

NewStatesman

Energy policy

Sustainable or not?



in association with





RENEWABLE STRATEGY LTD

Keeping the turbines turning

Strategy is as important as technology in wind power, says **Brent Van Der Merwe**, head of asset management at Renewable Strategies

Just a decade ago, the low carbon industry was the Cinderella of energy production. Since then, global investments in the sector have blossomed dramatically, with renewable energy leading the way.

In Europe, the number of offshore wind turbines grew 500 per cent between 2008 and 2013 and the previous five-year period. Now other parts of the world are looking to follow Europe's leadership.

Renewable Strategy Limited (RSL), an advisory firm with an emphasis on strategic asset management, systematics and analytics, is at the cutting edge of supporting both on and offshore wind industries. RSL consultants optimise the asset management process from its inception to that all-important lifetime return.

RSL's proven mastery of the challenging conditions of generating electricity at sea has enabled asset management leadership in other sectors. Two offshore wind farms already use RSL's tried and tested Maintenance Planning System as their sole asset management tool. With a single wind turbine costing roughly a hundred times the price of an average family car, informed and systematic service management is a must, and big players in the industry are currently making the switch to RSL for this reason.

Very few wind-farm owners know exactly how well their assets are faring. This lucky handful sleeps well at night, safe in the knowledge that operation and maintenance is optimised not just for cost

saving but also maximum revenue for the whole lifecycle. RSL estimates that the O&M activities of the remaining 95 per cent of wind farms around the globe are not striking a good deal on pro-active maintenance. There is consequently substantial production loss in making good, and lifetime return on investments suffers similarly. If strong yield production on the back half of the turbine life is important, then simply maintaining the status quo is not an option.

O&M strategy

Elias Dencker, the director of RSL, believes that the solution lies in integrating a robust O&M strategy at owner level with proactive planning systems at operator level, supported by running parallel trends and analytics. This can be difficult if control of these elements is lost to OEM. Owner-operators are heavily reliant on the supply chain, and trust is key; blind trust however should have no place at the table.

Planning and prioritising for maintenance in the long term is what enables windfarm owners and operators to maximise output proactively. Using the original equipment manufacturer can make a big difference to how a turbine's servicing schedule is managed. Without intelligent monitoring, OEMs can effectively lock themselves into the chain where the owner neither controls nor fully understands the impacts of the process and its impacts on production yield and returns.

Analytics

The haemorrhaging of spares and unscheduled stoppages, rarely foretold by OEM, is a direct result of reactive asset management philosophy causing the life of the asset to be halved in some cases, with an obvious adverse impact on the investment. Proactive and insightful analytics confronts the asset downside risks through systematic and informative management tools providing management with the opportunity to make active decisions with regard to investment returns.

Planning systems

A robust, integrated, computerised operational planning tool offers flexibility in the face of unscheduled events. Proactive, analytical trend identification, alarms and failure prediction can dramatically reduce costs, unplanned downtime and revenue loss. Systematised oversight of plant assets also limits the likelihood of suppliers causing chaos through ad hoc servicing and repairs, putting out one fire with short term solutions that kindle a subsequent fire.

Off-the-shelf planning tools lack the built-in insights and algorithms required to be useful. RSL offers these bespoke tools to match the needs of operators, tying them in with their other systems, providing a strategic asset management advantage in the process. ●

For further information about RSL's management tools, visit www.renewable-strategy.com

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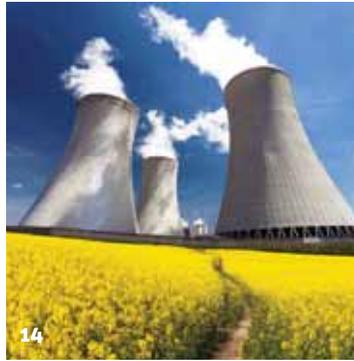
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Sustainable and affordable?

Whatever your political loyalties, you are likely to agree that the government faces some great obstacles in putting together a coherent energy strategy. Three difficulties immediately spring to mind, the simplest of which is the lack of finances. No matter whether an individual supports austerity or considers it utterly toxic, it exists and it is shrinking the money available for initiatives to do with fuel.

Second, there is a lack of consistency surrounding what constitutes either “clean” or “sustainable”. In the past century, received wisdom had it that nuclear fuel was the ultimate bogeyman; people witnessed the Windscale fire of 1957, which was at level five severity on the seven-point International Nuclear

Event Scale. A generation later, in 1986, Chernobyl caught fire and blasted a plume of radioactive fallout into the atmosphere. Safety standards have clearly improved since then and reading the articles in this supplement will confirm that nuclear power, being carbon-neutral, is now seen as preferable to many of the alternatives.

Some more senior readers may still have an emotional response against it, and the received wisdom might change yet again.

Policymakers will depend on advice as well as their own political allegiance, and that advice has changed in the past. Any owners of a diesel car will confirm that buying something on an individual level because it is thought to be green and sustainable can too easily backfire

when the assumed facts change around you – and it could well be the same on a national scale.

These obstacles become insignificant, however, when offset against another significant difficulty: formulating an energy policy for sustainability on a national scale can only achieve so much when the rest of the world may or may not be joining in.

In these pages we examine the international spectrum of sustainable initiatives and Britain’s place in them. The honest truth is that we’re influential and we are substantial consumers, but on the map we are not that big.

If sustainable energy is to become a reality, it is going to take policy change and implementation of those policies, and this will have to be done on an international scale.

It will have to be affordable as well, or it will lose votes and a new government will come in with its own ideas. Agree or disagree with shadow secretary of state Lisa Nandy’s politics and vision, but her article (*starts next page*) speaks loudly of her frustration over the government’s changes to plans that were in place.

Formulating a sustainable policy that fulfils all of those criteria is a big ask. The problem is that there seems to be no alternative. ●

This supplement, and other policy reports, can be downloaded from the NS website at newstatesman.com/page/supplements

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Energy and the need for change

Britain's place in the world energy market is important but needs better management, says **Lisa Nandy**, shadow secretary of state for energy and climate change

China, already investing more in clean energy than the United States or Europe, has made a commitment to build an additional 800 to 1,000 gigawatts of nuclear, wind, solar and other zero-carbon power-generating capacity by 2030. That's close to the total current electricity generation capacity of the United States. India has committed to build 100GW of solar power by 2022. That's more than the total capacity of all Britain's power stations combined. This year, clean energy investment in the US grew to almost \$400bn (£262bn). Since President Barack Obama came to power, America's wind and solar capacity has tripled.

Britain should also be at the forefront of this tech-led transformation in the global energy economy. The Confederation of

British Industry has estimated that the UK's low-carbon sector is already worth more than £100bn to the country, and it already employs more than a million people. Now we have the chance to create hundreds of thousands more good, skilled jobs in these businesses. This could make us more prosperous and help to put our economy on a more sustainable footing.

Instead, since the Conservatives came to power, we have begun to lose our leadership position. The UK has dropped out of the top ten countries in the world to invest in low-carbon energy for the first time, and the World Energy Council has just downgraded Britain's ratings for energy policy. Energy schemes put in place with cross-party support over the past decade are being unpicked systematically by George Osborne.

Downing Street's failure to establish a clear and stable environment for investment means that it is drying up right across the energy system, just when we need it. The situation is worst for those seeking to develop projects using cutting-edge low-carbon technologies, because the government seems actively hostile.

The signal to investors has been that Britain simply isn't open for business on renewable energy. As James Murray, the editor of the website BusinessGreen, puts it: "The government's attack on renewables is like the White House deciding in 1995 that it wanted to restrict and bad-mouth Silicon Valley."

The Tories have slashed solar support by almost 90 per cent. Already, over the past month, more than 1,000 jobs in the British solar industry have disappeared. ▶



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The UK needs to be open for business on renewable energy



Onshore windfarms are being blocked in Britain

▶ A further 20,000 solar jobs are thought to be still at risk. Despite offering the cheapest form of low-carbon power, onshore windfarms are also being blocked – even where they enjoy strong local support. Staggeringly, even wind projects that previously had government support are having that removed retrospectively by the Prime Minister who once put a wind turbine on his roof.

The Green Investment Bank – set up with cross-party support to drive investment across the low-carbon economy – is being sold off. There is a great risk that it will end up becoming just another commercial bank without its green mandate being protected.

A tax raid on the clean-energy sector in George Osborne’s Budget earlier this year – in the form of a perverse decision to put a carbon tax on energy projects that don’t produce carbon – also had the

consequence of throwing into doubt an exciting project to develop carbon capture and storage (CCS) technology in Yorkshire. Almost six years after David Cameron took power, promising to develop four CCS projects in Britain, we don’t yet have a single one.

The government has botched the nuclear programme badly

It’s a similar story with nuclear power. The Labour government initiated the plan for new nuclear stations that could provide vast quantities of low-carbon energy. Six years on, there are still none under construction. The government has botched the nuclear programme so badly that families and businesses face the prospect

of being signed up to pay out, for 35 years, for the most expensive power station ever built anywhere in the world, and it’s already years behind schedule.

The cheapest energy is the energy we don’t have to use. Yet funding for improving the efficiency of existing homes – including those of vulnerable people such as pensioners and the fuel-poor – has been cut in real terms. More egregious, the rules to ensure that new houses don’t leak warmth and carbon emissions have been ditched. This will have the effect of creating a new generation of cold homes with residents forced to pay over the odds for their energy bills.

This catalogue of reckless decisions could not have come at a worse time. We face the biggest power crunch in a decade, and next winter the gap between demand and supply will be even tighter. We urgently need investment in new power

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stations, and energy efficiency, to secure supplies. As Cameron's former speechwriter Ian Birrell wrote in response to the government's chopping and changing of energy policy in recent weeks, "It seems bizarre to make such regressive moves: major investments worth billions have already been scrapped."

Yet these decisions are not simply damaging our economy and our energy security. They are also hurting our reputation.

The Paris summit meeting in December should be an opportunity for the PM to showcase Britain as a place to invest in low-carbon industries, and to demonstrate to developing countries that we are following a new pathway to economic growth that does not rely on burning dirty fuels. It's a tragedy that he will turn up to the talks right at the time when his Energy Bill to ban windfarms is passing through parliament, and when his own

climate-change adviser, Lord Deben, is stating that the UK is not on course to fulfil its existing carbon commitments.

This is shameful. As on the Europe question, it shows this is a government prepared to put the obsessions of its backbenchers before the national interest.

These decisions are hurting our economy and our global reputation

The Labour government was among the first in the world to recognise both the economic opportunities from cleaning up the economy, and the risks that would follow if climate change is not checked. It was Tony Blair who put the matter on the agenda of the UN Security Council and made it a priority at a G7 summit. It was

David and Ed Miliband who passed into law the world's first Climate Change Act. It was Gordon Brown who helped establish the UN's Global Climate Fund to help the poorest countries in the world protect their citizens from the impact of rising seas and more extreme weather.

The former US vice-president Al Gore came to London recently and urged ministers not to abandon this record.

"The United Kingdom's historic legacy of leadership on the most important moral issues faced by humanity, including the climate crisis, is long and has been recognised with respect by the community of nations," Gore said. "It is time for the UK government to honour and live up to that legacy, and to return to its global leadership position." He is right. Ministers must change course. ●

Lisa Nandy is the shadow energy secretary and the MP (Labour) for Wigan



Checks and balances

Energy models are changing and the stakeholders need consideration, says **Lawrence Slade**, chief executive of Energy UK

Nothing stays the same. We face change all the time and the UK's energy sector is no different.

I doubt that, last year, many people would correctly have forecast the significant price falls we've seen in energy tariffs or the rapid changes Britain's energy sector generates and supplies power to homes and businesses.

Since privatisation, the industry has moved from a regional model, with a number of local companies – to a more consolidated market, with larger players at its heart. Today, I think we can see the tide starting to ebb back towards a more decentralised, distributed energy model.

So, superficially, while the switch and socket stay the same, the power behind the plug is ever-changing.

Today more energy is generated from environmentally sustainable, renewable sources. There has been a huge increase in power derived from wind and solar. So much so that Britain now can enjoy days where renewables make a significant impact on how the country is generating electricity. Days when wind meets around 20 per cent of our electricity demand.

The energy industry is also attracting massive investment for new nuclear as well as developing power sources from biomass. We are considering linking up our energy demands with power coming down interconnectors not just from the continent but from as far afield as Iceland.

But Britain's energy solutions are not all global in their implementation. Towns

Carbon monoxide

Imagine drowning in your sleep. A horrible thought, but something similar happens with carbon monoxide poisoning. CO poisoning claims about 40 lives and leads to thousands of hospital admissions every year. You can't smell, see or taste CO and symptoms often get mistaken for common ailments – such as flu. Having your boiler serviced regularly cuts the risk and fitting an audible CO alarm can provide all the warning needed to get out – or let fresh air in. Alarms are cheap and easy to fit. Then a regular test is all it takes to protect you and your family.

and housing associations are generating their own energy, a trend set to continue as new local projects take the place of our old, landmark power stations.

How this develops, and how we should manage different technologies on the grid, is a challenge that's coming.

But, whatever the solution, it won't all be done in control-rooms – more power will be in our pockets. Already you can switch your heating on, or turn the thermostat down, from your phone. The increasing use of apps and new technology will soon make this commonplace and our relationship with energy easier, more accurate and more responsive

Nationally, the roll-out of smart meters will see a radical shift in how we all engage with, and manage, the energy we use. Smart will end estimated billing and allow customers to make the direct connection between what's on – and what it costs to run.

People power is being felt in the supply market, too. Around a quarter of a million bill-payers shop and switch supplier every month with almost 30 suppliers from which to choose.

But no five-year parliament is long enough to get a power station from drawing board to plug. Therefore, while change is always with us, our energy pathway must be sufficiently robust to last the lifespan of multiple parliaments.

I believe this requires partnership between industry and politicians and as well as a genuine conversation with customers about what we can bear to pay for the cost of energy security and environmental improvement.

I believe there is willingness on all sides but we urgently need to see the path we're taking. ●

For more information on Energy UK see www.energy-uk.org.uk

Home Heat Helpline

When winter looms some energy customers start worrying their bills will rise as the mercury falls. But help is on hand with the Home Heat Helpline. HHH is a free, impartial and confidential service for energy customers concerned about how to cut the costs of heating. It helps callers access support, make their homes snug and warm and provides a range of energy saving tips. If you, or anyone you know, is worried about staying warm this winter, call the Home Heat Helpline on 0800 33 66 99 – sometimes a friendly voice makes all the difference.

savills

The energy market matures

Subsidies are going away – and yet **Stuart Campbell** of Savills Energy feels positive about the future

First the good news: the sustainable energy industry is maturing. Now the bad news: the sustainable energy industry is maturing. This means, particularly given the economic backdrop against which it's happening, that we are moving into what might be described as a post-subsidy world. In other words if you want sustainable energy, nobody else is going to pay for it.

At Savills Energy we believe this is actually good news. It's worth considering why.

The old methodology was relatively straightforward. The focus was on generation: you would start with the notion that there were now subsidies available for "green" projects. Generating your own energy was seen as cash-positive; you'd be able to grow new business offshoots as a result. So you'd then have a look at the generation technologies available, whether solar, wind, ASHP or biomass.

The return on investment and business case would typically be easy to develop and you might have had an external developer like us ready to help with market contact to unlock the value of transactions.

Unfortunately – at first glance – the government has been financially up against it (technical term) since 2008. Finances have tightened and the generous subsidies intended to kick off the sustainable energy market are going away.

Note that phrase, though. The idea of the subsidies, which have been around

for many years, was always to get the industry going. A kick-starting resource should never have been taken for granted and shouldn't exist in perpetuity.

Time to mature

In other words, perhaps a little prematurely, the industry has been forced to grow up. The focus is changing from generation to saving energy in the built environment, and being smart about how you buy and use it – what we call energy optimisation. Enterprises need to get used to normal business rules for funding their sustainable energy activities, and this means taking a different approach. First you need an audit to establish what you already have. Larger enterprises amongst you will already have been busy ensuring you are ESOS compliant by the end of this year; MEEs compliance comes by April 2018, so properties cannot be re-let if rated F or G on EPCs. This actually offers a more sensible basis for going into sustainable energy than a subsidy.

Following this you need to look at the options on offer and for this you'll need the right partner. Starting at the start, Savills offers energy brokering – just finding the right deal, buying smarter; we can then make sure your building is as energy efficient as possible by utilising new technologies (LED lights etc). Maybe you can get paid to turn certain bits of kit off at times of stress on the national grid, all designed around the right funding approach for you.

This is non-trivial work and it's essential to make a business case as lean as possible. Property and facility managers should recognise the pattern – it's a sign of energy and buildings following the same rules as any other business asset. Funding too is normalising. Instead of assuming someone else will subsidise a project there are other options: Energy Savings Performance Contracts can be funded or part funded from savings made during the sustainable energy installation, making them cost neutral. Finance houses and high net worth individuals are getting involved in funding projects. It's just like any other element of your organisation – it follows the same rules.

Savills has been at the forefront of this move to energy optimisation. The first and most important step is that audit, to ascertain where you are and what needs to be done. We can help with that and have contacts to deliver all the recommendations made in the audit report.

It said at the beginning of this article that this is actually good news. We meant it. "Sustainable" energy has to mean financially as well as ecologically. The economy has forced the industry to grow up and find genuine sustainability. Armed with the right partner and network, it is now possible to design, fund and invest properly in a long-term energy plan.

And it's not artificial. ●

For further information see
www.savills.co.uk/energy-optimisation



Onshore wind – let the market decide

The general election has left us with a series of sustainable initiatives but more is needed, says **Michael Parker**, head of onshore wind, RWE Innogy UK

In the wake of the general election, the government has announced a series of measures aimed at reducing the cost exposure of UK taxpayer support for the renewable industry. RWE Innogy UK strongly believes that the UK energy sector should deliver a competitive supply of energy at the lowest cost to consumers. On that basis, we strongly believe that increased onshore wind capacity is crucial.

Over the coming years and decades, as new energy infrastructure is needed to secure an affordable, steady domestic production of energy, the UK energy mix should remain just that. A mix of conventional and renewables such as wind are complementary, and will continue to provide energy side by side.

What we therefore need from government is:

- A commitment to using the mechanisms within the Energy Market Reform package to deliver the cheapest mix of energy generation for consumers, consistent with the UK's emission reduction commitments
- A separation between planning decisions and energy policymaking to ensure that communities can decide whether any form of energy generation is built in their area
- A commitment to acknowledge the part

that onshore wind has to play in the current and future energy mix

- A clear assessment, in consultation with industry, of the capacity gap post-2020 and the amount of low carbon generation that is likely to be needed to fill the gap and ensure security of supply
- A commitment to transparency around the overall impact of renewables on consumer bills, taking into account not only the public support for renewables, but the effect they have had in reducing wholesale energy prices.

We are committed to a
secure UK market driven
by competition

RWE Innogy UK is committed to the development of a secure UK energy market – driven by competition – which delivers value for UK consumers and for taxpayers. We believe increasing efficiencies and competition in the UK market can support the government's deficit reduction objective while delivering the energy security needed by the UK.

Onshore wind is price competitive. Independent analysis shows that on a levelised cost of energy basis (cost of

energy over lifetime of a power plant), it now costs the same to build new onshore wind capability as to build gas power stations, and onshore wind is considerably cheaper than new nuclear.

As our ageing infrastructure is retiring, the UK needs to build more capacity to fill the gap being created and ensure the lights remain on. New generation capacity must be built at the lowest cost possible to consumers.

A modern wind turbine produces electricity 70 to 85 per cent of the time, and independent experts' reports, such as that by the Royal Academy of Engineering, estimates that we won't need any extra backup specifically for wind until we hit 50GW of wind capacity – nearly five times the current level. During Q2, 2015, renewables generated 25.3 per cent of UK electricity, 42 per cent of which came from onshore and offshore wind. In total, wind generated 10.7 per cent of the country's needs.

To fill the capacity gap using the cheapest form of generation, onshore wind can have a crucial role to play and will help the government to avoid using taxpayers' money to subsidise higher consumer bills. ●

For further information on RWE Innogy see www.rweinnogy.com/uk



Energy policy needs continuity

Professor Jim Skea CBE FRSA FEI, Energy Institute president, and co-chair of the IPCC's Working Group III, explains what the energy sector needs to see from UK government

Six months on from the general election, we still await the much anticipated “reset” in energy policy. No doubt it will come, but only after the Chancellor’s spending review, due at the end of November. This will define the space within which the Department of Energy and Climate Change can juggle its triple goals of affordability, energy security and carbon reduction.

Earlier this year, the Energy Institute (EI) called upon its members to share their specialist insights into the energy industry’s current and future challenges, and how the industry and policymakers can effect change. This resulted in the first Energy Barometer report, published in June, in which they outlined their thoughts about the government’s role.

The need for policy continuity was one of the strongest messages coming out of the survey. It is seen as essential in reducing investment risk and encouraging a long-term view, while promoting better use of existing technology and incentivising innovation.

EI members believe that the current complexities of the energy system, driven by competing priorities, necessitate clearly communicated policies that are consistent over time and with each other.

Greater levels of investment are needed across all technologies and sectors to enable security of supply and the transition to a low carbon energy system. The positive part of the “reset” is the chance to de-clutter an unnecessarily complex policy landscape. Layers of policies that overlap, interact with and contradict each other have accumulated, and a spring-cleaning of the policy cupboard is long overdue.

The policy landscape has become unnecessarily cluttered

Some of the recent announcements make eminent sense in terms of good governance. A good example is HM Treasury’s review of business energy taxes. The consultation document chips away at the complexity of the current system, with a view to delivering a simpler and more stable environment for business that will reduce administrative costs and increase incentives to invest in energy efficiency. A clear, thought-through framework is needed to deliver a robust and enduring energy policy. This is an encouraging first step.

The other pressing need in the “reset” is for the government to articulate the overall aims and philosophy of its energy policy. Whether intended or not, investors across the energy industry have been left confused about overall intentions and in a number of cases have drawn their own conclusions by withdrawing investment plans. For example, what is the approach to local energy decision-making – does central government have the last word on areas such as shale gas or are decisions deferred to local communities, as in the example of onshore wind?

We reset computers using Ctrl-Alt-Delete. We got the energy policy “delete” in June – now the Ctrl-Alt is eagerly awaited.

The EI Energy Barometer surveys energy professionals on an annual basis to identify priorities and trends, and monitor progress over time. When we go back to members for their views in early 2016, they will be able to provide their feedback on how the new government has performed in its first nine months since the elections – this promises to make for interesting reading. ●

To access the Energy Barometer 2015 report, go to www.energyinst.org/energy-barometer



The fate of UK renewable energy

The government has done a lot of work on renewables – but has it started moving in the wrong direction, wonders **John Findlay**, managing director of Carbon Zero Consulting Ltd, a leading provider of independent design advice on renewable heating technologies

The UK's commitment to replace coal power generation (and later, gas) with low carbon power from nuclear and renewable sources will not only reduce CO₂ emissions but also improve security of supply, generate jobs and end our reliance on fossil fuel. Policy to reach these goals has been, for more than 20 years, rudderless. The new government has picked up the baton with gusto and is now reaching new heights of chaos.

Progress has been made with the installation of onshore and offshore wind arrays, solar "farms" and a splash of hydro-electric. In the right conditions these generate more than 15 per cent of the UK's power with corresponding reduction of "carbon intensity" of our electricity supply. However, we sit shamefully toward the bottom of the European league table for renewable energy deployment. It is often heard that wind turbines "only work when its windy". The UK sits in a windy ocean allowing offshore turbines to generate 40 per cent of the time. Furthermore the potential for domestically engineered tidal power is untapped – and enormous. Tidal energy is always available, zero carbon, secure, predictable and has no waste product.

Since the May election, the Department of Energy and Climate Change has turned towards gas. We are told that coal will be replaced by gas (which has about half the carbon output of coal) from do-

mestic gas resources, imports – and shale gas. This will allow the DECC to claim a reduction of CO₂ output, albeit through replacing one fossil fuel with another. UK shale gas is an entirely unproven resource and highly dubious economically due, amongst many constraints, to greater geological complexity compared to the United States.

Nuclear power, a British invention remember, must be a major part of our future (zero carbon) power supply. For the Chancellor to claim we are "leading the way in nuclear power" is a little disingenuous if you consider we are financially guaranteeing the Chinese and French to design, build and operate new reactors. As a chartered engineer, I and many others are aggrieved that he seemingly cannot trust his own engineers to provide nuclear, tidal or other sustainable power sources given the same degree of financial backing.

A stated intention of predecessor governments was to utilise low carbon electricity to provide heat (and cooling) to the majority of domestic and commercial properties, using heat pumps. This is without doubt the most efficient means to do so. These use the ground or the air as their renewable source of energy with input from (low-carbon) electricity.

A criticism of renewable heat and power technologies is their need for subsidy to incentivise uptake. It is not widely known, and certainly not broadcast by

government, that nuclear and fossil fuel technologies are subsidised to a massively higher degree than renewables ever could be. The entire renewable heat incentive (RHI) budget accounts for less than 1 per cent of the DECC's spending, with the remainder consumed by nuclear decommissioning costs. Oil and gas production receives huge tax incentives – a subsidy by any other name, £6bn in 2015 alone.

In the face of the Paris climate conference and ever growing global awareness of the need to reduce CO₂ emissions, the DECC and the Treasury are moving in entirely the opposite direction. Their recent moves include cessation of onshore wind and sustainability measures, huge cuts to feed-in-tariffs (FIT), potential cuts to the RHI – and now subsidies worth millions are being granted to polluting diesel electricity generators . . . You really could not make it up.

The recent "anti-renewable" stance by the government puts at risk the nascent renewable technology sector before it has had a chance to become established. So shouldn't we be asking why we are importing gas from Qatar and Russia, and expertise from France and China, when we have all the engineers and natural resources we need to provide our own sustainable heat and power? ●

For more information go to www.carbonzero.co.com or call 0844 855 0115

centrica

Two decades of policy: what's changing?

Iain Conn, chief executive of Centrica plc reflects on 20 years of energy development and the way forward

It is 20 years since the first Conference of the Parties of the UNFCCC in 1995. In this era of widespread “climate change awareness” what have we done, and what have we learned?

The first ten years was a period of visioning, but without material action. We were coming to terms with the potential realities of anthropogenic climate change and attempting to set expectations for mankind’s response. Such awareness was building, but commitment was not globally uniform.

The last ten years have been about experimentation at scale to balance energy security, affordability and stabilise climate change. It has not all gone well, but is mankind better off for it? In my view undoubtedly yes – largely because we have learned a great deal, energy and GDP are now diverging, as are CO₂ emissions and energy.

Globally we spend an estimated \$7trn annually on energy, or approximately 10 per cent of global GDP. The energy system is huge, and does not naturally change quickly. It is possible for governments to force change at pace through directives and regulation. However, it is expensive to try to move the energy system without waiting for the efficiencies which come from harnessing the forces of markets, technology and innovation. It is also regressive and extremely painful for consumers if such expense is recouped through energy bills rather than general taxation.

The next ten years must be about

learning from this and taking material pragmatic action.

What are the positive things we have learned? We have learned that for material and practical change there are natural pathways which we need to pursue. In “heat and power” it involves energy efficiency, natural gas, nuclear where it is politically supported, and the development of cost-competitive renewables at an appropriate pace.

In “transport” the pathway involves energy efficiency, downsized internal combustion engines, hybridisation and

There are two untapped forces: governments and the customer

some biofuels, and the development of electric vehicles at a pace which allows for decarbonisation of electricity production.

We have also learned that the UNFCCC process is slow – perhaps the “slowest common denominator”. However, COP21 will be significant because of the shift from a “top-down” to a “bottom-up” process, with most countries making commitments. We will still be far short of the 2° centigrade stabilisation pathway, but the body of commitment to action will have passed the tipping point. This is very encouraging.

So what more is needed? There are two major untapped forces. The first is the power of governments fully internalising what we have learned, and driving policy individually and collectively in line with the pathways outlined above.

The markets are not yet capable of driving change on their own. Governments will have to continue to make interventions and influence the mix. The missing ingredient is an alignment of philosophy between governments to pursue these material and pragmatic pathways as we evolve the energy supply and distribution mix while progressing towards an economy-wide price of CO₂.

The second untapped force is the power of the customer to influence demand and change the energy mix. The convergence of economic distributed generation technologies for businesses and homes, the ability to control patterns of energy use and the insights we can now extract from large volumes of data are enabling customers to take control of their energy use, driving efficiency and lower carbon choices into a more decentralised energy system. These trends are global – taking place in both mature and growth markets.

This second force is the one I am most optimistic about. It is happening.

These two forces together, with the continuing march of technology and innovation, will set us on the right path. ●

For more information on Centrica see www.centrica.com

Why we need the nuclear option

A generation ago the nuclear industry was the bad guy but now it is a source of sustainable energy and we need to take it seriously, says **Kirsty Gogan** from Energy for Humanity

It was surely no accident that on the same day that President Barack Obama said “no” to the hugely controversial Keystone Pipeline, and just weeks before the Paris climate summit, he said “yes” to nuclear energy.

Obama’s rejection of the Keystone XL oil pipeline ends a seven-year saga, with a declaration that the project is “not in the national interest and would undercut US global leadership in the fight against climate change”. The White House said the rejection was vital to bolstering credibility as the US urges other nations to confront climate change. In the final weeks building up to the conference, the rejection sends a diplomatic message as the Obama administration works towards a global climate agreement.

Political leadership of this kind is critical, given that average global temperatures have risen by 1°C since the Industrial Revolution. Paris is supposed to ensure that warming does not exceed 2°C, even though the existing pledges made so far will amount to between 3°C and 4°C of warming by 2100, depending on your level of optimism or pessimism. Scientists

say that beyond the 2°C threshold, severe and irreversible changes are likely. Whatever you think about arbitrary thresholds, going beyond 2°C looks nothing short of disaster on a heart-breaking scale.

In some cases, it is enough to make one change one’s mind. The climate scientist Ken Caldeira, speaking at the White House, confessed that he had once been arrested while protesting against New York State’s Shoreham nuclear facility, but changed his mind about nuclear power after studying climate science.

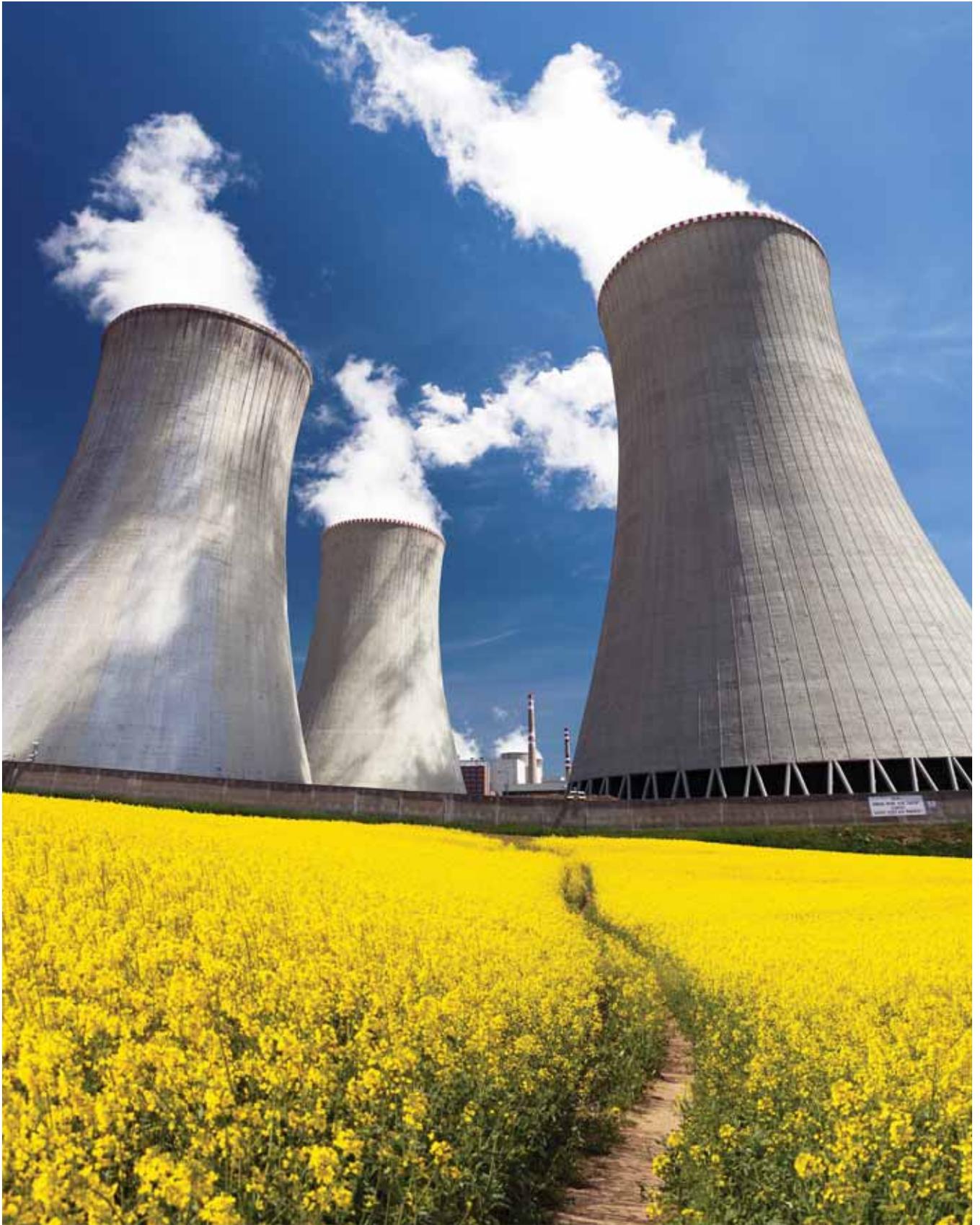
Along with other leading scientists who pioneered the study of climate change, he is calling on environmental campaigners to drop their long-held opposition to nuclear and look again, as he did, at the facts, and recognise “nuclear power as one of the very few technologies that can provide high-density power in an environmentally acceptable way”.

An irrefutable mountain of evidence is forming that keeping average global temperatures below the additional 2°C will be very difficult, but that this goal is unrealistic without a significant expansion of nuclear energy generation.

And yet, since 2001, when the wording was agreed at the sixth meeting of the Conference of the Parties to the Rotterdam Convention, known as the Bonn Agreement, nuclear energy has been explicitly excluded from climate mitigation strategies, and nuclear projects have been banned from receiving financial assistance from the climate pact’s development mechanisms.

Were this wording to remain intact, it would not only contradict Obama’s and the Environmental Protection Agency’s Clean Power Plan, but also undermine climate pledges (INDCs) submitted by countries including China, India and Japan. It would prevent developed nations from counting the emissions reductions of nuclear plants constructed after 1997 towards their carbon target. It is likely that a technology-neutral deal focused on carbon reduction will be the outcome.

However, although the battle may have been won, the war has not. The devil will be in the detail, with anti-nuclear NGOs embedded in UNFCCC technical meetings, where nuclear could still easily be locked out and excluded from finance ►



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Carbon-free production of nuclear power is the ideal solution to the world's burgeoning energy demands

► mechanisms, greatly increasing the risk that our fight against climate change will ultimately fail.

Caldeira, together with James Hansen, Tom Wigley and Kerry Emanuel, will host a press conference in Paris on 3 December to appeal to environmental leaders who still hold anti-nuclear positions to support development and deployment of safe and environmentally friendly nuclear power instead. For example, the Climate Action Network, which represents all the leading environmental groups, still insists, despite all evidence to the contrary, that “nuclear has no role to play in a fully decarbonised power sector”. The four pioneers of climate science will state that the anti-nuclear position of these environmental leaders is, in fact, “causing unnecessary and severe harm to the environment and to the future of young people”.

At present, the majority of environmentalists seriously underestimate the full scale of the challenge, insisting that decarbonisation can be achieved entirely by accelerating the deployment of renewable energy (particularly wind and solar power), coupled with marked improvements in energy efficiency. Nuclear energy, they say, is just not necessary to tackle climate change effectively.

It is tempting to think that we could reduce our carbon emissions by saving energy. But electricity consumption is forecast not only to grow, but double by mid-century, and we hope that it will.

Today, half of the world’s population lacks access to electricity, but quite rightly aspires to energy-rich lives, not only for household use, but also for the modern energy services that so many of us rely on – including water sanitation, refrigeration, industry and streetlights. Nearly three billion people cook over open fires fuelled by wood, dung, coal or charcoal. The health consequences are severe: every year, indoor air pollution causes two million premature deaths, a million cases of chronic lung disease, and half of all of pneumonia deaths among children under the age of five.

There is a perceived conflict between expanding global energy access and preventing climate change. The solution to solving both of these challenges has come to indicate small-scale, decentralised, renewable energy technologies.

The UN’s flagship energy access programme, for instance, claims that “basic human needs” can be met with enough

electricity to power a fan, a couple of light bulbs and a radio for five hours a day. Now, while there is undoubtedly an enormous difference between having no electricity at all and having enough for a light bulb and a radio, surely it is morally indefensible, not to mention highly unrealistic, to base our climate mitigation strategies on an assumption that poor people will remain poor.

First of all, this is not our decision to make. Access to electricity is the absolute bedrock of development and progress, and we should both anticipate and strongly support the poorest people in the world in achieving it.

And while there is rightly an emphasis on extreme poverty reduction, we should not forget the new middle classes, particularly in China and India, but also elsewhere, including Africa.

An important test in Paris will be whether the current widespread institutional, ideological insistence on investing time and effort in exploring renewables-only pathways will be abandoned in favour of a technology-neutral deal that

Electricity consumption is forecast not just to grow, but to double

reflects the urgency and scale of the challenge we face. The climate emergency demands a combined strategy of nuclear and renewables that can deliver the best outcomes at the lowest cost, with priority given to lifting billions of people out of grinding poverty so as to achieve modern standards of quality of life.

Not only is a renewables-only future a gamble with our climate but also, for a high-energy planet, it looks surprisingly high-impact, with ever-greater areas of land being taken to provide energy. Consider the devastating environmental and social consequences of the proposed expansion of hydroelectricity and biomass on the wider environment. Weirdly, insisting on 100 per cent renewable electricity appears diametrically opposed to a genuinely environmental vision for our planet where land is spared for nature; where forests and biodiversity habitats are protected; and where priority is given to social justice and dignity for all people.

On the other hand, nuclear has surprisingly green credentials as an extremely

dense source of power with a tiny land footprint. That is one reason why more than 75 eminent conservation biologists from around the world recently wrote a letter to environmental leaders calling on them to consider nuclear a green technology. No other zero-carbon energy source has scaled faster than nuclear power, as seen in France and Sweden, two of only six countries in the world so far to have decarbonised their electricity supply successfully (the others being Brazil, Iceland, Norway and Switzerland) through a combination of nuclear and renewables.

Many people do not know that nuclear energy is similar in its life-cycle emissions to wind and is considerably cleaner than solar. And, just in case of any doubt: yes, including mining and waste disposal. In terms of safety, more people die from fossil fuels in China in three days than have died in all civil nuclear accidents ever combined. According to major studies, nuclear power is one of the safest ways to produce energy – ironically, considering its reputation as the most dangerous.

In the UK, the first new nuclear plant is having a difficult labour. Once built and operating, Hinkley C alone will generate 7 per cent of the UK’s total electricity, probably for a hundred years, and it will save nine million tonnes of carbon-dioxide emissions every year if replacing gas (twice as much if replacing coal). For these reasons, I want to see the Hinkley plant built. But boy, is it expensive.

The last count was £24bn, up from £16bn last year, due to a complex mess of financing, technical and project management woes. Nevertheless, even the eye-wateringly expensive Hinkley is likely to end up being good value per MWh compared to every other form of low-carbon energy generation, with the exception of onshore wind (even more so, once systems costs are taken into account). It will open the door to a new generation of young engineers reinventing nuclear.

People such as Leslie Dewan, the chief executive and co-founder of the Boston-based Transatomic Power, are developing new reactor designs that promise great improvements over conventional nuclear power. These are simpler, safer reactors that can be mass-produced in order to compete with coal. They use existing nuclear waste as fuel and have built-in proliferation resistance.

As an environmentalist, Dewan is motivated to transform nuclear power to



The new Hinkley Point C plant may show the way forward

help solve big global challenges. The reactor will be designed to generate power from nuclear waste, she says, transforming what is now a significant liability into a highly valuable resource.

Such fast reactors can burn more than 90 per cent of their uranium fuel, against less than 1 per cent extracted by conventional nuclear systems. Fast reactors also produce waste, but in much smaller volumes than conventional (slow) reactors. And, more importantly, the radioactivity becomes inconsequential within a few hundred, rather than ten thousand years.

Disposing of existing nuclear waste in next-generation fast reactors could generate enough electricity to power the whole world for about seventy years. Not only this, but if fast reactors were used to dispose of nuclear weapons, we could power the world for centuries. Amazingly, for the past two decades, former Russian warheads have already generated 10 per cent of US electricity, a perfect example of turning swords into ploughshares.

Advanced nuclear energy can fundamentally address many concerns – safety, waste, proliferation and cost – but also align with our values and aspirations for our clean-energy future. This is our goal with Energy for Humanity: to mobilise and bring into the mainstream a new, pragmatic and ambitious vision for energy, led by sound humanitarian and

environmental values, working within a growing global movement.

In terms of the speed with which this can happen, the next generation will take time, but existing designs have been shown to deliver high volumes of carbon-free electricity in relevant time frames. As research by Professors Barry Brook and Staffan Qvist has shown, Sweden provides a historical benchmark “best-case scenario” on which to judge the potential for nuclear expansion. If the world as a whole were to follow their example, all fossil-fuel-fired power plants could be replaced within a little over 30 years.

The price of nuclear electricity in Sweden has always included a surcharge corresponding to the full estimated costs of researching, building and operating a final repository for all nuclear waste. At the end of the nuclear expansion period, Swedish electricity prices (including taxes and surcharges) were among the lowest in the world, and the running cost of the nuclear plants (per kilowatt hour produced) was lower than for all other sources, except existing hydropower installations.

It is for these reasons that nuclear must be acknowledged as a proven, scalable strategy for carbon reduction and included in the December negotiations in Paris.

A critical test at the conference will be whether the current widespread institutional, ideological insistence on investing

time and effort in exploring renewables-only pathways will be abandoned in favour of a technology-neutral deal that reflects the urgency and scale of the challenge we face. The climate emergency demands a combined strategy of nuclear and renewables that can deliver the best outcomes at the lowest cost, with priority given to lifting billions of people out of poverty to achieve the quality of life that we take for granted.

Sending a strong message to those at the climate-change conference that nuclear must be treated equally with comparable low-carbon sources such as solar, wind and hydro is imperative. We are at a watershed moment in protecting the Earth’s climate. The world needs all low-carbon energy sources to prosper and we need to give developing nations a chance to provide electricity to their citizens. Let’s make sure that nuclear technology is available as part of the climate solution.

As a lifelong environmentalist, I haven’t always been pro-nuclear. I changed my mind, and I am not alone. Many people are now taking a fresh look at nuclear energy. For the sake of the Earth’s future, please research the subject for yourselves and look at the credible evidence out there. If you really care about climate change, you should care about the facts. ●

Kirsty Gogan is the co-founder and director of Energy for Humanity



A strategic solution for Europe

Northern Ireland is facing energy difficulties alongside the rest of the UK. **Guy Clapperton** explains a specific initiative that uses a new technology, CAES

The United Kingdom's ageing fleet of old and polluting generation plants is causing alarm as National Grid issues warnings of a "shortfall" in reserve capacity. Northern Ireland is also facing into the equally daunting prospect of having insufficient generation reserves and the prospect of severe consequences for energy users by the end of the decade. However, solutions to the generation dilemma need to be about more than "keeping the lights on" by replacing the current ageing fleet with more fossil-fuelled or nuclear-powered generation. Large scale bulk energy storage should play a significant role in providing much needed reserves and a more efficient and environmentally sustainable energy system.

Irish renewable energy group, Gaelectric, is planning the rollout of a pipeline of bulk energy storage projects across the UK and on to the European mainland, using a technology known as Compressed Air Energy Storage, or CAES. In addition to storing energy produced from wind farms and other sources of generation, this technology is being designed to help transmission system operators better manage the power systems of the future, when the electricity industry will no longer be dominated by the monoliths of the past and high penetrations of renewable sources of energy will be the norm.

Keith McGrane, head of Gaelectric Energy Storage, comes to the power industry from a background in physics

and banking. For the past eight years he has been leading the development of an energy storage project located on Northern Ireland's east coast, near the port town of Larne.

Responding to the two obvious questions that most people ask: "Why compressed air energy storage?" and "Why Larne?" he says: "Compressed Air Energy Storage involves storing energy as air, compressed to very high pressures in caverns that have been created specifically for this purpose within salt deposits deep underground. When power is needed, this high pressure air is released up to the surface to drive turbines that generate electricity.

"The only place with salt deposits suitable for CAES on the island of Ireland is on the east Antrim coast, near the port town of Larne. However, there are well known salt deposits elsewhere in the United Kingdom that may also be suitable for CAES. It also happens that Northern Ireland has a lot of wind energy already connected to their transmission grid. Energy produced from wind and solar can be variable and intermittent, which presents challenges to system operators to accommodate particularly when the connected levels reach 30 per cent to 40 per cent. Northern Ireland shares a common target with the rest of the island to generate 40 per cent of electricity demand from renewables by 2020."

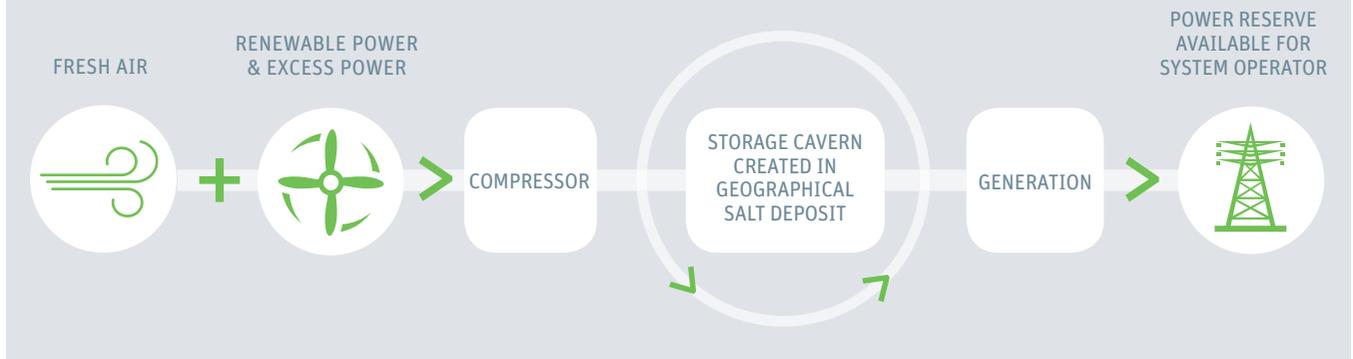
He says: "The area around Larne and

the Islandmagee Peninsula to the south, are also on the coast with access to the open sea. Sea water is used in a process called solution mining to create the caverns needed for CAES within a salt layer located at approximately 1,400m below ground level. The CAES station itself is located immediately above these caverns and comprises compressors, electricity generation equipment, pipelines to the coast for sea water and normal connections to the electricity and gas networks."

The Larne CAES project has been designed to generate up to 330MW of power for periods of up to six hours duration. In addition to storing power and making this available to system operators when called upon, the project will also provide a range of other services, including variability balancing and quick response generation, to help system operators manage the transmission system, particularly as more variable renewable energy sources become connected.

"The transition from over-reliance on fossil fuels to a future where renewable sources of power are commonplace and can be easily integrated using knowhow and the type of services that CAES can provide is inevitable," McGrane says. "System operators across the UK and Europe recognise this and are looking for solutions including the type of large-scale bulk energy storage that CAES provides. With this in mind we are developing the Larne CAES project with a 'lift and shift'

HOW CAES WORKS



approach, so that it can be easily replicated at other locations in the UK and within Europe wherever there are geological salt deposits suitable for CAES.”

A new category of energy infrastructure

Large scale storage is treated the same as generation for planning and regulatory purposes. But McGrane says this is incorrect: “Storage is not generation, and it is not transmission, it is storage. It is important that storage solutions such as CAES become available quickly. The current market regulatory arrangements and planning system do not facilitate this. Energy storage needs to be viewed as a new category of energy infrastructure. It should not be charged on the double for generation and transmission as these costs have already been borne by the energy it is storing.

“Storage solutions also help system operators manage and run power systems more efficiently and in this way limit the extent of transmission and distribution infrastructure that is needed. These and the other benefits that accrue from storage infrastructure need to be recognised in market mechanisms that reward storage infrastructure for both the generation and the system services it provides.”

CAES technology has been around for some time. Two plants have been operating for several decades, one in Germany and one Alabama in the United States, while more are planned in the US. How-

ever, Gaelectric’s Northern Ireland project is the first CAES plant worldwide designed specifically to support the integration of renewable energy within modern electricity transmission systems.

Gaelectric is partnering with Dresser-Rand, the leading provider of compression technology to the oil and gas sector, in developing the compression technology for the project. Dresser-Rand has itself been acquired by Siemens, the German firm which is synonymous with the power industry.

Gaelectric is already progressing projects in the UK, and in the Netherlands with local partners AkzoNobel and Gasunie.

A European Project of Common Interest

The security and sustainability of Europe’s energy supplies have been identified by the European Union as key priorities. A support mechanism has been developed to accelerate the delivery of major energy infrastructure in Europe. These projects normally have beneficial impacts on more than one member state and are known as Projects of Common Interest. In 2013, the Larne CAES project was designated as a European Project of Common Interest. Earlier this year, it was recommended for EU grant funding under the Connecting Europe Facility, recognising that “The PCI (Project) would contribute to market integration, renewable energy input and system security in

both Ireland and the UK (Northern Ireland) . . . The project is technologically innovative and has the potential to be replicated in other parts of the EU with suitable geological conditions.”

Energy prices in Northern Ireland and within the Single Electricity Market on the island of Ireland are among the highest in the EU and well above those in the rest of the United Kingdom.

This is threatening jobs and investment. Recent announcements of job losses, including the loss of more than 800 jobs at Michelin tyres in Northern Ireland, have been laid at the door of high energy costs. Energy prices have the potential to stabilise, becoming less volatile and more secure as more renewables become connected and are accommodated by system operators using new tools and system services provided by technologies such as CAES.

“We are confident that the Larne CAES project will provide an important solution to integrating more renewables on to energy systems in Northern Ireland and across the United Kingdom and Europe,” McGrane says. “It will enhance the management of transmission systems by addressing imbalances between supply and demand. This will result in lower system-wide electricity production costs and reduced electricity costs and prices for households and businesses.” ●

For more information go to www.gaelectric.ie



Finding the route to the future

Has wind found the right route to market? **Keith Patterson**, head of renewables at Brodies LLP, asks the question

The UK government's shift in policy on renewables has been tumultuous. Decried as the "bonfire of the policies" by Renewables UK, some in the sector have said that subsidy cuts will discourage investment and ultimately threaten the sector's future viability, while others have argued that they are necessary to protect consumers and keep energy bills down.

At the time of writing we are still in the dark on some key decisions that will shape the renewables industry in the future. Nevertheless, it is imperative that we look to identify the principal challenges faced by the sector, and what future government policies could be introduced to alleviate them.

Independent generators, especially those operating on a smaller scale, are probably the most at risk. They need to access project financing to fund their developments, and the most fundamental requirement of the funding market is being able to identify levels of predictable revenue. These are often called the floor revenues in developers' models, and in Renewables Obligation (RO) projects these comprise a combination of Power Purchase Agreements (PPA) and RO payments. In projects supported by a Contract for Difference (CfD), the CfD approximates to a "price guarantee". In the absence of both, or any other form of financial support, it will be hard for funders to identify sufficient floor revenues to justify an investment or lending decision.

The recent shift in policy has served

to highlight the impact that government policy can have on the energy market in this country. As a consequence it is also becoming clearer to investors that any investment decisions in the energy sector require some form of support from government, in order to mitigate the risk of future policies undermining the basis on which the investment was made. This, coupled with market prices at between £40 and £50 per MWh, make unsupported investments a remote prospect.

So, is our current approach to energy supply sustainable? New generation capacity is needed and the UK government will, in some shape or form, have to provide support for the necessary investment. The government is, of course, keen to promote new nuclear, at a rate far higher than onshore wind or solar, and is relying on the delivery of Hinkley Point by 2025 to meet electricity demand. Presently there is no certainty the technology can be even successfully operated, and as it will account for 7 per cent of electricity demand, what happens if it is not commissioned or commissioned late?

Onshore wind and solar will remain the most cost-effective renewables for the foreseeable future. Experience from other countries demonstrates that renewables are able to contribute effectively to the supply of power to the grid, and that intermittency is manageable at higher levels of renewables penetration than is currently the case in the UK.

While the government's shift in policy points to a hiatus in the deployment of

onshore wind, in the longer run it is likely that the government will seek to support some further onshore wind deployment. How could this be achieved?

The CfD mechanism could easily be adapted without primary legislation. The UK government could, for instance, set a ceiling price at a low level and see if anyone bids at that price in a new CfD round. Given current prices, money may be needed in the early years but it may be that over the life of the CfD it would be budget neutral. Even at such a level, a CfD would still provide valuable financial support in the form of those essential floor revenues for the funders' analysis.

This is, of course, similar to the route to market used today. We could see new developments on the route to market, such as the CfD (or a successor instrument) allowing such routes to be adapted. The new world of renewables may encourage generators to exploit the fact that PPA covenants may not be as important. Equally, there may be scope to use licensed supplier or licence-lite routes to take power directly to its user. We may even begin to see the development of more "mini utilities" or vertically integrated businesses.

While the UK government's policy direction has certainly attracted criticism in some quarters, it will may nudge the industry into developing new models and routes to market that could yet breathe new life into this hugely valuable sector. ●

For further information see www.brodies.com



Maximising the assets

With the right approach, the value of wind investments will rise, says **Neil Douglas**, director of asset management at Natural Power

As the renewables industry is undoubtedly maturing and government policy in the UK and across the world shifts in response, we see a number of conditions driving down cost – Contracts for Difference in the UK, subsidy reduction, competition from other energy technologies and a global drive towards grid cost parity.

Last year the wind industry set a new record for annual installations. Globally, more than 51GW of wind generating capacity was added, according to statistics from the Global Wind Energy Council (GWEC). This figure represents a 44 per cent increase in the annual market.

With more modest financial yields forecast and a change in asset ownership structures, especially with the increased involvement of pension and infrastructure funds in the wind power sector, it is simply not enough to deliver against performance based purely on availability any more. There comes the requirement for a much more pro-active approach to operational wind farm management that takes all its complexities on board. In doing so, the industry will be able to drive optimisation to meet the needs and demands of more sophisticated owners and the need to really drive performance optimisation.

We must use our increased knowledge and understanding, together with improvements in technology and innovation, to maximise the future value of our

windfarm assets by thinking smart. By demanding a higher level of information, we can begin to realise the 1 to 2 per cent increases across a portfolio that the new world investment desires.

Furthermore, by improving our ability to interpret this data and by having the opportunity to intervene at the right time, we are able to deliver the potentially game changing, knowledge-based, predictive management of wind farms that ensures that the assets we already have are optimised for maximum efficiency and output.

Constant monitoring leads to better management of costs

Undoubtedly the best way to achieve these desired improvements is by focusing on the core areas in operations where a gain (or saving) can be made. Looking for the low hanging fruit is the obvious place to start and is crucial for maintaining the overall reliability and performance as standard. It is self-evident that constant monitoring leads to better management of costs, and will drive strategy in addressing the technical issues.

Only once a solid baseline is established should you then turn your attention towards the marginal gains across your port-

folio to boost your assets' performance further. Many asset owners are now taking a longer term view of performance, so investment in technologies, such as Lidar, to monitor wind speed and flow conditions, or turbine upgrades such as aerodynamic modifications, are crucial in this process.

To ensure the industry is able to stand on its own two feet, it is continually incumbent upon us to innovate and find new ways to improve this proactive management approach. This will ensure maximum returns for investors, and the logical outcome of this is ultimately to drive down the cost for consumers.

Today's asset management challenges often stem from the complexity of the sites involved, variations in technology and the data available (plus the analytics needed to make the most of that data to support managers in making decisions). In this coming era, it will no longer be sufficient for wind asset owners to consider the basic requirements of site management, compliance and servicing. For client assets to retain and increase value in the evolving market, we will apply performance management and integrated systems, smarter interpretation of data, predictive maintenance programmes, and cost-of-energy led decision making, putting owners solidly in control and delivering a long-term, total asset management solution. ●

For more information go to
www.naturalpower.com

Putting policy into perspective

Energy diplomacy offers an unprecedented opportunity for the UK to lead the world. By **Murray Simpson**

The UK has long enjoyed an international reputation for having a strong and well-balanced energy policy, but the government's current approach has come under greater scrutiny at home and abroad. The withdrawal of subsidies for wind and solar power attracted an inevitable backlash from the renewables industry, which was followed closely by the admission that the UK is unlikely to meet its mandatory 15 per cent renewable energy target in 2020. A mixture of environmental, political, economic and geopolitical factors is challenging the government to make difficult decisions.

The government's energy policy has also attracted international criticism. The World Energy Council (WEC) recently downgraded the UK's top-notch AAA rating for providing secure, affordable and sustainable electricity supplies to AAB, after an increase in the cost of power as a proportion of household budgets. This move preceded the subsidy cuts, but Joan MacNaughton, executive chair of the trilemma team at the WEC, has made it clear that the uncertainty over the renewables sector could push the UK down the league table from its current fourth place – behind Switzerland, Sweden and Norway.

Amber Rudd, the Secretary of State for Energy and Climate Change, has admitted in parliament that the UK doesn't have the right policies to meet the EU renewable energy targets for 2020 but has stressed her commitment to achieving this.

The challenge must be seen within a global context of growing energy demand that will lead to greater competition for more expensive resources. On 18 November, Secretary Rudd sent a strong signal by signing up the UK to phasing out coal-powered energy. Yet the big question remains whether the government will be able to build enough gas and nuclear plants to ensure continuity of our energy supply.

Moreover, the UK must play its role in international efforts to ensure sustainable solutions in order to mitigate the palpable risks of climate change. To put it bluntly, only a concerted global effort will save our planet from the effects of climate change and all future UK energy policy must take this into account. The forthcoming COP21 climate talks in Paris present an important opportunity for the UK to demonstrate global leadership in this regard on an unprecedented level.

Taking stock of our renewables sector

The media furore over the withdrawal of subsidies should not obscure the very real achievements of the UK's renewable sector. In its analysis of the health of the sector to 2014 and beyond, PricewaterhouseCoopers reported that from almost no investment before 2011, the UK has benefited from a small-scale solar revolution, with £5.7bn invested in just three years.

More recently, the Renewable Energy Review 2015, widely acknowledged as the most reliable source of data on the sector in Britain, reports that the private sector

has invested more than £1bn in renewable electricity, heating and transport fuels, growing the industry to more than 112,000 jobs and supplying the UK with 19.2 per cent of its power in 2014, 2.8 per cent of its heat in 2013 and 4.4 per cent of transport fuels in 2014.

Huge investment has been placed in renewable technologies to provide a more sustainable long-term solution. From biomass boilers and air-source heat pumps to solar thermal technology and photovoltaic set-ups, there is now a wide range of energy alternatives to alleviate demand on the National Grid.

Exporting home-grown talent and expertise

This investment has given the UK a new generation of highly skilled engineers, as well as biochemists, legal and financial-service providers, installers and construction workers, across the whole of Britain. Job creation is of course vital to our own economy but this home-grown expertise also represents a valuable global resource that must be put to good use.

It should not be forgotten that the private sector is still proving to be a rich source of investment in renewables. There are 25 crowdfunding platforms focusing on renewable energy in Europe alone, and many projects are fully funded within a matter of hours. Just a fortnight ago, we were at a busy conference on crowdfunding for renewable energy to raise cash for our solar nano-grids in Kenya. ►



SHUTTERSTOCK

The best approach to tackling energy policy and meeting demands for power considers these challenges globally

► While Rudd might maintain that buying renewable energy from other European countries is an option, any future energy policy should take into consideration that we have the skills and resources not only to deliver our own renewable energy, thereby creating jobs and contributing to GDP, but also to export energy and the associated technologies.

The UK's challenge for developing countries and emerging economies

The UK is extremely well placed to respond to the challenge for developing countries and emerging economies. To put it succinctly, these countries stand on the brink of enormous economic growth which will undoubtedly lead to an expansion of energy consumption.

The major advanced economies, and Europe in particular, have achieved declining energy demand despite economic growth. The critical question – and one that will be key to the success of the Paris climate talks – is whether developing economies can grow without a corresponding increase in carbon emissions.

This response is at the core of many of the preliminary diplomatic moves in the run-up to the conference, and there are many encouraging signs that renewable energy will be the main driving force in economic growth.

Fatih Birol, the executive director of the International Energy Agency (IEA), told a press conference in November that Africa could be the first region in the world to power its economic development with renewable energy rather than fossil fuels such as coal.

Birol said that the big push from governments to get electricity to the two out of three people in Africa who don't have access will help support this, as will falling costs of renewable energy. The price of solar panels fell by 75 per cent between 2009 and 2014, and the costs of producing energy from the sun continue to fall.

Innovative alternatives to expensive infrastructure projects

As mentioned, two out of three people in sub-Saharan Africa do not have access to electricity. However, the new UN Sustainable Development Goals have set a global ambition to secure reliable, modern, affordable and sustainable energy access for all within this generation.

As international development agencies, national governments, investors

and businesses collectively wrestle with how best to achieve this goal by 2030, and at the same time protect the planet from degradation, sustainably manage its natural resources and take urgent action on future generation, there is an opportunity to demonstrate the viability of innovative and sustainable new business and economic models.

The world is increasingly waking up to the fact that innovative off-grid projects can complement large-scale renewable energy projects, offering an effective – and cost-effective – alternative to large, expensive infrastructure projects in meeting the UN goals, given the stability and absorption issues in some countries.

At the country level, Kenya has ambitious development targets, articulated in the “Vision 2030 Strategy” released by the Kenyan government in 2007. One of the foundations of Vision 2030 centres around energy, because the government recognises that the planned development projects and goals for economic growth will increase demand on Kenya's energy supply. We are working with the Kenyan

The UK has the
opportunity to
contribute to change

government to make sure that climate change is an integral part of Vision 2030's programmes and policies.

Projects such as our solar nano-grids (SONGs) venture in Kenya are bringing power and new business opportunities to remote communities. By linking clusters of about 60 families in rural communities to small-scale, communal solar power systems that are also connected to agricultural use or an industrial application, solar energy is not only delivering power to households and communities, but helping to lift people out of poverty.

The project brings together an interdisciplinary team of practitioners, social scientists and engineers who are developing and enhancing the social, technical and economic merits of solar nano-grids in rural communities. It's a significant project that rests on working closely with developing countries and a detailed understanding of the energy uses and needs of households and communities. The project approach ensures that the technology used is cost-efficient compared to other

sources; community members' capacity is built to enhance the advantages of pooling their interests and ensure that the processes and delivery are properly suited to the communities' needs.

Malcolm McCulloch, who leads the energy and power group at Oxford University's Department of Engineering Science, is part of our team conducting the research, development and implementation of this international programme. As McCulloch points out, it's not about having either big or small-scale projects. Both have their own important role to play: the large-scale renewable energy projects help wean industrialised communities off fossil fuels and small-scale renewable energy projects democratise energy by uplifting rural communities that would otherwise be left behind.

Achieving a sustainable vision

If we are to achieve the world's vision of a sustainable planet, with better quality of life for greater numbers of our populations, we are going to need innovation on a scale that has never been seen before. There is no doubt in my mind that the skills, resources and commitment exist to deliver on this innovation, but it will require a realisation of mutual self-interest that will challenge our current business, development and economic models on every level.

Placed in this context, the challenges and achievements of the UK renewables sector look very different. To focus on the national agenda alone at this time would be narrow thinking indeed. Only by taking a broader view can the UK demonstrate that it is capable of making an impact on a global level and providing the visionary leadership that the world needs at this juncture in our history. Our future could depend on it.

It is to be hoped that the talks in Paris will provide a platform for the UK government to demonstrate a broader vision of its energy policy and leadership on the international stage.

With the eyes of the world upon it, the UK delegation has the opportunity to contribute to lasting change and renew international faith in our status as a world leader in energy policy. ●

Dr Murray Simpson is a senior visiting fellow in the Department of Engineering Science at the University of Oxford, and chief executive of the INTASAVE-CARIBSAVE Group



Less energy, more power

The UK energy market is on the verge of an “electric shock” and is having to undergo a fundamental transition towards decentralisation and efficiency, says **Jonathan Maxwell**, chief executive of Sustainable Development Capital LLP (SDCL)

Have we approached the “electric shock” moment for the energy market? Spare capacity on the UK electricity system is set to fall to 1.2 per cent this winter, the tightest in a decade according to National Grid. Electricity supply is insufficient to meet demand over the next five years as capacity is coming off line.

The electric shock seems to have happened on Wednesday 4 November, as an unexpected outage of power plants sent wholesale electricity prices soaring and prompted the grid operator to call for the first time ever for industry to reduce power. More than 10 per cent of Britain’s electricity needs at that crunch point came from supply that will no longer be available next year.

A large part of the problem is a centralised and inefficient energy system. We are wasting 60 per cent-plus of the energy we use in the UK when we take into account generation, transmission and distribution losses in the centralised energy system. We routinely waste another 25 to 30 per cent in end use in buildings.

On the supply side, the UK electricity system must transition from an inefficient centralised generation, transmission and distribution system to one in which the grid interacts with highly efficient, de-centralised, independent, resilient and clean energy production. Installed capacity of well-established and low cost distributed energy technologies such as combined heat and power and rooftop

solar PV will be crucial parts of the solution. Whereas the centralised energy system is over 60 per cent inefficient, good quality decentralised combined heat and power projects deliver more than 65 per cent efficiency through smart design and by using thermal and electrical generation on site.

On the demand side, energy efficiency, storage and demand response will all play key roles in a more efficient future. It is now widely accepted that energy efficiency is the most cost effective way of reducing greenhouse gas emissions and improving energy infrastructure, security and resilience. While renewable energy subsidies and market incentives for new supply capacity are being rolled back, the good news is that energy efficiency delivers its results on purely commercial terms. According to the International Energy Agency, energy efficiency is the most cost effective tool to reduce energy sector carbon emissions, accounting for more than 40 per cent of the required reductions to limit global warming to 2° Centigrade.

At the same time, energy efficiency offers enduring costs savings, improved profits and performance and benefits to the economy. Technologies employed are typically commercially proven and delivered by some of the world’s leading services and technology companies. For example, LED lights save 60 per cent plus energy and related costs, while other measures such as automated building

management systems, air conditioning and insulation deliver savings that cover the costs of implementation in three to five years. Building and infrastructure owners benefit from better financial performance, environmental performance and infrastructure performance.

SDCL manages four government-backed energy efficiency investment funds, in the UK, the United States, Singapore and the Republic of Ireland, and is developing its investment portfolio and business model internationally. Alongside four governments, SDCL has attracted a wide range of institutional investors. By combining equity investment capital with expertise, SDCL has developed a business and investment model which can remove the cost, risk and complexity associated with energy efficiency and decentralised energy projects. Clients benefit from cost savings, improved infrastructure and environmental performance. Investors benefit from attractive investment returns. Services and technology partners benefit from implementation and deployment at scale. The economy is benefiting from displacement of stress on the grid and scarce resources and a substantial reduction of waste and emissions.

The electric shock is a crucial opportunity to transition to decentralisation and efficiency and create more power – and heat – with less energy. ●

For more information see
www.sdcl-ib.com

Making sustainability sustainable

Everybody talks about it but many miss important points, as the philanthropist and author **Per Wimmer** explains to Guy Clapperton

Per Wimmer is a man on a mission. Actually he's a man on quite a few missions: a quick glance around the shelves of his London office shows you that he's keen on motorbikes, with a taste for Harley-Davidsons; an equally quick Google search confirms that he's in serious training to be an astronaut.

All this makes him a conspicuous consumer of fuel, assuming his ambitions bear fruit – which is no doubt partly why he is so passionate about sustainability; but he believes that many organisations and indeed countries miss the point. As the strapline of his new book, *The Green Bubble*, says: “For green energy to be truly sustainable it needs to be commercially sustainable.”

It's the commercial bit that many people overlook. He has witnessed many initiatives to make energy more sustainable and they have all been well-intentioned. Some have even lasted seven or eight years but then, as Wimmer puts it, “somebody gets tired”. This can be almost any stakeholder: consumers get tired of paying extra, a chief executive looks at the costs or a government realises that the

technology has not delivered on the goals set. Efforts get shelved quietly.

Wimmer's view, and it is compelling, is that to call a project that falls over because of financial issues “sustainable” is a complete misnomer. If it wasn't sustained then it wasn't sustainable, QED.

We do need to do something. Early in *The Green Bubble* he points to events just a few decades ago. “In the summer of 1977, a series of lightning strikes knocked out the electricity supply to most of New York City for more than 24 hours,” he writes. “In the almost total darkness that resulted, civilisation appeared to evaporate. More than 1,600 shops were looted, more than 1,000 fires broke out, and an outburst of general violence and disorder prompted nearly 4,000 arrests.”

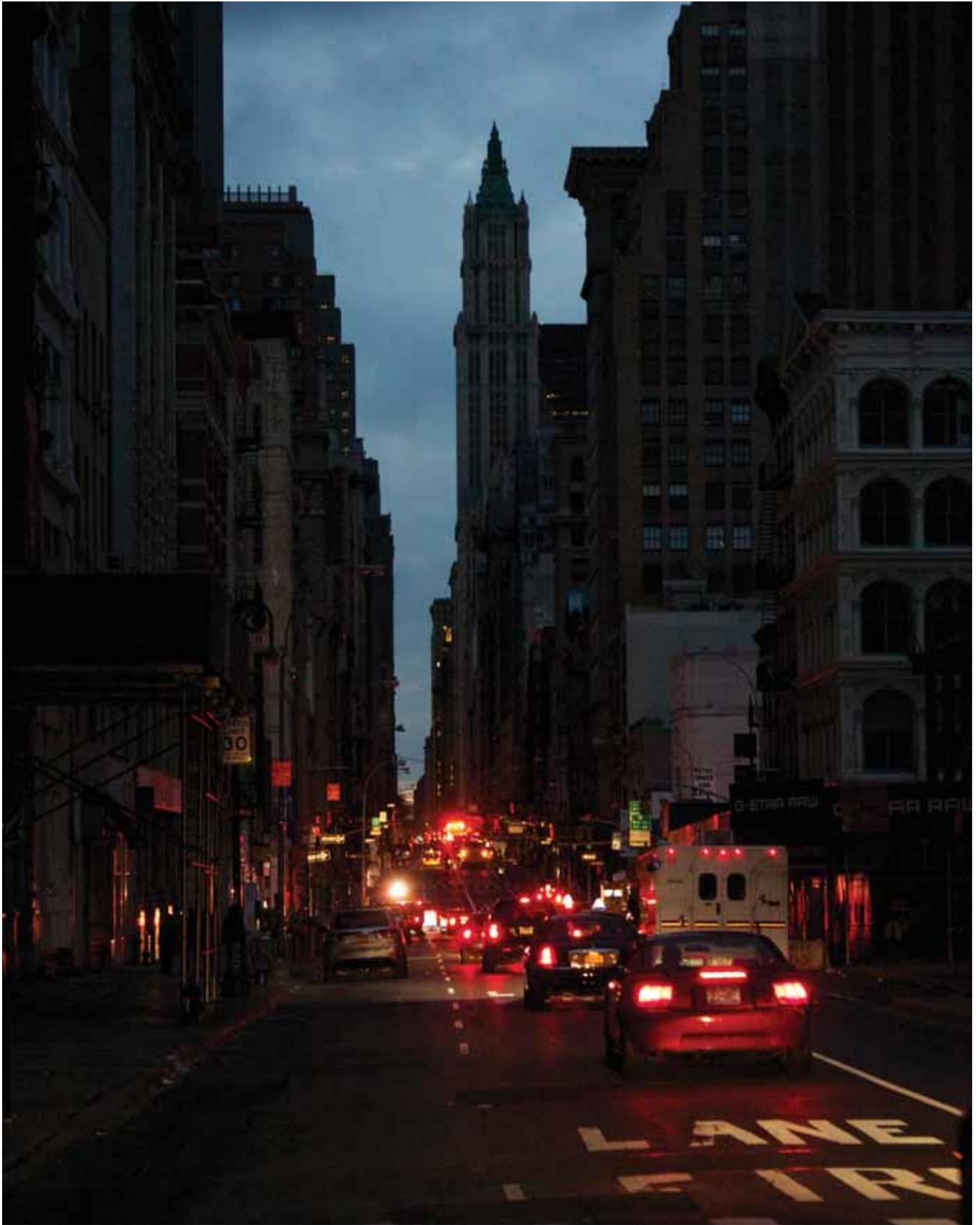
In a society now even more dependent on power consumption, where businesses can't function without powered computers connected to powered servers on the internet, and swaths of pedestrians can barely move without being connected to their music, their emails and social networks, the effect can only be increasing.

This is what has led to the present position in which so many governments are

wasting so many tax dollars on green initiatives, Wimmer believes. It works like this: everybody understands that something like the New York outage could happen again in a major city, with even worse results. Therefore, governments start offering incentives to businesses making green products or putting some sort of sustainable initiative together – and then the “someone gets tired” syndrome kicks in, as described above. For instance, only a couple of years ago, UK consumers were being urged to put solar panels on their homes, only for the businesses involved to run into difficulties when subsidies were withdrawn more recently as the initiative failed to stand on its own merits.

The issue is slightly clouded by politicians' need to get elected every few years, Wimmer acknowledges, but looking at it realistically, there is no alternative.

Yet some steps can be taken. First, it is essential that everybody understands the scale of the problem. The book refers to the notion of a CMO – short for “cubic mile of oil”, coined by the bioengineer Hewitt Crane to help people envisage just how much power we are consuming. By 2050, if we achieve the current conservation ►



SHUTTERSTOCK

A vision of apocalypse: New York City's blackout in the summer of 1977 led to the near breakdown of civil order



Hydroelectric power is proving a secure response to China's energy needs

► targets, we will be consuming six CMOs; if we don't achieve our targets we will be consuming more.

The next step is to take a hard look at the alternatives to our current means of producing energy. Fossil fuel still makes up the largest part of what we consume, and containment of CO₂ is starting to do something to make that less damaging than it used to be. Wind and solar energy are inevitably dependent on environmental factors and have been known to fail to produce the hoped-for energy when relied on in anger.

More interesting to so-called futurologists are hydroelectric power, which is starting to look viable in the longer term but for the moment has a prohibitive cost per megawatt (although installations in places such as Fukushima in Japan are looking promising); geothermal energy, which will in theory harness the heat generated within the Earth but hasn't happened yet; and the nuclear option (see page 14 for an article on why this is an essential part of the energy armoury).

The proportion of alternative technologies in use as mainstream sources of power is minimal, however; in 2009, according to Wimmer's book, it was roughly 1 per cent, including solar, wind, geothermal,

wave and tide energy but excluding hydro and biomass, and the figure is only likely to increase to 4 per cent by 2035.

The good news is that the will to do something to ensure a greener future isn't fading even if some of the efforts don't work. Wimmer's proposed framework is to divide subsidised projects into "A" schemes and "B" schemes.

The A list is quite straightforward and consists of projects that have proven mer-

"Some ideas appear to work: they're green – and complete nonsense"

it. German taxpayers appear happy to pay for solar panels because they are proving to be worth having. Likewise, in Spain, the notion of panels is working well, at least partly because of the adequate availability of sunshine. "If we do subsidies in an intelligent manner we can get the benefits," Wimmer says.

"The B list is the one where you get the mad scientist. These ideas apparently work, they're green – and they're complete nonsense. You can see plenty of them today; they need a business brain

behind them." He has seen too many companies realise that if they had adopted a particular idea they would have gone bust very quickly.

Such projects, Wimmer believes (although he doesn't single any out), have their place and that place is in the academic world. "I'm not against innovation," he stresses. "Some ideas on fusion have started in British universities and are now viable fusion companies."

This may be how the future will work. Wimmer is positive about the level of collaboration that exists between universities and industry, with numerous businesses spinning out of their partnerships. He just feels that for the moment there needs to be some sort of brake on spending for the sake of it.

"There is a limit to what countries can do with their tax dollars," he says.

Wimmer's vision is to persuade the world to back projects by all means, but to sanity-check them against commercial reality as well as in theory. Then we might end up with schemes that are sustainable in every sense of the word – and maybe, just maybe, some sort of long-term green energy strategy that works. ●

Guy Clapperton is a supplements editor for the New Statesman



Off grid, on grid or maybe in between?

Living off the grid can be a choice as well as a necessity. **Danny Jones** of Offgrid has a look at why people might opt out of the mainstream

You might think that living off grid for power to be a lifestyle compromise made out of necessity but, increasingly, it's a choice homeowners are making for more pragmatic reasons. One common factor is how the technology involved has advanced to the point of making an "off grid" existence the same as being "on grid", with the added satisfaction of generating and using your own power.

With the sun setting on the feed-in tariff, complete self consumption of energy generated by solar PV installations has attraction and offers the best option for maximising the returns on investment in solar PV. Increasing concerns over the looming generation gap, fuelled by National Grid's own public nervousness, is a further driver for grid independence.

So the concept of "grid-defection" is taking hold, where individual consumers look to take themselves off grid either partially or entirely. On a wider scale, whole communities invested in energy efficiency are able to pool the energy generated by renewables in larger-scale storage systems that can be backed by grid connection of restricted capacity and so get the best of both worlds.

Such hybrid solutions have benefits for network operators where community energy storage solutions are able to absorb peaks in power demand, providing grid resilience with the potential to avoid investment in upgrading grid infrastruc-

ture. This gives the network operators additional tools to adopt broader measures for how grid resilience can be tackled.

For more modest solar installations, another take on the self-consumption theme is moving part of your consumption off grid. Making the garage and utility room or the home office independent from the rest of the house is a popular move.

For new connections to the grid, the threshold at which grid independence becomes more financially attractive is reducing. This can be attributed to how off grid installations have transitioned from

Customers have
no desire to become
experts in electricity

typically bespoke and individual solutions to what are now factory-built complete systems offering consistent quality and economies of scale through series production. The gridtogo "hybrid" system pioneered this approach and was introduced a few years ago in response to the increasing demand for sophisticated off grid power. More than capable of supporting a house or farm for example, gridtogo can be delivered and plugged in as opposed to having a fortnight's work on site to create a customised solution.

What customers want is electricity –

to be able to switch the lights on when needed, have a cup of tea any time and be sure that the freezer stays frozen. Probably most importantly is a need to have the Wi-Fi service and internet connection uninterrupted. They want to go about their daily routine exactly as they would if they were grid connected. They have no desire to become experts in managing and maintaining electricity generation plant and so the equipment that sits behind being off grid has to deliver that same level of performance, day in, day out.

For those with a desire or necessity to be grid independent, the means now exists to do so without compromising your lifestyle. Offgrid Energy Ltd, a British company, leads the way in this fast developing market and draws on the UK's prominence on the world stage for the supply of power generators and solar PV systems. As a technology and manufacturing company, it has seized on the opportunities both in the UK and further afield to engineer an integrated product that means grid independence is a cost effective and instantly accessible option.

One thing that is for sure is reliance on grid connection as the only way to have a dependable power supply is in the past. An alternative exists and the option to sit in the middle and have both is very much a reality. ●

For more information on Offgrid see www.offgrid-energy.co.uk



Skilling the next generation

Oil and gas may be a natural resource, but securing the future of the North Sea will take collaboration, says **John McDonald**, managing director of industry skills organisation OPITO

Low oil price, job losses, falling production and slashed exploration campaigns: at first glance all may not appear to be rosy in the UK oil and gas industry. Look beyond the surface, however, and you'll find an industry positively bursting with enthusiasm and eager to share stories of its successes, its opportunities – and yes, its challenges, with a new generation.

There is no getting away from it, the current figures are stark. The oil price has fallen by around 62 per cent since 2011 and in this year alone has dipped to under \$50 a barrel. Oil & Gas UK estimates employment supported by the industry in the UK has contracted by 15 per cent since the start of 2014 to 375,000 and it is likely capacity may have to be reduced still further in order for the sector to weather the downturn.

But this is an industry well used to peaks and troughs. More than 43bn barrels of oil equivalent (BOE) have been produced to date from the UK continental shelf and almost half again remains to be extracted. Four new fields came on-stream in 2014, bringing approximately 190m BOE into production and the Department of Energy and Climate Change approved eight new fields which will require capital investment of £2.4bn to develop and are expected to yield 160m BOE of production over time.

Maximising the recovery of the UK's oil and gas resource and sustaining employment in the North Sea's world-class supply chain will take two things: collaboration and skilled people.

A huge amount of work is under way to ensure the UK energy sector will emerge from the downturn in safe and competitive shape to grasp the opportunities that will continue to present themselves in the future.

It will remain one
of the most diverse and
pioneering industries

OPITO, the industry-funded skills organisation, is among those leading the charge. Headquartered in Europe's oil capital, Aberdeen, we are focused on workforce development for the industry across the UK.

The industry is built on people: their skills, their knowledge and their creativity. It is important, now more than ever, that the industry adjusts to ensure its future in the North Sea. Big changes have been and are being made across the sector, changes that will define the sector for the next 30 to 40 years in the UK.

Ensuring that we have a sustainable pipeline of talent coming into the sector

is critically important for its long term success which is why we have spent some time asking young people what they think about the industry and trying to understand the perceived barriers.

During a recent poll of school pupils aged 16 to 18 who attended OPITO's structured work experience programme in Aberdeen, the majority of youngsters admitted they were concerned about the longevity of careers in the sector.

The global opportunities the sector offers, its entrepreneurial spirit, high salary expectations and the chance to continue developing skills while working were among the reasons why they would pursue a career in this area; however many said they had been worried by reports of the recent global downturn.

We have seen very testing times in recent months and the challenges aren't yet over, but this industry is dynamic, it will pull back and it will remain one of the most diverse and pioneering industries on the world.

In order to achieve this, education and government must work together to inspire young people and ensure they understand the wide range of careers available to them across the diverse energy sector, and are equipped with the right skills to pursue them. ●

For more information on OPITO see www.opito.com



Investing with the wind in your sails

Wind technology is excellent and makes it worth setting up a new financial scheme, says **Sami Raja**, senior consultant at Heron Global Partners

Heron Global Partners is working very closely with a company that has recently launched on the renewable energy scene in a very bold fashion. It has issued a series of mini-bonds that pay a fixed rate of 9 per cent per annum for five years. The first phase of these bonds has just been released and will lead to the installation of 30 fully-functioning wind turbines. Harnessing wind power is one of the cleanest, most sustainable ways to generate electricity. Heron Global Partners is very excited to be doing its part in leading the UK towards a greener future.

The proposed changes to the RO (renewable obligation) and the FIT (feed-in tariff) have no effect on the projects in question, offering investors safety and security. All the sites have gone through the process of environmental tests, planning permission, approval for access roads, grid connection and receiving the FIT subsidy once a wind turbine is erect and functioning. The subsidies offer a guaranteed revenue stream for the next 22 years under the FIT scheme.

Jobs

Compared with fossil fuel technologies, which are typically mechanised and capital intensive, the renewable energy industry is more labour intensive. This means that, on average, more jobs are created for each unit of electricity generated from renewable sources than from fossil fuels.

In 2011, the wind energy industry di-

rectly employed 75,000 people in a variety of capacities, including manufacturing, project development, construction and turbine installation, operations and maintenance, transportation and logistics, financial and legal consulting services.

The Union of Concerned Scientists conducted an analysis of the economic benefits of a 25 per cent renewable energy standard by 2025. It found that such a policy would create more than three times as many jobs as producing an equivalent amount of electricity from fossil fuels – resulting in a potential benefit of 202,000 new jobs by 2025.

Health and environment

Generating electricity from renewable energy sources rather than from fossil fuels offers significant public health benefits.

Wind energy produces no toxic pollution or global warming emissions. Wind is also abundant, inexhaustible and affordable, which makes it a viable and large-scale alternative to fossil fuels.

The air and water pollution emitted by coal and natural gas plants has been linked to breathing problems, neurological damage, heart attacks and cancer. Replacing fossil fuels with renewable energy has been found to reduce premature mortality and lost work days, as well as cutting overall health costs.

Wind generates electricity without emitting pollution. Moreover, wind energy requires virtually no water to operate

and so doesn't pollute water resources or strain supplies by competing with agriculture, drinking water systems or other important water needs.

In contrast, fossil fuels can have a significant impact on water resources. Both coal mining and natural gas drilling can pollute sources of drinking water. Natural gas extraction by hydraulic fracturing (fracking) requires large amounts of water and all thermal power plants, including those powered by coal, gas and oil, use water for cooling.

Heron Global Partners is aware of the environmental concerns associated with wind turbines. We appreciate that there may be worries regarding the environmental impact that wind turbines can have on land have been put to rest by most.

Recent survey reports show that less than 1 acre per megawatt is disturbed permanently and less than 3.5 acres per megawatt are disturbed temporarily during construction. The remainder of the land can be used for a variety of other productive purposes, including livestock grazing, agriculture, highways and hiking trails.

Looking to the future is key, as Heron Global Partners is well aware. We really appreciate the contribution that each and every one of our clients has made towards helping us fund new renewable energy projects. ●

For more information go to
www.heronglobalpartners.com



Extending the National Grid's reach

Our needs stretch the National Grid but the technology is there to broaden.
By **Chris Anderson**, chief executive of 4C Offshore

Electricity is now integral to our life, no longer just turning our night into day and driving industry's machines, but now recharging portable devices and powering our vehicles. Even with energy conservation our demand is unlikely to diminish in the near future. Besides, consumers taking this all for granted we have also got fussier.

- We want electricity to be readily available but we don't want to see how it gets here;
- We want to move away from electricity generation through fossil fuels to sustainable and renewable energy;
- We have to replace old and outdated generating stations that are reaching their expiry date.

This requires us to reinforce our grids invisibly, acquire new sources of power while we wait the 15 or so years it will take to build replacement nuclear power stations and discover and build the "fracked" gas infrastructure. We must also improve energy security, so that volatile markets and global conflict can no longer hold us to ransom.

Use our seas

There is no single solution to solving all of the above, but playing an increasingly strategic role are subsea power cables.

UK renewable electricity generation is often some distance from where we live. For example, Scotland is a great source of renewable energy but lacks the consumers to justify investment. We need to move this energy and therefore we need to reinforce our grid.

For grid reinforcement the seas around our shores offer an invisible route to lay cable, and in many ways it is simpler and faster. Whilst in any endeavour there are always environmental constraints, they are often less onerous than trying to run electricity cables overhead using pylons or indeed across the land of many, many stakeholders and owners. Subsea route engineering is at times difficult but with the advent of high voltage direct current cable, suitable for underwater environments, we can now run power cables hundreds of miles on and under the seabed.

We can run cables
hundreds of miles under
the seabed

The seas also offer another solution – the ability to connect our UK grid to other countries. By having the ability to transfer electricity between other states, coupled with time differences and cultural differences, we are able to balance demand: each country can send the other its spare capacity when it no longer needs it, achieving greater utilisation of our generation systems. Add to this technology and market drivers such as ambition for a wider European energy market, pressure to cut carbon emissions and a UK government acceptance that this offers an alternative to building more power stations. We are experiencing an unprec-

edented growth in submarine electricity grid expansion. Andrea Leadsom MP, the climate change minister, recently said: "We are the first EU member state to allow interconnectors to bid into the capacity market."

This has been achieved by providing interconnectors with the cap and floor regime. Industry takes on the risk of developing such massive projects, the regime ensures a minimum return for the price of the electricity below which consumers top up the developer's revenues to the level of the floor, and if revenues exceed a maximum (the cap) then the excess is returned to consumers. The rationale is that it encourages interconnectors to be built by reducing a developer's exposure to the potential loss.

Subsea electricity interconnectors are not just happening here in the UK. We are seeing an explosive European growth market for those with ambition and resources to meet the opportunity.

Europe (and the UK in particular) is now the most active region globally for new subsea electricity interconnectors. There are a number supplying cross border electricity from France (IFA), the Netherlands (BritNed) and Ireland (East West) already. Ten major interconnectors planned to connect the UK to Europe, out of the total of 13 European-wide grid interconnector and grid reinforcement projects that are likely to complete within ten years. ●

**For more information go to
www.4Coffshore.com**

NewStatesman

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be downloaded from the *NS* website at:
newstatesman.com/page/supplements
