

# Spotlight

## ENERGY: GREENING THE GRID

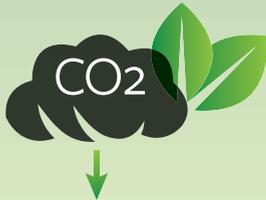
Rebecca Long-Bailey / Meg Hillier / David King



# How can we decarbonise the UK countryside?

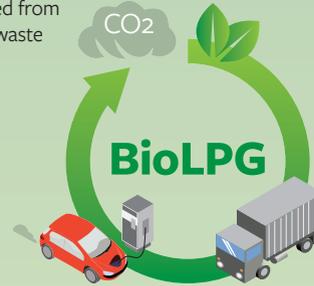


The Clean Growth strategy aims to reduce the UK's carbon footprint over the next decade

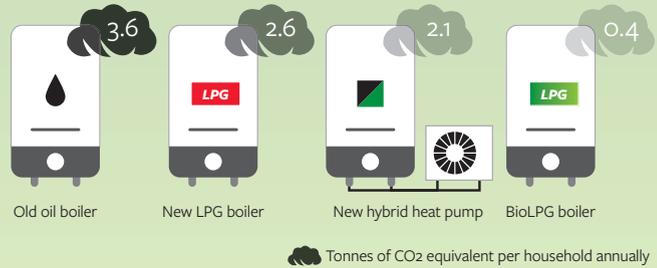


BioLPG is a low carbon, drop-in alternative

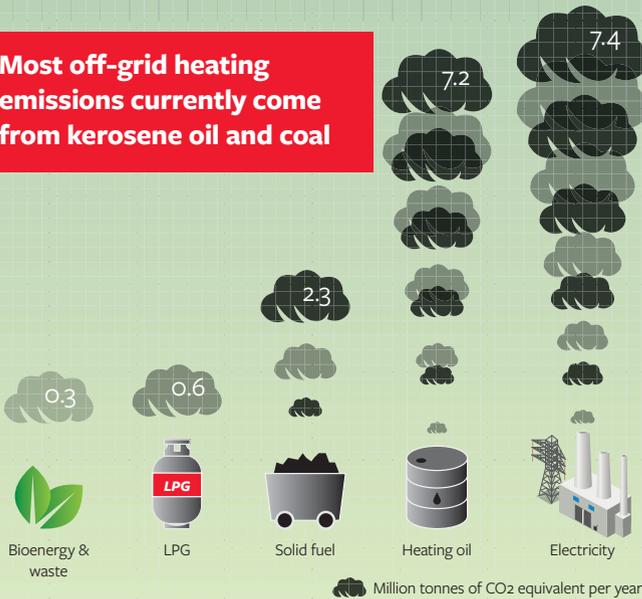
BioLPG is created from renewable and waste materials...



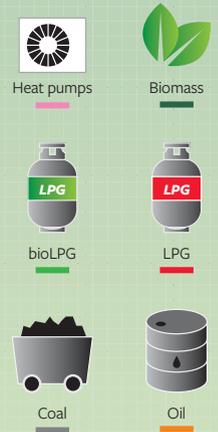
...and can help off-grid households move away from traditional fossil fuels



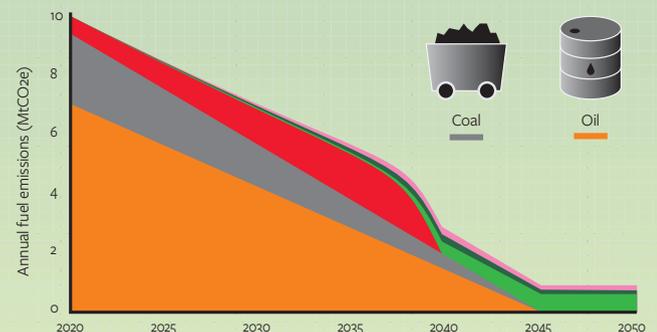
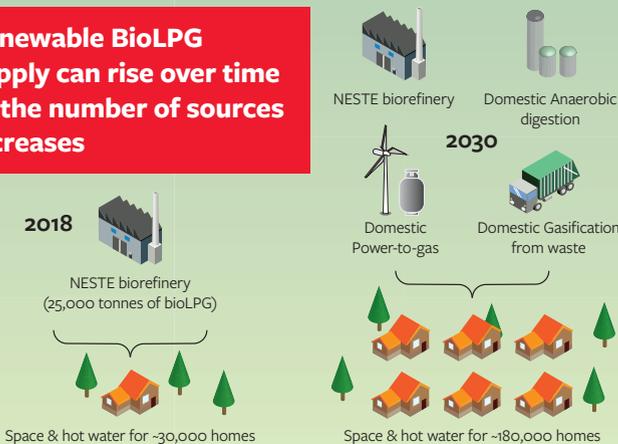
Most off-grid heating emissions currently come from kerosene oil and coal



BioLPG and gas heating technologies can drastically cut emissions from rural properties in the long term without breaking the bank



Renewable BioLPG supply can rise over time as the number of sources increases



Decarbonisation scenario modelled by Ecuity showing the impact of bioLPG and gas heating technologies on the market

Figures: Ecuity Consulting calculation based on data from BEIS (2017) and EU Commission (2016)

# A bright future needs investment



**T**his year marks the 110th anniversary of Ernest Rutherford being awarded the Nobel Prize in Chemistry for his work laying the foundations of nuclear physics. Rutherford, who described the atomic nucleus and the proton, was without doubt one of the most brilliant scientists in human history, but like many scientists he was sceptical about how his discoveries might be used. In 1933, Rutherford is reported to have told the British Association that “we could not expect to obtain energy”, in any usable sense, from nuclear reactions. “It was a very poor and inefficient way of producing energy,” he continued, “and anyone who looked for a source of power in the transformation of the atoms was talking moonshine.”

Rutherford died four years after these comments, but nuclear power would soon change the world. Electricity from nuclear fission was first supplied to homes in 1954, in the last year of Einstein’s life. But in the almost seven decades of nuclear science since that point, it remains difficult for many people to see what can be achieved by controlling these most fundamental forces.

This is most apparent in the work being done on nuclear fusion, the much cleaner and cheaper (but much more difficult) type of nuclear power being developed by scientists around the world. If fusion plants can be made to work, they will run on fuel that can be made from seawater. Publicly owned fusion power could permanently end energy poverty and the reliance on fossil fuels for electricity. But while the government has committed, through energy pricing guarantees, tens of billions to the controversial new Hinkley Point C fission plant, our public investment in fusion is a few hundred million. In fact the only type of nuclear fusion technology in which our government has invested seriously is the hydrogen bomb. By the logic only politicians can summon, a technology that could destroy humanity is considered an investment worth hundreds of billions, while the technology that could give humanity a bright future is all but moonshine.

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# How to fix “the greatest market failure the world has seen”



**Privatisation of the UK’s utilities has failed, and public ownership offers the solution, writes Rebecca Long-Bailey, Shadow Secretary of State for Business, Energy and Industrial Strategy**

**I**magine how different this past month would have been if there was a Labour government instead of a Conservative government riddled with infighting and led by a weak Prime Minister. The Windrush scandal would never have happened, and the Business Secretary would have just announced a radical insulation policy to save households over £1bn and a cap on energy prices would have already been in place saving households over £1,000 since 2010.

Sadly, that is not what happened. Instead, the Home Secretary resigned following her botched handling of a national scandal in which 50,000 legal migrants have lost jobs, been detained at risk of deportation and denied life-saving NHS care.

It was Labour, in opposition, who pledged to save households £270 a year by properly funding a street-by-street programme to insulate four million homes in our first term in office, and bring all homes up to EPC average by 2035. In response, the government could only point to a review being carried out into carbon monoxide alarms. And, by blocking Labour’s amendments to the

price cap legislation, the government has ensured that the cap on energy bills promised a year ago by Theresa May might not be in place by this winter, and that another Conservative election promise of knocking £100 off bills will go unfulfilled.

This is just one of the many examples of how the Tories are failing to ensure that our energy system works for people, businesses and our planet. No amount of government gimmickry will add up to the radical action needed to transform our energy system and save our planet. Scratch the surface, and it is clear where the Tories really lie on the environment – funding for renewable energy slashed; fracking licensed; no real action on soaring energy bills, and climate targets missed again and again. The government also has a dismally poor record on insulating homes. According to the House of Commons library, between the end of April 2013 and the end of December 2017 only around 1.5m homes had been insulated.

This litany of failure is galling, not just because climate action is urgent and necessary, but because failing to act is costly. Poorly insulated, low-quality and



## Up to 4m people are living in fuel poverty

SHUTTERSTOCK/ZHAOJIAN KANG

energy inefficient housing along with spiralling energy costs and stagnating wages have left up to four million people up and down the country living in fuel poverty. One million of these include someone with a disability; the health impacts of fuel poverty are worst for the most vulnerable in our society. Many of these people have had to make the heartbreaking choice between surviving freezing temperatures with no heating or receiving an energy bill that they simply cannot afford to pay. The latest figures from National Energy Action show that excess winter deaths last winter were 39.5 per cent higher than the year before at 34,300 in England and Wales.

It is beyond belief that households have been overcharged to the tune of £1.3bn last winter, while the six Distribution Network Operators (DNOs), according to the *Financial Times*, made an average profit margin after tax of 32 per cent a year between 2010 and 2015, equating to £10bn over six years and dividend payouts of £5.1bn.

The Labour Party will not allow this exploitation of a basic human need to continue any longer. We will radically

reform the UK's energy system both to address the glaring market failures and tackle the biggest issue facing humanity: climate change, which has been described by Sir Nicholas Stern as "the greatest market failure the world has seen".

Combatting this challenge will not be achieved through warm words. It requires a radical shift in the way we organise our energy system.

That's why Labour has put climate change front and centre of its industrial strategy, with a mission to deliver 60 per cent of our energy from renewable sources by 2030, and a commitment to transforming our energy system so that it is decentralised, flexible and diverse – fit for a future based on renewables. The only way to do that is by taking our energy system back into public ownership.

In private hands, the modus operandi for the owners of our national and local grid infrastructure has been to cut costs, pay out big dividends and make it harder for renewable and community generators to connect to the grid so as not to undermine their profits. They have not planned for how the grid will need to work in the long term, nor have they had any incentive to make the necessary investments to make that happen. But transforming our grid for a renewable future will require restructuring and innovation, both of which mean long-term investment and strategic planning of the kind that the private sector has failed to deliver.

Privatisation of our utilities and natural monopolies has failed. Quite simply, bringing critical parts of our energy system back into public hands and democratic control is the only way to ensure that we put climate change at the heart of our energy system, along with committing to renewable generation from tidal to onshore wind. As the leader of the Labour Party has said in the past: "To go green, we must take control of our energy."

The next Labour government will transform our energy system and invest in renewable technologies which will create good jobs, boost our exports, and lower the price of energy for businesses and households, protecting the most vulnerable in society from fuel poverty.

# What guarantees are there for the green economy?



**Meg Hillier MP, chair of the Public Accounts Committee, says the government mishandled the sale process of the Green Investment Bank and has thrown carbon reduction targets into jeopardy**

**I**n August 2017, the government sold the Green Investment Bank to a consortium led by the Australian banking group, Macquarie, for £1.6bn. Wind back to 2010 and the Green Investment Bank had been heralded as an opportunity to deliver major projects on the UK’s ambitious carbon reduction targets and to boost the green economy.

The UK’s commitment under the Climate Change Act 2008 was to reduce greenhouse gas emissions by 34 per cent by 2020, and by 80 per cent by 2050 (with the baseline measured from 1990 levels). The EU Renewable Energy Directive of 2009 also commits the UK to securing 15 per cent of all UK energy from renewable sources. The creation of the GIB – which was finally formed in 2012 – was a signal that the UK was ramping up its focus on climate change.

But by 2015, with another spending review underway, the government decided that it could not afford further public investment in GIB. David Cameron’s government also had a policy goal to sell assets where there was no strategic rationale to retain them. If a sale could also contribute to a reduction

in the fiscal deficit then it was viewed as a double win for the government.

The Public Accounts Committee examined the sale last year. While the government broadly secured the financial objective, we have serious concerns about whether the Green Investment Group (as it became) will contribute to the UK’s green objectives. The GIB was created because a lack of private investment in green projects prior to 2011 meant the UK was not likely to meet its obligations. In 2011, the government estimated this shortfall to be £33bn per year in the decade to 2020.

The GIB was expected to take the risk that other investors would not, with a potential win for UK industry as well as the climate. The bank’s mission was to “accelerate the UK’s transition to a greener, stronger economy” and to “build an enduring institution” – though “enduring” was not clearly defined, which became an issue when we examined the sell-off.

The “double bottom line” policy meant that the GIB was designed to achieve both green impacts and financial returns. Financial success was determined by a



## The sale leaves no guarantee of investment in the UK

SHUTTERSTOCK/AMES A. HARRIS

required rate of return on investment, but the definition of what constituted success for the green objectives was not clear and this has been a concern running through to sale and beyond.

The lack of defined green success criteria made it impossible to measure whether the objectives had been achieved. And the contribution of the GIB investments to wider growth in the green economy was not properly evaluated, so it has been impossible to assess the degree to which the GIB caused growth in the green economy since 2012, and whether it addressed previous failures in the green energy market.

By the end of March 2017 the GIB's portfolio of 100 projects totalled £12bn, including £8.6bn of private capital committed. The GIB achieved investment in all four target sectors: offshore wind, waste and bioenergy, energy efficiency and onshore renewables. But it struggled to deliver investment into energy efficiency, as the much smaller average size of transactions of energy efficiency projects meant it wasn't able to commit as much capital to the sector as the government would have liked.

And in spite of being a state investment vehicle it resisted investment opportunities in other technologies (such as tidal energy or carbon capture) because they were not sufficiently developed to be suitable commercial investments. The primary objective in selling the GIB was to remove it from the public sector balance sheet and therefore reduce public debt. At the same time the government clearly had an interest in maximising the sale price.

But to be credible the sale had to be about more than just money. The aim was to ensure that the GIB continued to focus on investing in projects beneficial to the green economy. The government could have achieved a higher price (and therefore better value for money by its own definition) if it had taken a phased approach to sale. Because many projects were in construction phase, there was a larger discount to take account of the risk. Two years later more of the projects would have been operational, lower risk and so the government could have

achieved a higher price.

Even with the financial benefits there were some smoke and mirrors. The government claims that the sale reduced public sector net debt by £1.7bn. But this figure does not take account of underlying assets. The reduction of the public sector net financial liabilities (which nets assets against liabilities) is much lower at £201m. The government chose to use the higher figure in its calculations. The sale also moved responsibility for around £500m of the bank's future commitments to Macquarie.

The bank was established with five green purposes: reduction of greenhouse gas emissions; advancement of efficiency in the use of natural resources; protection or enhancement of the natural environment and biodiversity; and promotion of environmental sustainability.

New owner Macquarie has publicly committed to continuing these, but is not legally bound to do so. It could choose, for example, to pursue one purpose to the detriment of the other four.

Five trustees were appointed to safeguard the public interest in continuing investment to reduce carbon emissions. Our concern was that their influence is too limited. They have the power to prevent changes to green purposes but they do not have input into investment decisions. So the green purposes could be maintained or altered but there is no guarantee that Macquarie will invest to deliver on them. There is also no guarantee that Macquarie's committed £3bn investment in the three years after the sale will be in the UK. The bank was created as an "enduring institution" but the definition of "enduring" was loose.

On sale the name changed to the Green Investment Group (GIG), meaning Macquarie has secured a useful brand for global marketing. Our worst fears are that the Green Investment Group will not deliver on its green objectives for the UK. In its rush to sell off this asset the government has also sold off control of investment into reducing carbon emissions. The double bottom line – of cash and green dividend – could become a double loss and the government will be powerless to stop it.

Britain's industrial base will become more competitive if the ability to self-generate and store electricity is rolled out, writes **Peter Aldous MP**, chair of the APPG on energy storage

# Imagining a battery-powered Britain



**H**ome batteries growing in popularity, solar module prices plummeting, record renewable power generation levels in 2017, and new government support for British manufacturing – where does one begin to make sense of the growing number of positive clean energy headlines?

To start, it needs to be said that the UK's energy sector is going through a period of disruption on the scale of the emergence of the combustion engine or advent of nuclear power generation. The “disruptors” are renewables, energy storage, electric vehicles and associated digital systems, and are backed by some world-leading climate policy.

Clear policy and long-term vision have already won the UK a reputation as a global leader in deploying new technologies. The UK's Climate Change Act underpins our reputation as one of the leading markets for clean tech and I agree with minister Claire Perry who recently described the legislation as the “gold standard” in emissions reduction policy. Our ambitious legislation has already earned us a

distinct international edge in the development of green financial products and business models, of cutting-edge software management systems, and in our ability actually to deploy these new technologies on the ground.

In my view, the next big story is that of energy storage. There are a large range of technologies such as liquid “flow” batteries, compressed air systems that use underground caverns and even use of the second-hand batteries from electric vehicles. In the future such systems will be deployed in homes and alongside power generation sites across the country.

The government sees the industrial opportunity of this new sector and that is why they have set up the £246m Faraday Challenge. The challenge's support is already funding cutting-edge battery storage trials and vehicle-to-grid technology, which will allow for idle, plugged-in electric vehicles to both feed and take power from the grid. It is also going into the nation's universities and into creating a new manufacturing scale-up facility in Coventry.

We're not alone in our pursuit of building batteries, energy storage systems, and electric vehicles (which often happen alongside each other). Such policy is incorporated into China's current Five Year Plan, is being incorporated by existing national players such as Japan and South Korea, and is being championed by the European Commission with their new “Airbus-style” Battery Alliance.

The European Commission alone is aiming to prompt development of between 10 and 20 EU-based, Tesla-style “gigafactories” in the coming years. This represents enormous clean energy investment if we are to think that Tesla's Nevada gigafactory will produce the same battery capacity in 2020 as all manufacturers globally in 2013. If the UK is to win market share we need to move quickly.

I believe that, if a range of policies in this country are quickly amended and energy storage costs continue to fall, that we could see up to 12GW of battery storage deployment in the country by the end of 2021. That's very significant,



## The UK could see up to 12GW of battery storage by 2021

SHUTTERSTOCK/SONTHORN WONGSAITA



and up from less than 1GW in 2016. This would be a historic boost to our energy security, create green jobs, and demonstrate our international leadership in the field.

My view, which is supported by the Renewable Energy Association, is that there are significant opportunities to build storage systems alongside offshore wind sites, on solar farms, in homes, as standalone systems, and alongside EV charge hubs, to name a few options.

If the technology is rapidly developing, if the social need in terms of tackling climate change is proven, and the UK government is supporting the creation of new facilities and trails, what's left to do? In my view, the piece that's missing is the creation of a market.

### Building markets – the role for policy

To build better products and exports we need robust domestic markets.

The key to unlocking this is the Smart Systems and Flexibility Plan, released in July 2017, which aims to further transform our electricity system to one in which a multitude of decentralised points of clean energy generation and storage are able to rapidly react to changes in production and demand.

Good progress has been made to date on the twenty-nine point plan but much more needs to be done to keep pace with our global competitors. As a particular priority we need to find parliamentary time to introduce a clear definition for energy storage in primary legislation.

How the electricity network operators charge for use of, and connection to, the grid needs to reflect the benefits of a smarter system that allows for the storage of power. There's been a huge amount of technological change, but many of the grid codes remain esoteric which is creating bottlenecks.

We need reforms that both empower the networks to manage local EV, solar, and storage demands but also ones that pressure them to ensure that new project developers can actually do business and connect up their projects.

Demand-side response, in which larger energy users such as food refrigerators turn down their power usage for short periods of time, is another new technology that UK companies are leading on. So too is the idea of "aggregation" in which thousands of home batteries are collected into a single virtual power plant that can respond when power needs to be turned up or down. Frustratingly these unconventional forms of power management can't bid into auctions in the same way a new gas-fired power station can, and the Department for Business, Energy, and Industrial Strategy still needs to take action.

In my mind, beyond the Smart Systems and Flexibility Plan, three key issues remain. One is around building regulations – our homes of the future need to be energy efficient and carbon neutral. Costs for new solar power systems and batteries are already low but can fall further if incorporated into a new building. This will also support the government's ambition of rolling out home electric vehicle charging.

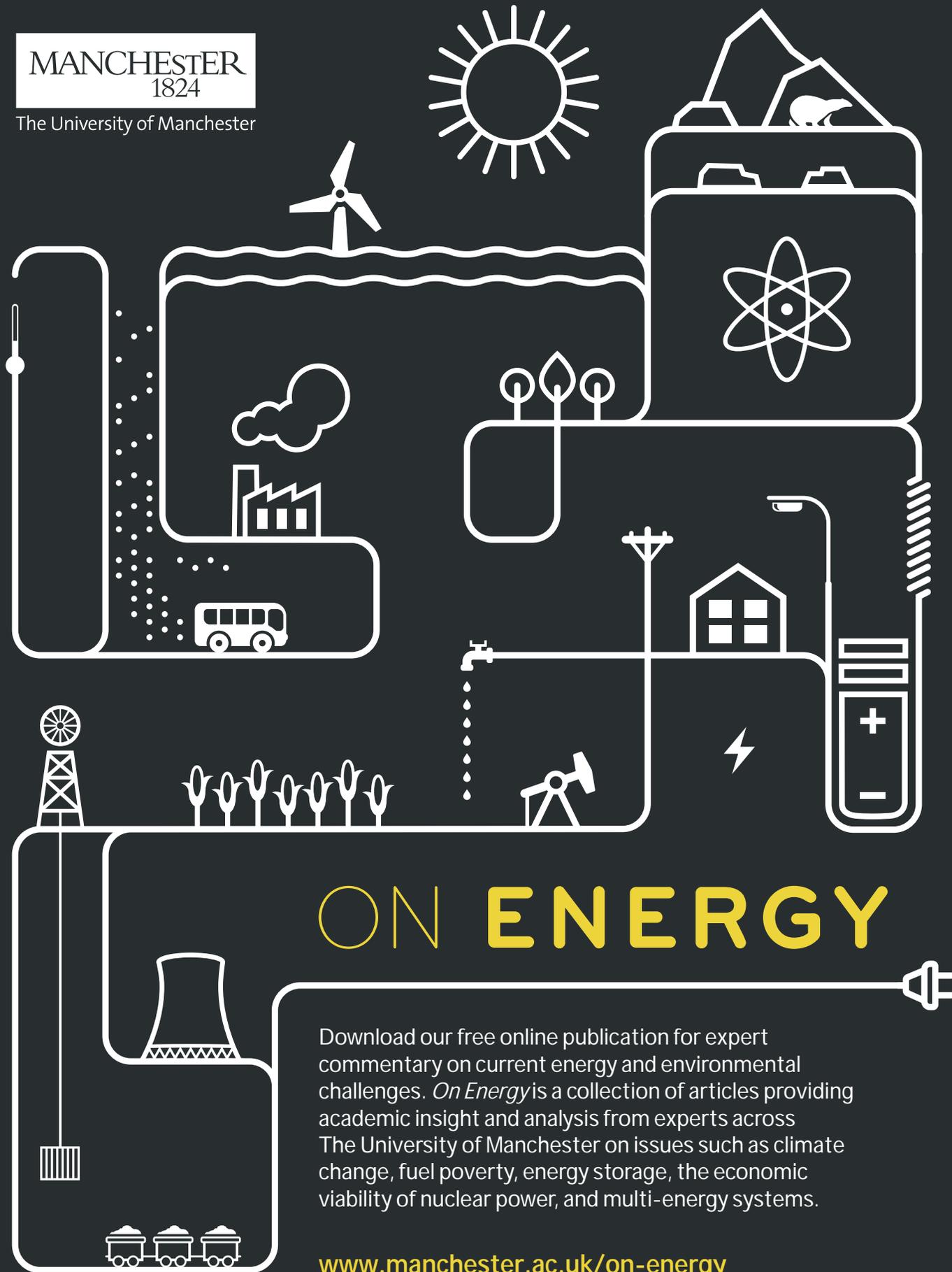
The government has also shown a willingness to use the tax system to spur markets and tackle common challenges – for example on discouraging single-use plastics. A step further would be to sensitively design the business rates methodology for the energy storage sector as it gets onto its own two feet.

Finally, consumer protection is paramount. Consumers need to know which installers they can trust. That means industry and the regulator collaborating, for example by supporting existing schemes such as the Renewable Energy Consumer Code (RECC), which plays a key role in providing guidance and ensuring high standards in the sale and installation of small-scale renewable energy systems and battery storage.

With the right combination of industry and government collaboration Britain can be leading this energy revolution, not playing catch up.

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# Innovation will bring energy into the 21st century

By utilising data, customer interaction can be transformed for the better, explains **Jon Slade**, chief executive of ENSEK

**T**he energy sector is facing a digital overhaul that will bring it firmly out of the analogue age and into the 21st century. By embracing data analysis and utilising technology, the sector can fundamentally transform how it interacts with customers, offering a far greater range of services.

As an industry, energy has a tendency to be perceived as out of step with developments taking place across other industries. The sector has only relatively recently entered privatisation, and is carrying the residual effects of standardised practice. Firms have relied on a nationalised infrastructure for a long time, which requires every participant who enters the market to adopt the same processes, hindering their ability to innovate and drive a more digitally focused service offering to their customers. As a result, it lags behind some of the more mature and long-standing competitive markets when it comes to leveraging data and technology.

The market, however, has made huge strides to become more dynamic, and has significantly opened up. Customers now have a reasonable choice now of who supplies their energy; but I would venture that there needs to be slightly more differentiation required across that supply offering in the future, so customers can choose something that is genuinely different.

As part of this modernising agenda, it is crucial to encourage new entrants to the energy market as they are introducing new and innovative forms of customer engagement that are much more driven by real-time access to

information and data.

ENSEK is a technology provider to the energy retail market; we provide a breadth of services to our clients that enable them to manage their industry interactions and all of their customer engagement, and our applications facilitate multi-channel contact with customers. As a firm, we are committed to supporting the sector's progression, by offering energy providers cutting-edge technology solutions, enabling them to have the best possible customer service.

ENSEK is unique in the market place, as it offers an end-to-end platform that provides full servicing capability to our clients, through every step of the process, whereas most providers only offer a segment of the overall procedure. Secondly, as a business we started by reconstructing the key data relationships and exchanges of information to create a data reconciliation platform, and we built all of our services on top of that, so data and information is really the starting point of our whole approach.

Looking to the future, I believe that two themes will be integral to the progression of the energy sector, and the optimisation of data. The first is smart metering; the adoption of smart meters will be key, and leveraging that data to create new propositions and tariffs essential. The second is the development by providers of blended services, so instead of just offering gas, or electricity, providers will move towards battery storage, solar, electric vehicles, and other products that support a decarbonised world.

Using data in the right way will be essential to this progress, and ENSEK is proud to be helping to facilitate this advancement. We are dedicated to playing a key role in the evolution of offerings for customers by supporting our clients with a set of diversified, adaptable systems. Enabling them to harness that data better will be integral to our growth and their evolution as well.

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**David King, former chief scientific advisor to the government and special representative for climate change, talks to Augusta Riddy about a new initiative to make the West Midlands a hub for clean energy innovation**

# Will the Black Country turn green?

**T**he industrial revolution that took hold in the West Midlands made Britain the world's foremost economic power, but almost two centuries later the region is in need of ingenuity once more. Native industries such as coal mining, which once dominated the Black Country, and the car industry that supported Coventry and Wolverhampton, have experienced steady decline, and the economic identity of the region has been eroded. The West Midlands is now one of the poorest parts of the UK; almost a quarter of its citizens were classed as living in relative poverty between 2014 and 2017. But David King, the government's former chief scientific advisor, is adamant a second industrial revolution is happening: the transition to clean, green energy. "It's of that sort of magnitude," says King, who believes the West Midlands can carve out a new niche for itself in the energy transition market. "I think it's going to be a big part of the

regeneration of the region."

For King, who has also been the government's special representative for climate change, energy transition is "the biggest and most important global endeavour", but it is also a huge opportunity for economic growth. King estimates that the market for transition products could be worth \$3 trillion in just a few years, and he wants to put the West Midlands at the heart of this growing economy.

As chair of the West Midlands Regional Energy Policy Commission, King hopes to pioneer a regional approach to energy transition, which he says is becoming possible thanks to devolution. "The creation of regional mayors," he says, "is the instrument for delivery". In March the commission and its partners – Energy Capital, The University of Birmingham and the Energy Systems Catapult – released a report entitled *Powering West Midlands Growth: A*



David King, BEIS minister Claire Perry and Mayor of the West Midlands Andy Street at the launch of the West Midlands Regional Energy Policy Commission's report

*Regional Approach to Clean Energy Innovation.* Central to the report's recommendations was a call to establish four "Energy Innovation Zones" across the West Midlands.

These zones will provide the infrastructure for "industry, universities, innovation agencies and local authorities" to work together, under the "guidance of the mayor", to develop clean energy technologies, implement them and commercialise them. King says that the zones will focus primarily on "green energy, clean growth, new energy infrastructure systems and improving the competitiveness of energy-intensive manufacturing firms."

The zones are a concept for now, but King is confident a pilot scheme in the West Midlands would be "followed up with developments of energy innovation zones across the country." As in other economic zone projects, public money would create the conditions for wider



## “The shift to green energy is an industrial revolution”

economic growth. The new Conservative metro mayor of the West Midlands, Andy Street, has already begun lobbying the government for financial support.

King suggests that, should Street be successful, the funds provided by central government would come in part from green taxes paid by energy companies. The commission will also seek out private investment, and are currently hoping to secure an initial £500m fund. This capital is expected to be allocated largely to energy infrastructure, including pipes, wires, electric vehicle charging infrastructure and cutting edge low-carbon energy technologies.

The commission views the zones as a natural implementation of both the government’s Industrial Strategy and Clean Growth Strategy, so King argues that the request for funding “isn’t a big ask”. “The energy innovation zones,” says King, “are going to be a critically important part of the UK’s overall

strategy to meet [carbon] targets.”

Despite having had no particular previous attachment to the West Midlands, he has taken up the role of regional cheerleader with gusto. “It’s quite possible the West Midlands will pick up a significant fraction of [the transition market] by getting into the game early.” He believes the industrial and manufacturing heritage of the area has primed the region for its next industrial revolution; “it has many of the manufacturing industries that are of crucial importance to this whole rollout.”

Fuel poverty and air pollution are both pressing issues in the West Midlands, and King is confident that the green technologies developed in the innovation zones will be felt locally. When asked if the zones could prize energy out of the hands of big companies and into the hands of local authorities, King replies “that is definitely the aim.” If the zones become a buffer between consumers and the forces

# The zones could become green energy suppliers



Birmingham city centre

of the energy market, then, will this signify further energy subsidisation by the state? “The state or the region,” King concurs. “It’s the redistribution of wealth, so the taxpayers who can afford it are managing energy poverty.”

In the shorter term the zones will aim to support investment in up-to-date electricity and gas infrastructure “ahead of demand”, offer local tax incentives and bring the allocation of infrastructure costs under local regulation. They will try to gain more control over energy company housing efficiency obligations, and support innovation in construction.

Further down the line, however, King envisages the zones becoming clean energy suppliers, following the example of companies such as Bristol Energy – a council-owned energy supplier that promotes green energy usage, undercutting the big six.

Improving air quality is a clear example of the catalyst the zones could be for regional and mayoral empowerment. “The quality of air that people breathe in the West Midlands region is some of the worst in the country,” King explains. “The switch to clean energy is going to enormously improve the health of people in the region, so getting local ownership for creating a healthy environment is critical.”

While local authorities have been

defunded and demoralised for years, can something like an innovation zone help reverse the trend? “I hope so. I think that this is why I’m so keen on this concept of empowering the local mayors. Their budgets are still quite small, but nevertheless this is a very important way of stimulating growth.” To enable this energy “empowerment” of the region, “regulatory and cultural barriers need to be pulled down,” he argues. Developing new regulation will be an important task for the zones, especially when it comes to reforming housing stock. “New housing would be greened by using less energy and switching over to renewable energy wherever possible. This is a question of local authorities having the ability to create these regulations for the built environment.”

Looking at the bigger picture, King thinks the old energy suppliers are in denial. “The clean, green energy economy in Britain is the biggest growth sector. It is turning over in excess of £50bn a year and employs more than half a million people.” Only the companies that “pick up the slack” and get stuck into the green energy market will survive, he says. By creating the climate for businesses, local authorities and academics to capitalise on this global shift, innovation zones could re-energise a region that has been left behind.

# How council-led energy reduces costs for citizens

Digital connectivity, smart cities and the Internet of Things will transform the modern energy market, writes **Mark Coyle**, chief strategy officer at Utiligroup

**A**s our world becomes ever more connected, there is a risk that many people may be left behind. This creates a need for utility services which can bring the benefits of new technology while engaging in a way that consumers trust. Pioneering councils are now setting up as energy suppliers and engaging customers that otherwise may not have engaged in the energy market.

It is 20 years since the introduction of competition to the residential electricity and gas sector. Competition was intended to bring choice and lower prices to consumers. There was an ambition to remove fuel poverty in its entirety, delivering affordable energy for everyone. Since then, our world has changed through internet technology, economic cycles and politics but fuel poverty remains. Securing affordable energy can be a struggle for many if they cannot or do not want to engage in the energy market. People can be confused, not have enough time or worry about falling into debt, which can result in their not switching energy provider. It is important, therefore, to balance the private sector choices with those from the public sector.

Consumers may feel that local, council-led energy is more attractive to them, easier to engage in and trust the suppliers' motives. While the private sector has to make a profit, the public sector can operate on a basis where any surplus made is returned to the public interest. In the last decade, Nottingham and Bristol councils have entered the energy supply sector. This has enabled other councils and social ventures to

offer energy through "white label" arrangements. A further council is due to enter the energy sector in 2018 with others exploring either full participation or white label arrangements.

These councils were all able to enter the UK energy supply sector through our Smart Supplier In A Box™ model. We provide fully compliant market entry, customer growth, competitive insight, secure smart meter communications and market change enabling. Our UK-based company can provide this through our own expertise, software, managed services and analytics building on our 20 years of extensive experience in making energy smarter for everyone. We aim to be the engine that helps create more choice, better prices and smarter delivery in a journey towards tomorrow's energy.

We have provided this core capability to mitigate the necessary requirements of industry complexity to approaching fifty companies. While the supplier focuses on the customer, we focus on the industry in long-term delivery partnerships that are bringing new choice to consumers. It is vital that there is diversity of energy supply choices to reach all consumers and achieve the best outcome in their service, cost and path to sustainability. This is the mission we set ourselves: to help make the UK energy supply market better for all. By working with pioneering councils already in the market today and those joining it in future, together we can make that happen. When a council joins the energy market it benefits consumers, creates local jobs and starts a local energy economy for further investment.

We believe there is still extensive work to do in making energy work for everyone. We don't pretend it is easy for the council or us, but the mission is important and the positive result is that people have better lives. The journey to make energy smarter for everyone has only just begun and we welcome working together so that it reaches every part of our society.

**For more information, please email:**

**[Mark.coyle@utiligroup.com](mailto:Mark.coyle@utiligroup.com)**

**Or follow him on Twitter @MarkCoyleUK**

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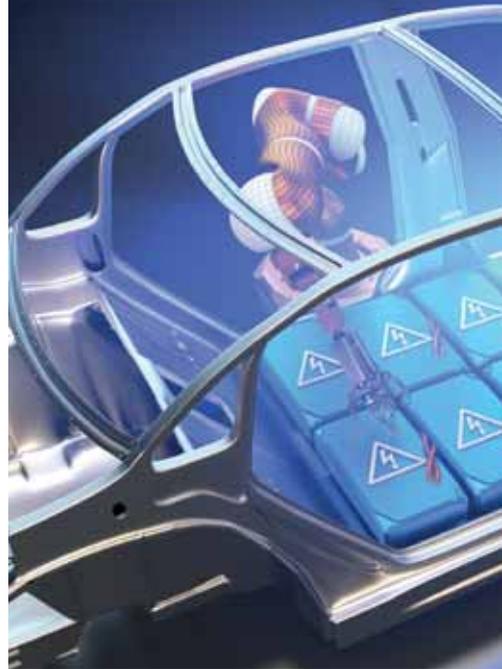
# Why critical materials are exactly that

Many of the technologies we depend on, from smartphones to clean energy, are reliant on critical materials, explains the University of Birmingham's **Dr Gavin Harper**

**T**echnological advancement comes at a price. In the context of materials, there is ever increasing demand which is often accompanied by limited supply. Additionally, the raw materials that underpin our modern lives come with environmental and social impacts at many stages in the supply chain.

Critical materials or elements are those which are at risk of short supply but are economically important, including those that possess unique magnetic, catalytic and luminescent properties. Such is the critical nature of these materials to the technologies that enable wind turbines, electric vehicles, fuel cells, electronics and solar panels to name but a few examples, that the European Commission has compiled and regularly updates a list of critical materials, and rare earths are at the top of the list in terms of supply risk. These include dysprosium, neodymium, terbium, europium and yttrium. Rare

BCSECM is working on the use of robots for automated disassembly of electric vehicles to recover critical materials



earth metals are not the only challenge though; platinum group metals are required as catalysts in electrolyzers, fuel cells and pharmaceuticals synthesis, and cobalt remains a key component of electric vehicle batteries.

Dr Paul Anderson of the University of Birmingham's School of Chemistry explains: "It's important to understand that, despite the name, many critical materials are not 'rare' because of a lack of abundance in the earth's crust. Supply constraints may arise because resources are subject to political interference or manipulation of the market, because they are cheaper to produce in other countries that may be willing to pay an environmental penalty, or because of political instability, for example so-called 'conflict minerals'. In many cases these materials are not produced on a massive scale so the mining market is small in relative terms, but the products they go into have enormous societal and economic value. They are

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also frequently very finely dispersed in the applications they are used in which causes problems for recycling.”

Diversifying the supply options for critical materials, developing substitutes and enabling the recycling of end-of-life electrical products, then, should be key priorities for government, academia and industry moving forward. And these represent the core tenets of the University of Birmingham’s Centre for Strategic Elements and Critical Materials (BCSECM).

Rare earth magnets, based upon an alloy of neodymium-iron-boron, play a crucial role in thousands of products. The magnets are used in motors, generators, fans and power steering units in electric vehicles, and are therefore a key resource as the automotive industry transitions to manufacturing ever greater volumes of electric and fuel cell vehicles. For a new generation of off-shore wind turbines, up to three tonnes of NdFeB

can be required. The next generation of electric aircraft will also require even greater quantities of these materials.

While it remains possible for engineers to design rare earths out of motors and generators, this will typically be at the expense of efficiency, increased weight or reduced reliability, which will have a negative impact overall on greenhouse gas emissions.

Professor Allan Walton of Birmingham’s School of Metallurgy and Materials says: “Presently, China has a dominant position in the supply of material for rare earth magnets; this provides them with a competitive advantage that allows Chinese manufacturers to move up the supply chain through cost-effective access to critical resources. With a near monopoly on supply and high global demand, the price of rare earth magnet material has gone through periods of extreme price volatility, which could easily occur again in the near future.”

Walton continues: “For a robust economy that considers materials security as part of a proactive industrial strategy, it is essential for the UK to have a diverse range of supply options for critical materials. One of these options could involve developing technologies to recycle critical materials from end-of-life technologies. It has been estimated that every year we import around 14,000 tonnes of NdFeB into the EU. However, there are technical, legal and economic barriers which have to be addressed to make this a reality. Workers at the University of Birmingham are currently scaling up recycling technologies to recover NdFeB magnets from electronic and automotive waste.”

By developing secondary sources of critical materials and by investing in ethical primary resources this can help mitigate the often serious social and environmental costs of mining in many parts of the globe. For example cobalt, a metal with significant supply risks, is subject to growing demand owing to our appetite for lithium ion batteries.

Our present primary supply routes

for cobalt raise many moral and ethical questions, with a large proportion being extracted in unsafe conditions by artisanal and often child miners in the Democratic Republic of Congo. The University of Birmingham is leading an EPSRC-funded project on recycling of lithium ion batteries (ReLiB), one of four “fast start” projects launched by the Faraday Institution earlier this year. Birmingham is leading a consortium of eight universities that is investigating how electric vehicle batteries can be economically and safely recycled at the end of their lives.

As the volume of EVs on the road increases, this challenge will only increase. It should be noted that secondary supplies will only ever meet part of the demand in a growing market and we should also be looking to secure supplies of materials in politically stable parts of the world where possible.

Following the launch of the BCSECM, the Centre has subsequently been awarded funding from the EPSRC to launch the Critical Elements & Materials (CrEAM) network. The network will bring together researchers from across the academic landscape with the aim of informing and safeguarding UK industry against shortages of critical materials. Later in 2018, the BCSECM will also launch a policy commission, examining the potential for a dedicated “UK Elements Strategy”. At a time when politics and policy are uncertain – a backdrop exacerbated by the UK’s impending exit from the European Union – it is important to consider carefully our position in relation to critical materials in a totally new context. This is essential to ensure that UK industry remains competitive globally and key resources are available at the right price to our manufacturers.

A bespoke UK Elements Strategy, modelled on the long-standing Japanese equivalent which is based on a hierarchy of replace, reduce, recycle, regulate, could provide proactive policy guidance to mitigate potential price and geopolitical volatility in relation to strategic and critical elements.

**Professor Peter Cameron, director of the Centre for Energy, Petroleum and Mineral Law and Policy at the University of Dundee, says Brexit has the potential to derail Scotland's prospering renewable energy industry**

# The Brexit power grab is a risk to Scottish renewables



**A**round a quarter of the UK's current renewable energy generation capacity is in Scotland and it is estimated that a quarter of the renewable energy potential in all of Europe could be found here in the future, both on land and offshore. If properly tapped, especially through offshore wind and tidal projects, this immense clean electricity source could contribute greatly to meeting the UK's carbon reduction targets. Brexit, however, has the very real potential to derail this progress.

Our discussions of national and EU energy policy are usually influenced by a so-called "energy trilemma": competitiveness, security and sustainability – and how to reconcile these priorities through the regulatory process. The reliance on government support makes the future of renewables in Scotland dependent on another trilemma: Holyrood, Westminster and

Brussels. With an eye on once-lucrative oil and gas revenues, the UK government refused to fully devolve all regulatory powers relating to energy. Hydrocarbon resources are, however, very different from the traditional power sector, and the Scottish government has, in the last ten years, achieved spectacular growth in the renewables industry through the careful and sustained use of devolved legal powers over planning and the environment. Brexit will impact upon each of these focal points, though, triggering uncertainty for the industry and especially for future investment.

This alignment will diverge from 2019, but not only because of Brexit. Sweeping new energy measures have been set out by the EU in a "clean energy package" that includes a new, more ambitious Renewable Energy Directive, linked to plans for substantial electricity grid investment to foster improved interconnections, energy efficiency and



measures to tackle energy poverty. This is all scheduled to become law in January 2021.

To some, the volume of this pending legislation will surely confirm their negative views about the EU. However, it is worth dwelling on the motives behind the new proposals. The success of wind and solar across Europe brings into question the traditional centralised model of electricity provision that underlay previous legislation. The intermittency of renewable supply requires more flexibility and

## 25% of UK renewables are in Scotland

responsiveness. We are, arguably, still at the beginning of a very extensive transformation of the energy economy, one which requires new rules to make it work properly and effectively, with a sub-set of rules to provide for vulnerable customers. The old rules are designed around a relatively simple model of centralised service, with a small number of large generating plants. A new set of rules is needed as the number of generating sites grows exponentially, and to deal with the increasing complexity of balancing supply and demand.

Scotland's renewable energy sector is intimately linked to the rest of Europe in its corporate ownership links, the sale of its power and the purchase of its equipment and infrastructure. Contracting, financing and trading will all be affected. Negotiators have yet to secure the conditions which allow private parties to trade energy across borders. Uncertainty will become a fact

of life for the sector.

At a conference on Brexit and renewable energy, held at the University of Dundee recently, one speaker after another voiced concern about the effects of Brexit on renewables: a loss of access to research funding in a sector that relies heavily on the application of innovative technologies, a decline in ideas and expertise coming to Scotland and a drop in funding clean energy projects after existing EU commitments come to an end. Yet, Holyrood, Westminster and Brussels all recognise that government action in subsidies, infrastructure tariffs and regulations is required in the post-petroleum energy mix.

But there is one significant difference. Holyrood and Brussels are much more closely aligned with respect to how fast the transition to a low-carbon economy should proceed. Everyone recognises that the transition will be driven by regulation, which in turn means there

## Westminster is less committed to renewables than Holyrood

**Nicola Sturgeon has warned that Brexit could limit funding and labour for renewables**



is a need for legal jurisdiction over the renewables sector. The transition will not happen quickly in a competitive market. Broadly speaking, both Brussels and Holyrood have focussed more than Westminster on exercising regulatory power rather than letting the market function more freely. Intervention in the power sector was the driver which created the renewables growth. The free market would not have achieved that result.

The SNP government saw the potential for a rich energy mix that went well beyond the oil and gas-centred perspective of Westminster. The future of jobs related to the fading oil boom, rather than the prospect of future revenues, was a driving concern. Their vision of a mixed energy economy – at the time derided by many – has become a reality and attracts wide public support. The sharp fall in the oil price underlined its economic sense and the folly of relying exclusively on domestic supplies of fossil fuels as an income generator.

It is hard to see any future Scottish government failing to promote a strong renewables sector, but real risks lie ahead in terms of the key legal arrangements that make energy markets work. Energy markets are defined by their regulatory structure. The energy companies participate in a market which has

common rules to ensure a level playing field. The idea behind a competitive market is that the most important outcome is a price which is as low as possible for consumers, and that other non-tariff issues are not able to damage that or artificially raise prices. Regulation harmonises the non-tariff issues, leaving the companies to compete on price. The regulator creates the rules of the game and leaves the companies to play the game – i.e. compete in the market – with little or no influence over the rules or changes to the rules.

So, the repatriation of powers from the EU becomes a very important matter indeed. It determines which body will have regulatory powers. With Westminster less committed to renewables than Holyrood, demands to “take back control” from EU institutions without a clear sense of what that means for the devolved nations is more than a little concerning for one of Scotland’s remarkable success stories of recent years. The real fear is that if Westminster is successful in getting hold of the powers currently residing with the EU, the Scottish renewables sector will become exposed to unavoidable policy risk. Future investors are risk averse. Increasing policy risk can only mean that there will be less investment.

# When it comes to CO<sub>2</sub>, we're not off the hook

**Dr Clair Gough,** research fellow at the Tyndall Centre for Climate Change Research at The University of Manchester, explains why we mustn't rely too heavily on carbon removal to fix our climate woes

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**A**s part of the historic Paris Agreement made in 2015, 197 countries agreed to endeavour to keep the rise in average global temperature to 1.5° c. To work towards this goal, it is useful to think in terms of “carbon budgets”, which define limits to the amount of carbon dioxide that can be emitted within a given timeframe.

At the Tyndall Centre for Climate Change Research in Manchester we have an integrated and whole systems approach to looking at climate change mitigation and its societal implications. We employ interdisciplinary methods to understand what is needed to stay within those crucial budgets, researching different ways of reducing carbon to allow the targets to be met. In recent years, there has been much talk about BECCS technologies (biomass energy with carbon capture and storage), to the extent that the approach has come to be viewed as an essential solution to the world's emission woes. I believe that this is a dangerous position to be in, especially with the technology itself not yet being widely or commercially used.

The reason for so much interest is that capturing and storing the carbon from fossil fuels can significantly reduce emissions; and there are currently only about 20 of these facilities around the world. By combining carbon capture and storage with biomass energy it becomes possible to apply the same approach to carbon taken up by plants via photosynthesis. By using these plants as fuel – biomass energy – and capturing the carbon dioxide generated, instead of being emitted back into the air it can

be captured and stored indefinitely, effectively removing it from the atmosphere. However, we mustn't become complacent. I've identified three key challenges to the mass rollout of BECCS, which are expanded on in our current research – “Feasibility of BECCS and afforestation for greenhouse gas removal (FAB GGR)”.

Firstly, scale is a huge issue. It's one thing to have a single power station that is delivering negative emissions, but if you want to impact the global levels of CO<sub>2</sub> – and be in a position where more carbon dioxide is removed than emitted at a global scale – the number of BECCS projects available needs to be massively scaled up, which would potentially require 1000s of power stations equipped as BECCS facilities.

A second challenge is ensuring a BECCS supply chain is genuinely negative; from the field where the plant is grown (where it is fertilised, watered, and harvested), to the ship on which it is transported, to the power station where it is processed – emissions from all these aspects of the process have to be accounted for.

Thirdly, to facilitate its use at the scale required, new policy and governance mechanisms will have to be developed to provide global coordination on emissions and new governance frameworks to oversee the complex networks of people and processes involved in these international supply chains.

Researchers at the Tyndall Centre are dedicated to exploring solutions to minimise climate change and its impacts, including building a better understanding of the role that BECCS can play. However, with or without the promise of negative emissions, there is much work to do in bringing emissions as close to zero as possible; the way society uses and supplies energy needs to be overhauled. BECCS is not the silver bullet that allows us to fix the climate problem – we're most definitely not off the hook yet!

**To find out more, please visit:**  
[www.tyndall.manchester.ac.uk](http://www.tyndall.manchester.ac.uk)

## ENERGY INTELLIGENCE

# The latest contracts, jobs and training

## THE FIVE LARGEST PUBLIC-SECTOR CONTRACTS NOW OPEN FOR BIDS

These contracts are now open for tenders.

### 1. Kent County Council

*Flexible Procurement and Supply of Metered and Unmetered Electricity*

Bid deadline: 08/06/2018

Tender value: £300m – £900m

Kent County Council is looking for suppliers to provide energy and other services, including automatic meter reading, data aggregation and collection, demand side response to organisations in the public sector until 2024.

Contact: psg@commercialservices.org.uk

### 2. Eastern Shires Purchasing Organisation

*Electricity (Half Hourly Metered, Non Half Hourly and Unmetered Supply)*

Bid deadline: 01/06/2018

Tender value: £750m

ESPO intends to create a new single-supplier framework for the provision of electricity, with ESPO acting as a go-between to buy electricity on behalf of central government, local authorities and schools in England, Wales and Scotland.

Contact: tenders@espo.org

### 3. Kent County Council

*Flexible Procurement and Supply of Natural Gas Daily Metered and Non-Daily Metered*

Bid deadline: 06/06/2018

Tender value: £200m – £600m

Kent County Council is accepting bid applications for suppliers to provide Natural Gas and services including automatic meter reading and gas purchase agreements.

Contact: psg@commercialservices.org.uk

### 4. Pembrokeshire County Council

*Supply and Distribution of Bulk Fuel*

Bid deadline: 05/06/2018

Tender value: £11.2m

Pembrokeshire County Council is looking to establish a framework of providers to supply and distribute bulk fuel (battery-stored energy) to itself and also to Carmarthenshire County Council.

Contact:

sian.kerrison@pembrokeshire.gov.uk

### 5. East Midlands Strategic Commercial Unit

*UK-London: Heat Networks*

*Investment Project*

Bid deadline: 31/05/2018

Tender value: £11m

BEIS is looking for a partner for a five-year contract to deliver and run a financial support scheme for the government's Heat Networks Investment Project.

Contact: HNIPProcurement@beis.gov.uk

**Total value: £2.27bn**

## THE FIVE LARGEST PUBLIC-SECTOR CONTRACTS OPEN FOR BIDS SOON

“Pre-Information Notices” give advance warning of contracts that will soon be open for tenders.

### 1. Cabinet Office/CCS

Suppliers will be expected to provide flexible billing services, administration and pricing for customers.

PIN value: £3.7bn

### 2. Cabinet Office/CCS

The Cabinet Office/CCS will accept bids from suppliers to provide daily and non-daily metered natural gas across the public sector.

PIN value: £1.6bn

### 3. Cabinet Office/CCS

Crown Commercial Services as the contracting authority intends to put in place an agreement for the supply of utilities via a comparison and switching website accessible by UK customers.

PIN value: £1.5bn

### 4. Coventry City Council

A consortium of Coventry City Council, Coventry and Warwickshire LEP and the University of Warwick has formed the UK Battery Industrialisation Centre. The UKBIC is aimed at facilitating the scale up and production of batteries and fuel cell technologies.

PIN value: £50m

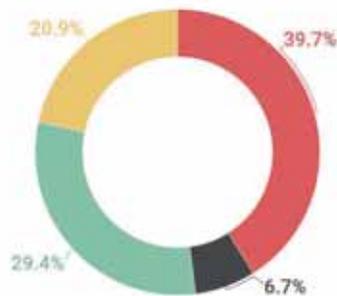
### 1. Department for Business, Energy and Industrial Strategy

BEIS intends to appoint contractors for a hydrogen for heat demonstration programme; including the definition of a hydrogen quality standard and testing appliances.

PIN value: £20m

**Total value: £6.87bn**

UK energy mix 2017



● Gas ● Coal ● Renewables ● Nuclear

Tender and framework data  
supplied by

tussell

## ENERGY JOBS NOW OPEN FOR APPLICATIONS

### **Deputy director of energy and security analysis, Department for Business, Energy and Industrial Strategy**

Salary: £66,000 – £117,800

Location: London

Closing date: 27 May

Leading a team of 40 analysts, this role will involve leading policy research and making recommendations to government on the risks, opportunities and trends that may arise from energy policy.

### **Senior policy analyst, Office of Gas and Electricity Markets (Ofgem)**

Salary: £29,200 – £38,600

Location: London or Glasgow

Closing date: 21 May

The role involves assessing industry-wide standards and helping to resolve disputes between companies, while protecting the interests of existing and future gas and electricity customers.

### **Senior manager of regulatory price controls, SSE plc**

Salary: Up to £75,000

Location: Glasgow or Perth and Kinross

Closing date: 20 May

The next round of energy network price controls, called RIIO-2, will begin from 2021. SSE is seeking a senior manager to oversee its compliance with these new standards.

### **Head of existing business sales – energy solutions, E.ON UK**

Salary: Senior executive salary plus comprehensive rewards package

Location: Coventry

Closing date: 2 June

This senior role will lead E.ON's sales team. They will be responsible for account managing existing customers and clients, to grow value and renew contracts.

### **Non-executive director, Smart Energy GB**

Salary: Unremunerated (six board meetings per year)

Location: London

Closing date: 23 May

Smart Energy GB is a trade action body, lobbying industry to roll out more smart meters. The non-executive director role involves attending six meetings a year, as well as the Smart Energy AGM, to discuss how to introduce more consumers to smart meter technology.

### **Head of policy, Office for Nuclear Regulation**

Salary: £62,753 – £71,653

Location: London or Bootle

Closing date: 20 May

The ONR is responsible for the regulation of nuclear safety and security across the UK. The head of policy will oversee the organisation's on-site inspections and policy recommendations.

## TRAINING OPPORTUNITIES

### **MSc in Sustainable Energy Systems, University of Edinburgh**

This one-year (full-time) course covers wind, marine and solar energy technologies, as well as the wider environment in which they are to fit, including resource assessment, production and consumption.

### **MSc in Offshore Engineering, Cranfield University**

This one-year (full-time) course develops professional engineers and scientists with multidisciplinary skills and the ability to analyse offshore energy engineering problems.

### **Level Three Advanced Energy Manager Diploma, Energy Institute (Glasgow or Perth and Kinross)**

This 12-day course offers a technical overview of energy management, including energy-saving projects, technologies, principles and return on investment.

### **Renewable Energy Management Diploma, European Energy Centre**

This two-day intensive course is for individuals considering a consultancy job and/or those who have to evaluate the benefits of adopting renewable technology.



# BIRMINGHAM CENTRE FOR STRATEGIC ELEMENTS AND CRITICAL MATERIALS

WE ARE DEVELOPING THE INSIGHTS TO ENSURE THAT BRITAIN HAS ACCESS TO KEY STRATEGIC ELEMENTS & CRITICAL MATERIALS THAT UNDERPIN THE TECHNOLOGIES OF THE FUTURE AND A MODERN INDUSTRIAL STRATEGY.

THE MAP BELOW ILLUSTRATES THE PRIMARY SOURCES OF SUPPLY FOR STRATEGIC ELEMENTS AND CRITICAL MATERIALS AROUND THE WORLD.

AS THE FIRST UK CENTRE IN STRATEGIC ELEMENTS AND CRITICAL MATERIALS, OUR SCIENTISTS AND RESEARCHERS AT THE BIRMINGHAM ENERGY INSTITUTE ARE LEADING THE WAY IN WORKING ON THE SOLUTIONS TO THESE CHALLENGES.



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