planning resource requirement, he adds and it is necessary to deliver 40GW of offshore wind – a policy he describes as "Possible but ambitious".

Again in common with the rest of the industry, he says that to deliver 40GW the UK has to have a much more co-ordinated approach to the grid, offshore and onshore. He wants, "Centralised co-ordination offshore, moving away from point to point connections to some type of meshed integrated offshore grid. And co-ordination onshore so we aren't doing these different connection points on the coast.

"Even further than that, the offshore grid needs more anticipatory investment." That is especially urgent for the East Anglia offshore wind farms.

He admits, "RWE has always had very strong views on transmission and I can't imagine myself ten years ago lobbying for anticipatory investment. But we are in a different world now". Anticipatory investment carries a risk, but, "Everybody has to start thinking that if you don't have anticipatory investment you are going to delay the rollout. And that will cost us more money than the risk of anticipatory investment. We know pretty much where these wind farms are going and you know offshore wind is a key plank of the decarbonisation policy." He would like to see the National Grid ESO given "A much wider mandate to get this planned" and he

would like the grid planning to happen at the time the leases are allocation.

Finally he says the government should remove the volume cap in its CfD allocation, because "the volume cap doesn't make sense if you can build stuff cheaper'."

ONSHORE: TOO SMALL

Of course Glover welcomes the government's decision to reopened the CfD allocation to onshore wind, but he says at 1GW, "the volume is too small. … We have 5GW in planning and it will be that 1GW that holds back the industry not the industry holding it back."

> "Merchant is difficult in the context of a very very uncertain carbon price in the UK

RWE's own onshore pipeline is 880MW and although the prospect of funding more renewables projects outside the CfD, for example with power purchase agreements, he is not hopeful of that at large scale. "We are negotiating currently for PPAs for some of our wind farms … So we do see industrial appetite for PPAs." But he doubts the PPA market will be big enough for the volume of renewables in the UK.

> "Our view is that we don't need another CCGT

The company is building one merchant plant in Scotland (where CV-19 has halted work) but in general, "Merchant is difficult in the context of a very very uncertain carbon price in the UK. We have the carbon floor price and we don't know whether it will be linked to the EU ETS so that is very uncertain." He notes that the company has ROC-funded projects that are exposed to UK power price risk, "so we already have a very large exposure to what I call outright UK power price exposure. That could be seen as a bit of a concentration risk for us, just because of the sheer size of RWE in the UK."

He says that in a net zero power sector world, with most power coming from renewables and nuclear, the risk of 'price cannibalisation' becomes very high. The post Neta (New Electricity Trading Arrangements) energy-only market "kind of worked when you didn't need to invest - when you had a merit order set by a lot of fuel-based plant and you could earn your return based on the fact that there was someone above you in the merit order that was more expensive... - it is good for efficient dispatch but it isn't a world for investment. For investment in the thermal side you have already gone to capacity market or long-term ancillary service contracts and in the renewable world we have gone for CfDs. That works. But the idea that you will be investment in anything on an energy-only basis we think is not realistic. We do it, we have seen more of the exceptional service rather than the rule.

I ask Glover to look into his crystal ball to consider whether the value of a kWh will disappear. He thinks that even in the 2030s, "The majority of the price duration curve is probably still going to be set by CCGTs or gas units. That is the RWE view. But there will be an increasing number of hours that are in the low negative to zero range". That is still a minority of hours. He adds, "We would effectively split the curve into two" in the 2030s with a lot of hours with a few gas units running, at low load factors, to set the price. But there are a lot of hours where we have wind and nuclear and from then on, "The volatility is skewed to the down side." Whereas historically a spike up would bring on oil or diesel peakers, he expects a lot of time at the CCGT price and then a 'down' spike to zero or negative when it is windy and the demand is low. That seems to me to present an interesting challenge to small peakers' model to capture most income from up-spikes.

I ask when might gas plants disappear? Glover describes that as "The real million-dollar question".

He expects CCGT load factors continue to fall. "The question is how long CCGTs can continue to operate on that basis, and what replaces them at that back end." The options are more seasonal storage, hydrogen fuelled CCGTs and carbon capture and storage (CCS). But "That's the bit that we as a company and we don't think the industry as a whole has worked out."

That direction is unlikely to be clear until the early 2030s.

Nor is the future for gas plant. Most projections have 15-25GW of CCGT capacity still being used in 2030, "But we have surprisingly different views on load factors. [Consultancy] Aurora still has them

THE HYDROGEN OPPORTUNITY

Hydrogen is rising up the agenda as as an alternative energy vector to electrification. Glover says RWE has trial projects. "At the moment we are in there as the supplier of green electricity but we are looking at the electrolysis process. At the moment I look at it a bit like EVs, in that I don't want to make electric vehicles."

He says hydrogen is too expensive to be used in power generation. "Our view is it should be used to decarbonise the industrial sector. We might think about hydrogen production as a downstream demand ... on the other hand you might say that hydrogen becomes our downstream product. We are looking at it and we haven't decided.

"I think at the moment we can find plenty of opportunities to invest more money than we have for renewables and we would rather have a clear investment story for our investors."

running relatively high and NGESO has them running near zero. We would be closer to Aurora's view than we would to NGESO as an assumption."

Does it mean that the UK has built its last gas turbine? "Our view is that we don't need another one. A bit like Trigger's broom, we can keep the ones we have in operation very cheaply for a long time, by redoing the gas path, turbines, etc. Particularly with low load factors that seems more sensible than building something new."

> "The markets are surprisingly small for these very short period ancillary services

He expects some more gas peakers but "That's when you start to ask, is it better to run an old CCGT on low load factors and at some point do a new outage, or is it better to swap it for a gas peaker? The emissions difference is almost zero, it's just an opex/capex calculation and that depends on what you think the load factor is. If you get to very very low load factors you are much better at gas peakers - at 10% the level of emissions is the same."

ANCILLARIES OF LESS INTEREST

In recent years it is batteries and the potential to provide ancillary services that have sparked investor interest. Glover says, "A few years ago we probably made more money on balancing services and we were getting a lot of turn-down on our wind farms. That has reduced as NGESO has found other ways to balance the system."

Nor has it jumped into battery investment, with just one in Germany, a couple in the US and one under construction in Ireland. Glover says, "We are looking at them – our current view is that the markets that current batteries are particularly good for are saturated quite quickly." An example is primary response, which suits batteries, "The markets are surprisingly small for these very short period ancillary services and as soon as you get enough batteries it is super competitive. In Germany's primary response services the prices are on their knees. So unless you get a fixed term contract the markets get saturated very quickly."

The potential markets are the US and Australia which have 'nodal' markets. "It really makes sense to have batteries co-located with your variable renewables and in a lot of US states they require it". He adds that in building up a battery business for the longer term, the timescale will be the 2030s and 2040s, because "It comes back to …when you think there is increased negative pricing. It gives you more opportunity to charge your battery for free and put it back in at £50, but to make that make sense you need to have more like four-hour duration than one hour. At the moment four-hour batteries don't really make sense for energy arbitrage and are too expensive for the ancillary service side." He adds, "We have 18 countries to choose from so we can afford to be a bit picky." NP

The 857MW Triton Knoll offshore wind farm reached a milestone in April as the first of two Siemens offshore substation platforms sailed from Belgium to the project, 32km off the Lincolnshire coast.. Triton Knoll is owned by innogy (59%), J-Power (25%) and Kansai Electric Power (16%), with innogy managing construction as well as long term operation and maintenance, on behalf of its project partners.

All of the price statistics in this section are derived from the Energy Imbalance Prices produced by Elexon. These are available from the Elexon Portal: www.elexonportal.co.uk.
Elexon makes sure that payment for imbalances in wholesale electricity supply and demand is settled accurately and efficiently. For more information on the BSC or Elexon's services, visit www.elexon.co.uk.

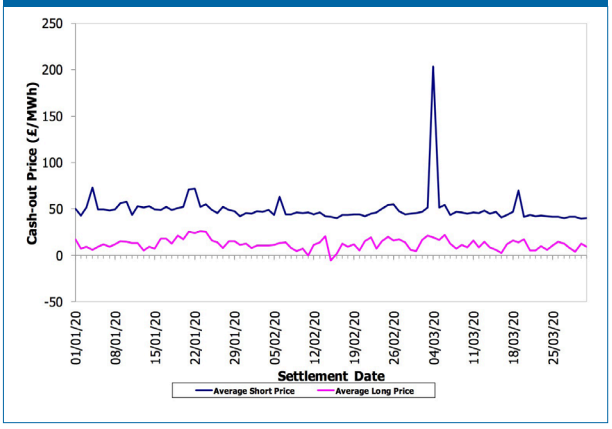
SYSTEM PRICES (LONG SYSTEM), £/MWH

	Min	Max	Median	Mean	St Dev
March 2020	-61.21	40.00	11.50	11.28	9.24
February 2020	-66.25	45.00	12.66	10.84	12.13
January 2020	-11.21	40.00	13.11	14.11	9.44
December 2019	-88.00	40.24	17.10	14.33	18.67

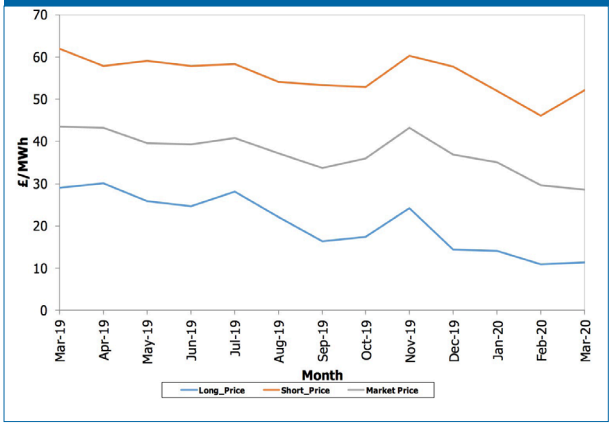
SYSTEM PRICES (SHORT SYSTEM), £/MWH

	Min	Max	Median	Mean	St Dev
March 2020	20.48	2,242.30	43.80	52.17	108.17
February 2020	4.15	120.00	45.00	46.06	8.99
January 2020	17.39	150.00	50.00	51.94	13.39
December 2019	5.99	160.00	56.00	57.74	12.32

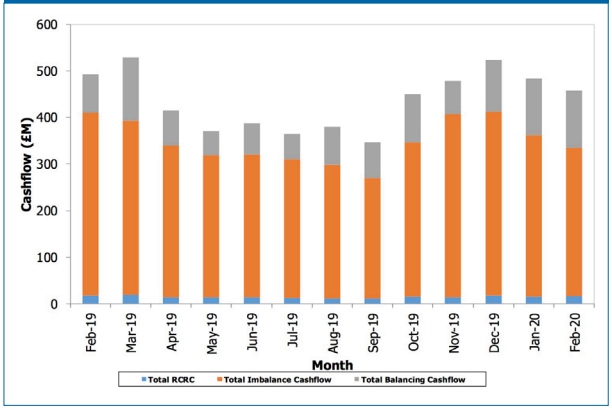
DAILY AVERAGE SYSTEM PRICES, £/MWH



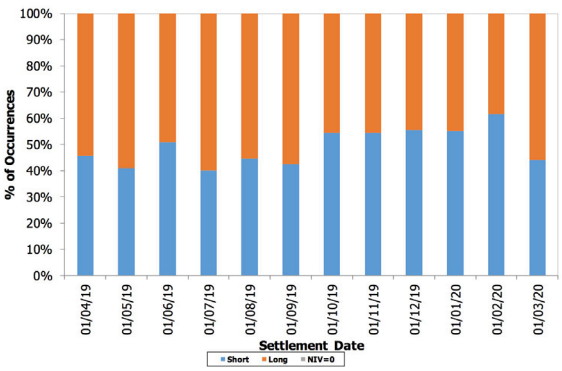
MONTHLY AVERAGE SYSTEM LONG PRICE (£/MWH), SYSTEM SHORT PRICE (£/MWH) AND MARKET PRICE



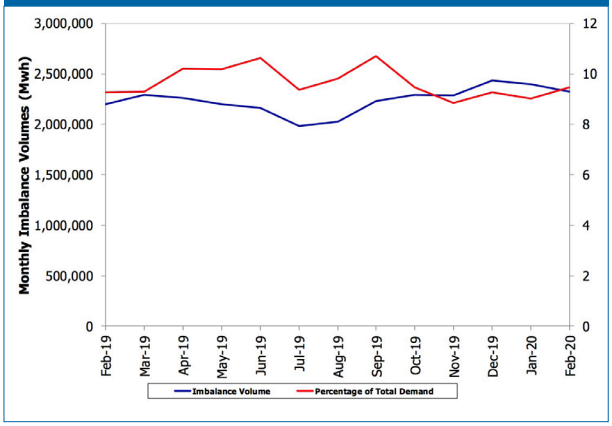
CASHFLOWS IN THE SETTLEMENT SYSTEM



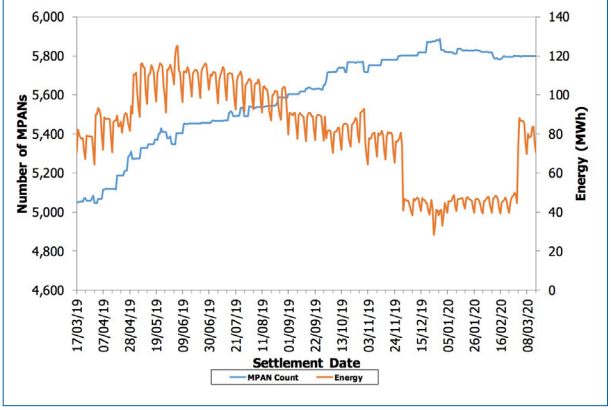
LONG V SHORT SYSTEM OVER PAST YEAR



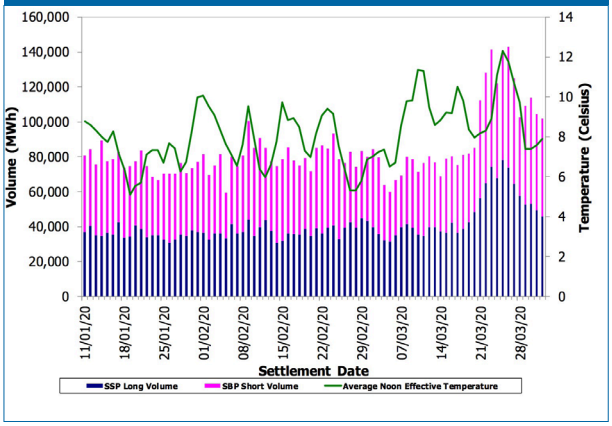
MONTHLY IMBALANCE VOLUMES



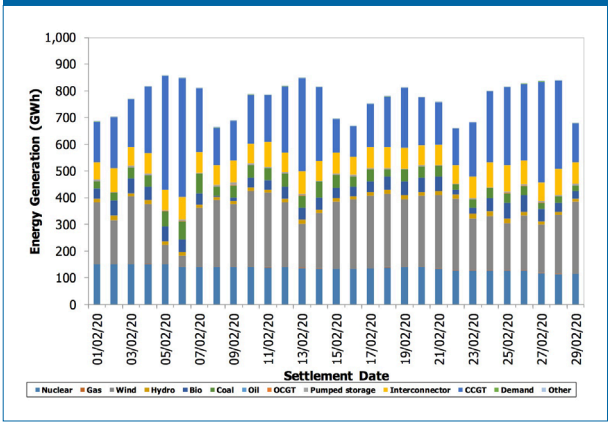
MICROGENERATION METERS AND ENERGY EXPORTED



DAILY IMBALANCE VOLUMES



DAILY GENERATION BY FUEL TYPE



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New Power

Issue 135 May 2020
ISSN 2040-5839
New Power is published by Energyst Media.

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Sort entries by: project name; developer; project type; location (mostly by county); country (England, Scotland, Wales, Northern Ireland); original planned start-up date; planned capacity; status (see below); actual start-up; current capacity; transmission capacity and from when; ownership.

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We welcome updates, please email the editor.

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