

THE NEW STATESMAN

# Spotlight

Thought leadership and policy

## Energy and Climate Change: Securing the supply

Kwasi Kwarteng MP

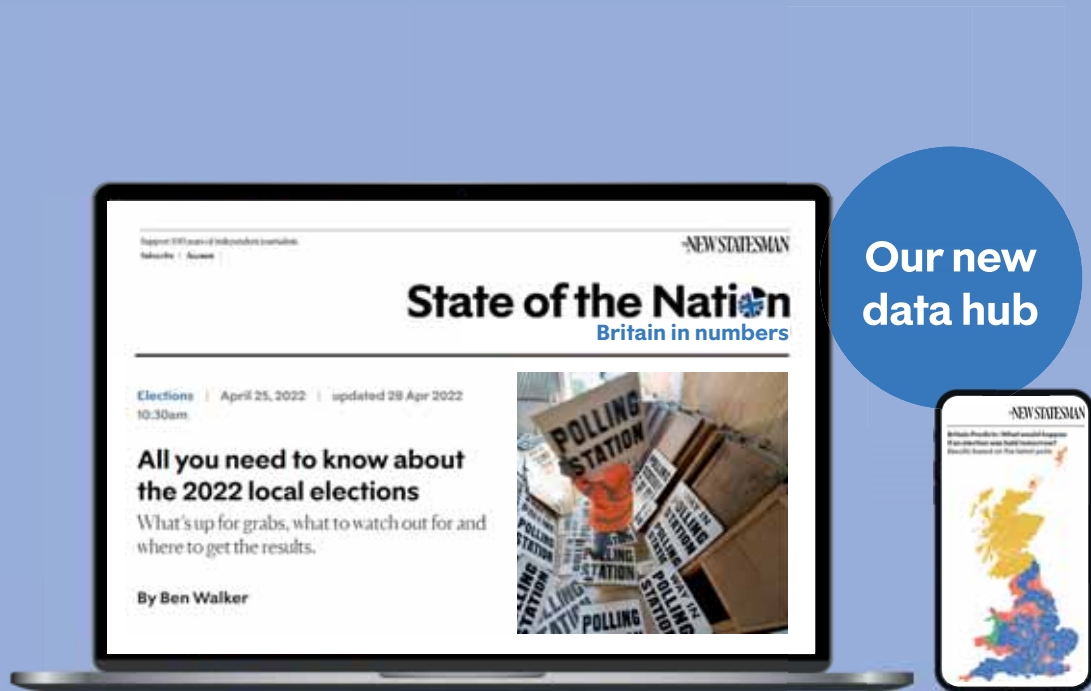
Connie Hedegaard

Carla Denyer



# What is Britain really thinking?

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# Leaky homes, leaky policy

When it comes to the climate, the Johnson government likes to tout its leadership credentials. “The UK leads the world in the race to net zero,” the Prime Minister said in the foreword to the government’s *Net Zero Strategy: Build Back Greener* document back in October 2021, ahead of the Cop26 climate summit in Glasgow.

But when it comes to energy, there are other areas of this country’s leadership that Johnson might be less keen to trumpet. Alongside its sky-high property prices, the UK has some of the worst-insulated housing stock in Europe. According to analysis by thermostat maker Tado, Britain ranks bottom compared to other European countries, with homes losing an average of 3°C of indoor temperature after five hours, compared with 1°C in Germany.

Leaky homes are one of the chief causes of high energy bills. They are also a major contributor to global warming.

And yet, experts believe the British Energy Security Strategy, released in April, has not fully capitalised on the opportunity presented by housing.

While the government has introduced some measures, including funding to retrofit low-income households and social housing, the strategy could go further. As one expert tells Sarah Dawood (see pages 6-7), making homes more energy-efficient could deliver the “largest savings on bills in the fastest time frame”. The strategy still leaves the UK reliant on gas, and the alternatives, like nuclear and hydrogen, will take far longer to bear fruit.

Following the war in Ukraine, leaders have made securing energy supplies a priority. As Department for Business, Energy and Industrial Strategy (BEIS) Secretary of State Kwasi Kwarteng tells *Spotlight*, the UK “cannot afford to be dependent on importing fossil fuels from abroad”.

But independence should not trump efficiency when it comes to energy security. As Cop26 president Alok Sharma said this month, the current crisis has made clear that “homegrown, renewable and clean energy, the price of which cannot be manipulated from afar, is the best option [for] domestic energy security. Climate security has become synonymous with energy security.” The government would do well to remember that the two are interlinked. ●

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## Do not ignore climate crisis, warns ex-Bank of England chief

The UK government must not ignore the need to reduce carbon emissions because of the immediate energy crisis linked to the war in Ukraine, a former Bank of England governor has said.

Speaking at the Net Zero Delivery Summit in London this month, Mark Carney said that efforts to address oil and gas shortages caused by sanctions and Vladimir Putin's own restrictions could derail the shift to clean energy and hamper limiting global heating to 1.5°C, potentially "building future costs that will dwarf current hardships".

The current cost-of-living crisis, compounded by the war's economic turbulence, has resulted in crippling energy bill rises. As part of the British Energy Security Strategy (see pages 6-7), the UK plans to source more of its own oil from the North Sea to make up for the Russian shortfall.

Cop26 president Alok Sharma also recently said that climate change must still get the media attention it deserves. Speaking at a Society of Editors' journalism summit in London, he said that current crises were rightly dominating headlines but that carbon emissions should be tackled in tandem. "Climate security has become synonymous with energy security," he said, adding that, unlike fossil fuels, UK-built renewable energy is not subject to international price manipulation and is the "best option for domestic energy security".

Meanwhile, Europe is planning to focus heavily on renewables. Leaked drafts of the European Union's forthcoming strategy to cut Russian gas imports reportedly shows that there will be a "swift, massive deployment" of solar power, especially rooftop panels, by 2030, and that the clean energy target for 2030 will be raised from 40 to 45 per cent. ●



## "Carbon bomb" projects will lock in fossil fuel use, says IEA head

Leading energy economist and executive director of the International Energy Agency (IEA), Fatih Birol, has warned against new investment in oil and gas projects in the wake of the war in Ukraine. Responding to an investigation by the *Guardian*, which identified 200 new so-called "carbon bomb" projects that would result in the equivalent of 18 years of current global carbon emissions, Birol said such initiatives would be disastrous for the planet.

Even prior to Russia's invasion, energy prices were spiralling after two years of suppressed demand was unleashed following the easing of lockdown restrictions. But Moscow's

actions have prompted Western countries to impose sanctions and seek to reduce their reliance on the Kremlin's energy exports, further disrupting supplies of oil and gas and sending wholesale energy prices soaring. In an attempt to increase their resilience in the face of a global energy crisis, many governments have begun to take a second look at fossil fuel extraction projects in their own territories. Birol said such projects were "not the solution to our urgent energy security needs" and said they would "lock in fossil fuel use".

Last year, the IEA said no new coal, oil or gas projects could go ahead if the world was to successfully meet its target of limiting warming to 1.5°C. ●

## Ministers meet on climate action ahead of Cop27

Representatives from 40 countries came together in Copenhagen this month to discuss climate priorities ahead of the UN's Cop27 summit in Sharm el-Sheikh later this year.

The government announced it would use the meeting, which the UK and Egypt convened together, to "take stock of action and implementation across key elements of the Glasgow Climate Pact signed at Cop26, the Paris Agreement and other international climate agreements and decisions".

The talks focused on driving down emissions, and climate change adaptation and mitigation. Ministers discussed actions to address damage done to the most vulnerable communities, as well as the role of early-warning systems, emergency preparedness, and risk reduction, among other issues.

Cop26 president Alok Sharma and Egyptian foreign minister Sameh Shoukry, Cop27 president-designate, co-chaired the event hosted by Denmark's minister of climate and energy, Dan Jørgensen. ●

## In numbers: The government's energy commitments

480k

The number of "clean" energy jobs the government aims to create by 2030

2,300

The number of social homes being retrofitted with efficiency systems

25%

Nuclear is projected to generate a quarter of UK electricity by 2050

## Climate change caused South Africa's floods, experts say

Experts have said the devastating floods in South Africa that killed over 450 people in April were caused by climate change.

South Africa's president, Cyril Ramaphosa, declared a national state of disaster after a year's worth of rain fell within 48 hours in the eastern provinces of KwaZulu-Natal and Eastern Cape. He called the floods "the biggest tragedy we have ever seen".

Research from the World Weather Attribution (WWA) service found that human-induced climate change doubled the likelihood of the event: from something expected once every 40 years to once every 20. The WWA report also suggested the intensity of the rainfall was between four and eight per cent higher as a result of climate change.

The study noted that the flooding "disproportionately affected marginalised communities". Poorer countries and the marginalised groups within them are five times more likely to be displaced by "sudden-onset" weather disasters such as floods and storms, than people in richer countries, according to a 2017 Oxfam report.

"[This incident] is telling us that climate change is serious," said Ramaphosa when visiting one of the affected areas. "We no longer can postpone... the measures we need to take to deal with climate change." ●

## Energy Security Bill announced as part of Queen's Speech

The new Energy Security Bill was announced in the Queen's Speech on 10 May as part of the government's upcoming legislative agenda.

The government said that the bill aims to deliver commitments from the British Energy Security Strategy, published in April, and the ten-point plan for a "green industrial revolution", published in November 2020.

The legislation will extend the energy price cap past 2023, to ensure suppliers charge fair rates, and appoint Ofgem as the new regulator for heat networks.

The government is also seeking to establish a new "Future System Operator", to have oversight across energy costs, secure supply and ensure progress towards net zero.

Innovation, such as in hydrogen and nuclear, is also addressed in the bill. ●



# Can the government's plan control soaring household bills?

## The UK seeks energy independence as people are pushed into poverty

By Sarah Dawood

The global events of the past two years have hit people's spending hard, and nowhere is this more apparent than in the energy market. The reopening of the post-lockdown economy, compounded with restrictions and sanctions on oil and gas imports due to the war in Ukraine, have all amounted to one thing: higher bills.

According to research from the House of Commons, the energy price cap – the limit on the rates consumers

pay per unit of gas and electricity – increased by 54 per cent in April, taking the estimated average bill for UK households from £1,300 to £2,250. The cap is speculated to increase by a further 30 to 50 per cent in October. By 2023, as many as 16 million people could be classed as living in poverty in the UK, according to analysis by the Resolution Foundation think tank.

As energy prices rise, the government is looking for ways to tackle soaring

costs while honouring commitments on the climate. The British Energy Security Strategy, published in April, aims to build a “self-sufficient” energy system that reduces dependency on foreign fuel, invests in clean technology and improves the energy efficiency of buildings.

It lays out a ten-point plan of investment, including prioritising sourcing fossil fuels domestically from the North Sea. “Net zero is a smooth transition, not an immediate extinction, for oil and gas,” it states. The government plans to phase out Russian oil and coal by the end of 2022, and to stop imports of Russian liquefied natural gas (LNG) “as soon as possible”.

The strategy includes a major projected push for nuclear power, with an aim for it to generate a quarter of UK electricity by 2050, and a £2bn investment into nuclear plants this parliamentary year alone. The nuclear option continues to be controversial (see pages 10-11), with some saying it is safe, clean and reliable and others arguing that the associated waste disposal, cost and development times are problematic.

The government aims to have over half of renewable energy generation coming from wind by 2030, plus a fivefold increase in the use of solar power by 2035. Electrolysis – where electricity is used to split water into hydrogen and oxygen – will be used to double our low-carbon hydrogen production by 2030, alongside plans for better hydrogen storage and transport infrastructure.

Leaky homes are one of the biggest contributors to bill increases and global warming, with the UK having among the worst-insulated housing stock in Europe. The government has already committed to some energy efficiency measures, including cutting VAT for insulation and heat pumps (a sustainable replacement for gas boilers), £1.8bn towards retrofitting low-income households, and household grants of £5,000 towards installing heat pumps via the £450m Boiler Upgrade Scheme.

Business Secretary Kwasi Kwarteng tells *Spotlight* that the UK has “enormous potential” in terms of developing “home-grown, self-sufficient, clean energy” and that our landscape and technological prowess make us “well-positioned to achieve greater energy independence” through mechanisms such as wind, nuclear and hydrogen.

“It is [clear] that we cannot afford to be dependent on importing fossil fuels from abroad,” he says. “It’s expensive, polluting and leaves us vulnerable to volatile global markets or the whims of dictators like Vladimir Putin.”

But energy experts question whether “independence” is the answer. Rob Gross, director at the UK Energy Research Centre (UKERC) and professor of energy policy and technology at Imperial College London, says it is crucial the UK works with other countries. “I think the principal goal should be having a resilient and secure supply of energy, rather than independence,” he says.

Trading with Europe is essential to ensuring the UK secures its supply of LNG, for instance, as the country looks to phase out Russian imports. He says it is “regrettable” that the UK was largely excluded by the European Union’s plan for affordable, secure and sustainable energy. Mainland Europe has storage facilities, while the UK has import terminals needed to regasify the liquid.

“We are all interconnected and still in one gas market,” he says. “Forget Brexit. We won’t be able to end our reliance on gas soon. We don’t say we’re going to be food independent, or mobile phone independent.”

**M**any believe the government has focused on the wrong technologies. Euan Graham, senior researcher for clean economy at climate think tank E3G, believes the government’s fixation with nuclear is “misguided”. According to E3G’s research, nuclear plants take 13 years to develop and deploy, compared to eight for offshore wind, six for onshore wind, one for solar, and less than a year to retrofit homes. Given that time frame, nuclear will not reduce household bills for a decade, says Graham.

Investing in domestic fossil fuels also means consumers are still at the whims of global oil and gas prices. “The Energy Security Strategy was a chance to make the UK’s energy supply affordable and reliable for millions of households and businesses, and government didn’t take it,” Graham says. “The problem lies in our reliance on gas, and the exposure to volatile price swings that come with it,” he adds. “The solution is to stop using the stuff, and that would have required a massive step change in both energy efficiency, and renewables.”



Onshore wind, contentious among Tory backbenchers due to turbines being perceived as an “eyesore” in the countryside, is notably absent from the strategy. Graham says that government should have cut red tape around onshore wind planning regulations, which would have “unlocked a huge chunk of projects that are effectively stuck in limbo”.

A greater emphasis on making homes more energy-efficient would have also produced the “largest savings on bills in the fastest time frame”, says Graham. It could have been deployed in a targeted way to ensure vulnerable households benefitted first. “Energy efficiency is the best tool with which to repair our broken energy system and it was left in the toolbox,” he adds.

Alongside grants, government could do better to incentivise the public to reduce their own household bills, says UKERC’s Gross. UKERC is calling on the government to launch an energy efficiency campaign this summer to educate people about small changes they could make to their homes as winter approaches. While major retrofitting such as installing double glazing, heat pumps and loft insulation can be costly, “low-hanging fruit” such as regularly servicing boilers and avoiding heating rooms that are not in use can make a difference to costs.

Suppliers could also be encouraged to invest in efficiency. The Contracts for Difference (CfD) scheme offers renewable technology developers the chance to “bid” for a fixed, pre-agreed price for the electricity they produce. This model incentivises suppliers to invest in low-carbon technologies, while protecting them and consumers from the market’s volatile price swings. Similar measures could be introduced for energy efficiency systems such as heat pumps and insulation, says Gross.

E3G has also suggested the government should introduce measures to increase the take-up of efficient household appliances, phase out gas boilers in new-build homes by 2023, launch a major training programme to upskill engineers in heat pump fitting, and introduce a lower stamp duty for energy-efficient homes.

Ultimately, the public needs to be included in the fight to tackle the climate crisis and rising bills. Eleni Stathopoulou, a lecturer in economics at the University of Sheffield, says the strategy “fails to be human-centric”, and lacks incentives for individuals.

“The link between energy use and bill reduction [needs to be made clear],” adds Gross. “A small fraction of the gas we burn is actually helping to fund Putin’s war. It’s about anything people can do to reduce it.” ●

# The shrinking road to net zero

## Time is running out – the UK must invest in clean energy

By Professor Karl Whittle

In association with



There are now fewer than 1,500 weeks to go until the end of 2050, by which time the UK needs to have radically decarbonised society to achieve its own net zero targets. For policymakers, it is no longer a question of should carbon emissions be reduced, it is a question of how.

### Reducing consumer energy demand

There is no way to reach net zero without reducing the total demand for energy – and change begins at home. To take a really obvious example, existing technologies such as LED lights can reduce energy consumption and demand. More significantly, it's necessary to also reduce consumer demand through changing the way we live, work and travel. The current energy crisis has brought into sharp relief both the economic cost and political implications of high energy demand. When it comes to the heating of our homes, the largest reduction in demand will come from improved levels of insulation that will reduce heat losses, such as in the roof space and through the use of double or triple-glazed windows. When combined with more energy-efficient heating systems, such as heat pumps or electrified boilers, an effective energy reduction for heating can be realised.

This is important because the use of our homes is changing and, for many, they are also now a workplace. For those still travelling to work, petrol and diesel are highly effective sources of energy – both are mobile and energy-dense, making them ideal for transport applications. Decarbonising transport will require a move to either batteries or hydrogen-based technologies, using fuel cells. Moving to battery-based transport is relatively easy, if not often expensive, to achieve for consumers through purchasing an electric vehicle and the use of a charging point. At the level of the individual, this does not place any extra strain on the national grid, but ten million cars simultaneously charging would be the equivalent of the UK's daytime electricity demand. Solutions to this challenge, such as only charging during times of low demand, do already exist, but a more effective solution would be to increase the use of public transport and through the redesign of our towns and cities to enable greater use of walking and cycling.





**Upgrading the UK's energy infrastructure needs to begin now**

### **Decarbonising industry**

To meet its net zero targets, the UK must significantly decarbonise industry. Companies are already transforming their operations and many large organisations have set their own net zero carbon emission targets sooner than the national 2050 date. For example, NSG Pilkington has trialled the use of hydrogen for the provision of the high temperatures needed in its glass production processes. This is just one example of change required, but there are many others, with companies such as AstraZeneca moving to zero carbon emissions by 2025, and Unilever following by 2039. This is where organisations such as the decarbonisation project HyNet, the North West Hydrogen Alliance, and Glass Futures, a global centre of excellence for low-carbon glass manufacturing, are focusing their expertise, developing solutions for the transition to a zero-carbon future that includes technologies such as hydrogen.

For most organisations, the effective and efficient use of buildings changed during the Covid-19 pandemic, with increased flexibility in working at home. This is likely to be a blueprint for the

future, with more homeworking being the norm, and so ensuring buildings are efficiently occupied, or used, is key in reaching net zero.

### **Energy storage and infrastructure**

Linked to a reduction in overall demand is the need to store energy generated from renewable sources. This energy can be stored using a variety of technologies – ranging from batteries, through pumped hydroelectric storage, such as at Dinorwig in north Wales, to hydrogen. The use of storage allows for a balanced energy mix to be developed, with consistent energy, such as from nuclear, balanced with these other sources, increasing the rate of migration away from gas, which is currently around 40 per cent of the UK's electricity generation.

Hydrogen is an alternative means of storing energy; as a gas it can be stored in a multitude of ways and can be directly combusted. Its generation, however, requires energy, but this could be managed using energy in periods of low demand. One key difference with batteries is that once the capacity has been reached they cannot be charged further. With

hydrogen the limit is only determined by the ability to store the gas.

Upgrading the UK's energy infrastructure needs to begin now. It is better to use a pragmatic solution that can be implemented and replaced later, rather than wait for a perfect technology to be developed, because it reduces the emissions of carbon now, helping prevent irreversible climate change.

### **Levelling up**

On the road to reaching net zero, the potential opportunities for levelling up will be widespread, as the societal change required in many areas will be equivalent to the post-war reconstruction of the 1940s and 1950s. There are currently over half a million people working in the low-carbon and energy industries in the UK, and this will need to be expanded.

Increased investment in housing in major cities such as Liverpool, Manchester and Glasgow where the level of home insulation is poor, or through the installation of home heating technologies, will require a significantly expanded skilled workforce. Significant national investment is needed, but this will create many high-skilled jobs and drive economic growth across the UK.

In the north-west of England and north Wales there are clear opportunities for regional growth arising from the net zero transition. Coupled with their existing expertise in manufacturing and digital technologies, and the opportunities arising from transport change, this region can become world-leading, creating high-wage, high-skilled jobs and driving economic growth.

As the UK moves to a net zero energy system with energy generation broadly based within its borders, the ability for the nation to control its own costs becomes increasingly possible while becoming more energy secure. Providing we are able to reduce energy demand, increasing energy security reduces exposure to external markets and factors, allowing costs and prices to be determined locally, helping to keep them down. ●

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*Karl Whittle is professor of zero carbon and nuclear energy at the University of Liverpool*

*Visit: [liverpool.ac.uk/climate-futures](https://liverpool.ac.uk/climate-futures)*

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# Should we invest in nuclear power?

## Questions about cost, safety and reliability persist

Wade Allison | Paul Dorfman

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FOR

**Wade Allison**

Emeritus professor of physics at Oxford University and author of *Radiation and Reason*, and *Nuclear is for Life*

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Finding sufficient energy is essential to all life. Humans have excelled at this, notably when they studied and overcame their innate fear of fire some 600,000 years ago. Until the Industrial Revolution they made do with energy derived from the daily sunshine that powers water currents, the wind and other manifestations, including the production of food and vegetation. But human life was short and miserable for the population at large. The causes were the anaemic strength of the sun's rays, averaging 340 watts per square metre, and its random interruption by unpredictable weather.

With fossil fuels, energy increased, and was available anywhere at any time. Life expectancy doubled and the world population quadrupled. For 200 years, whoever had access to fossil fuels had world power. However, at the 2015 Paris Conference, nations agreed that the emission of carbon posed an existential threat and that, sooner rather than later, this should cease.

Technology may be challenging and exciting, but it cannot deliver energy where none exists, today as in pre-industrial times. Writing in 1867, Karl Marx dismissed wind power as "too inconstant and uncontrollable". He saw water power as better, but still "beset with difficulties". Today, the vast size of hydro, wind and solar plants comparative to their power reflects their weakness and destructive impact on flora and fauna – a point often curiously ignored by environmentalists.

If renewables are simply inadequate and fossil fuel emissions only accelerate climate change, what abundant primary energy source might permit political and economic stability for the next 200 years? Natural science can say, without doubt, the only answer is nuclear.

In 1931, Winston Churchill wrote: "The coal a man can get in a day can easily do

500 times as much work as the man himself. Nuclear energy is at least one million times more powerful still... There is no question among scientists that this gigantic source of energy exists. What is lacking is the match to set the bonfire alight... The discovery and control of such sources of power would cause changes in human affairs incomparably greater than those produced by the steam engine four generations ago.”

He was right, but this transition requires adequate public education. In recovering from the Second World War, the world lost confidence and demonised nuclear energy. This denial of an exceptional benefit to society has persisted for 70 years, supported by bogus scientific claims around radiation and oil interests. But, aside from the blast of a nuclear explosion, nuclear energy and its radiation are safer than the combustion of fossil fuels, as confirmed by evidence from Hiroshima and Nagasaki, Chernobyl and Fukushima. Furthermore, nuclear applications in medicine pioneered by Marie Curie (such as the use of radiation to treat cancerous tumours) have been widely appreciated for 120 years.

Regulation around nuclear needs to be commensurate with actual risk, and it should be financed appropriately, with richer nations covering the costs. Fully informed, everybody should welcome the security of small, mass-produced, cheap nuclear energy plants dedicated to serving communities with on-demand electricity, off-peak hydrogen, fertiliser, industrial heat and seasonless farming for decades. The only real challenges are in building the relevant skills, and instilling public confidence. ●

## AGAINST

### Paul Dorfman

Associate fellow of the Science Policy Research Unit at the University of Sussex and chair of the Nuclear Consulting Group

**B**oris Johnson hopes his dream of “a new nuclear plant every year” will be aided and abetted by the recent publication of the government’s Energy Security Strategy. But with little interest from the investment market, and the fact that utility-scale solar and onshore wind cost less than a quarter of new nuclear, perhaps the Treasury’s concerns should be taken more seriously.

Here’s why. Hinkley Point C, the only new nuclear construction in town, where energy giant EDF is building two nuclear reactors, is overdue and over budget. Costs have ramped up from an original estimate of £18bn to £26bn, and the Somerset project is not due to open until at least June 2027, and more than likely quite a few years later.

Next in line is Sizewell C in Suffolk, which is supposed to be paid for via the “fiscally dextrous” Regulated Asset Base mechanism, a new funding model that transfers risk from developers to consumers to bring in more investors. This places great financial liability unfairly and squarely on the shoulders of UK taxpayers and electricity consumers, who will be paying for huge

upfront costs, inevitable delays and further cost hikes.

And there’s more. The EDF European pressurised water reactor (EPR) design, currently being built at Hinkley C and planned for Sizewell C, may have a generic fault with its most important safety feature: the reactor pressure vessel. As a result, a Chinese EPR has now been shuttered for ten months.

This is not forgetting the horrible mess across the channel, with half of EDF’s nuclear reactor fleet offline, many due to progressive corrosion. The French nuclear regulator is warning a “large-scale plan” lasting “several years” is needed.

Nuclear’s climate-friendly unique selling point (USP) is also up for grabs. Sea-level rise will increase coastal flooding, storm surges and erosion, making current coastal nuclear infrastructure increasingly obsolete. This means even more expense for any nuclear construction, operation, waste management and decommissioning – and, according to the UK Institute of Mechanical Engineers, even relocation or abandonment.

Happily, help is on the way – 256 gigawatts (GW) of non-hydro renewables were added to the world’s power grids in 2020 (nuclear added only 0.4GW). Last year, solar and wind made up three-quarters of all new generation – and with other renewables, the total figure is 84 per cent.

Even the UK investment minister recently concluded that wind farms in the North Sea will be more valuable to the UK than the oil and gas industry. There is no one left to dispute the fact that the heavy lifting of the net zero transition will be done by renewable energy.

Nuclear isn’t just slow and expensive – it’s far too inflexible to ramp up and down with the swings of demand. When the wind fails to blow and the sun doesn’t shine, that’s when grid upgrades, interconnection (which enables power to be shared between neighbouring countries), energy efficiency management, and rapidly evolving storage technology steps in to make up the difference. Nuclear’s contribution has, can and will only ever be very marginal. The reality is, it’s already well past its sell-by date. ●



SHUTTERSTOCK / PHIL SILVERMAN

# The hackers out for energy

## Why our supply is under attack like never before

By Nick Ferris

In May 2021, the Colonial oil pipeline, an 8,850km piece of energy infrastructure that supplies 45 per cent of all fuel consumed on the US east coast, was held to ransom in a cyber attack. DarkSide, a hacker group, broke into the Colonial Pipeline Company's IT network and demanded money. The operator shut the pipeline down and panic ensued as millions of Americans rushed to hoard fuel, pushing prices up across the eastern seaboard. Desperate to solve the crisis, the company immediately paid off a \$4.4m ransom, but it took six days for the pipeline to be restarted.

The attack is just one example of the cyber threat to energy infrastructure that data shows is escalating. The sector has become a leading target for cyber criminals, now accounting for 16 per cent of officially known attacks, according to systems-protection firm Hornetsecurity. Meanwhile, data from another security company, Check Point, suggests that the energy industry is the second most cyber-attacked sector after research and education.

The company records hundreds of attacks each week on the utilities that its security systems protect in the UK. But these attacks are not only relentless;

they occur on multiple fronts. In early February this year, for instance, a cyber attack hit the major Amsterdam-Rotterdam-Antwerp oil-refining hub, disrupting the loading of refined product cargoes in the midst of an energy supply crisis that was already causing headaches across Europe. And in November 2021, leading Danish wind turbine manufacturer Vestas had its internal IT infrastructure hacked. Cyber criminals were able to publish employees' contact information, pictures, medical information and bank account details.

"The cyber threat to energy is real and growing," says Deryck Mitchelson, chief information security officer at Check Point. "Energy systems are constantly being attacked by cyber criminals, and there are a number of instances where the utility sector has been compromised in a serious way."

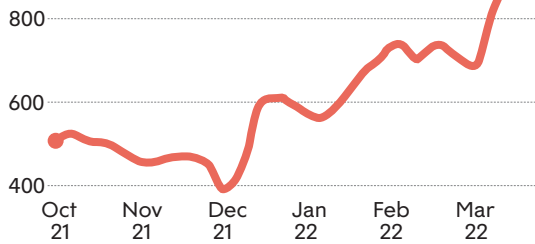
Why are hackers so interested in energy? In part, such attacks have the potential for high impact. "If you are an adversary state, there is the possibility of bringing a country to a standstill by cutting off its energy," says Sneha Dawda, from the Royal United Services Institute (Rusi), a defence think tank. "Another way you could cause mass disruption at the moment, with current high energy prices, would be to hack electricity meters to make them spiral even further out of control."

Jamie MacColl, Dawda's colleague at Rusi, adds that energy companies hold a lot of consumer data, which can be held to ransom by criminal organisations. "There has also been significant cyber espionage reported against companies that specialise in green technology," says MacColl. "These can once again be ransomware attacks, or there have been instances of companies, often in China, looking to steal other companies' intellectual property."

Recorded incidents of cyber attacks have increased in general since Russia's invasion of Ukraine, according to those in the industry. "Our data shows us that there has been a large increase in cyber attacks since the start of the war," says Mitchelson. As an example, he says that Avanan, an email security solution provided by Check Point, has seen phishing attacks increase by 800 per cent since the start of the war. Russian hackers were also able to temporarily disrupt internet services in

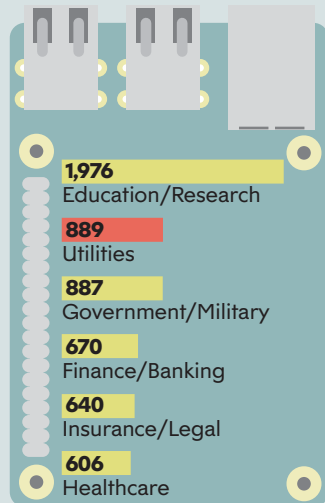
### UK energy systems are constantly under attack

Number of weekly cyber attacks in the utilities sector



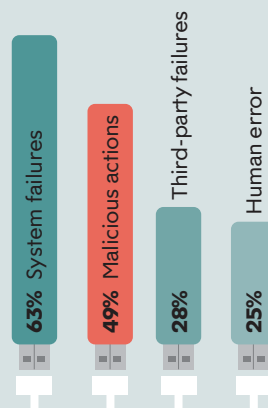
### Power utilities are the second most attacked sector in the UK

Average weekly number of attacks by industry



### Malicious actions are a root cause of half of these attacks

European cyber security incident cause breakdown for energy sector, 2019



SOURCES: CHECK POINT AND NIS

Ukraine by disabling satellite communications, Reuters reported in March.

The war in Ukraine has brought energy cyber security into focus, but concerns long pre-date the current crisis. As the energy sector begins its long and complicated transition towards net zero carbon emissions, the rapid roll-out of renewables and the digitalisation of energy supply networks leave the system more vulnerable.

A low-carbon future means electrifying heating, transport and

industrial processes. Areas of the economy once powered by fossil fuels are now being linked to electrical grid systems that are controlled digitally. This makes them accessible to hackers.

A net zero future also means a more decentralised electricity generation system. With solar panels and wind turbines dotted around the country, national power will come from a number of widely dispersed locations, as opposed to a few high-capacity coal- or gas-fired power stations. These facilities – along with the extensive power cables, substations and electricity storage units that they will

require – vastly increase the surface area of the energy system that is open to attack.

“Services are now more interconnected than ever – and that’s not just within national energy systems and utilities, but also in more complicated supply chains,” says Mitchelson. “All of this creates a really complex landscape to manage, and massively increases the cyber risk.”

If defence mechanisms are not up to scratch on the consumer side of the business, and IT systems are not appropriately segmented, then there is also a risk that weak points such as domestic appliances could be hacked, providing an entry point to the wider energy system. One recent study demonstrates how a targeted attack on personal electric vehicles and fast chargers could cause significant disruption to local power supply. Another study from 2018 shows how high-wattage internet of things devices such as air conditioners and heaters could be used to launch large-scale coordinated attacks on the power grid, leading to local power outages.

While it can be tempting to fixate on worst-case scenarios, the industry is aware of cyber threats, and regulations do exist to ensure companies install effective defence solutions. In the UK, for instance, Network and Information Systems (NIS) regulations were introduced in 2018 to ensure critical infrastructure remains well protected.

But, says Mitchelson, there’s only so much that regulation can cover. Ultimately, it is down to companies to put the best technological solutions in place to ensure that they are protected.

“NIS regulations mean there is a competent authority to go around and audit organisations, but these assessments are effectively like a car MOT: they only happen at an appointed time,” he says.

“Organisations have to understand that they are all constantly at risk, and they need to be running simulations and checking on vulnerabilities to ensure they are protected.

“We now have some very smart solutions, but there are a lot of very intelligent ‘threat actors’ out there as well. Whoever is ahead can switch like a seesaw: the trick is to make sure you are always the one at the top.” ●

# The tree-planting misconception

## Conservation is not about rewinding the ecological clock

By Ralph Fyfe

In association with



Communities and governments around the world have recognised the scale of environmental damage caused to ecosystems by humanity. Calls for climate action have resulted in government policies to try to mitigate the worst impacts and halt, or even reverse, the damage that has been caused.

Targets are set. The number of trees to be planted are specified, as is the acreage of peat bogs to be restored. These are noble aims, and positive steps are being taken by local and regional groups to implement change to meet these targets, supported through grant schemes and funds to promote environmental benefit. Private sector finance has entered the arena, particularly in carbon trading.

These interventions are well intentioned. After all, who would argue against the restoration of environments back to their former condition in aid of rehabilitating the environment?

However, there is a problem. Restoration implies recovering something to its past state. Furniture restorers can recreate the deep shine on a Chippendale sideboard. It's a static object. Ecosystems, however, are not. They are dynamic, a complicated set of changing social, cultural, economic and environmental conditions that have come together to produce what we see today.

We are the first generation that has a clear understanding of both past environmental changes, and the current and future threats being posed to our ecosystems. As such, we are in a position to make informed choices.

The biggest mistake would be to view landscapes as a blank canvas waiting to be painted with good intentions. To ignore local understanding of conditions, challenges and the voices of the current and past custodians of the land risks unintended and unforeseen consequences in a complex system.

When two or more risks interact, the potential collective effect can be greater than the sum of its parts. Timing is also critical.

Across the world right now, some of the most effective initiatives being deployed to tackle environmental degradation are those where schemes have been co-designed with

communities. Our own work in Tanzania is one such example, where lives and livelihoods devastated by soil erosion are being rebuilt through a combination of scientific evidence and cultural change.

Most ecological processes take place over long timescales. Just thinking about how long oak trees live gives a sense of the timescales we need to work to, and how long ecological processes can take to play out. However, we can learn from the deep past using evidence that spans centuries and millennia. Historical, archaeological and long-term ecological knowledge can allow us to understand how our landscapes today – which are a snapshot in time – came together. We can tease out social, cultural and economic processes from our data.

In some cases, these forces have combined to produce high-quality environments. In south-west England, our western Atlantic woodlands are full of biodiversity, store carbon and prevent flash flooding. But they are the product of centuries of management. Simply planting trees isn't enough to reproduce these benefits, particularly in areas that haven't supported trees for millennia.

**O**ur historical information also tells us about nature recovery in the past. Past populations were equally as dynamic as the ecosystems we see today.

Take, for example, the Black Death in the mid 14th century. Up to half the population of Europe died, and this will have had a major impact on food production systems. Pressures on the land will have eased considerably.

Even earlier, in the Bronze Age around 3,500 years ago, settlement and field systems expanded into marginal uplands, but only for a few hundred years. Around 500 years later these fields were no longer in use, although low-intensity seasonal grazing likely continued.

By looking to these past events, we can explore the pathways that past nature recovery took and, in some instances, discover new environmental conditions that formed as nature recovered.

Trees did not re-establish naturally, because the conditions (such as soils and climate) had changed. After the



**We cannot return a landscape to a particular point in time, says Fyfe**

Black Death, abandoned villages on the upland margins were not overtaken by woodland; heathland developed. Some of this heathland is among the rarest habitats in Europe today, supporting biodiversity.

What we find is that much of our high-value nature is a product of land management. Our farming communities know this. An Exmoor farmer I spoke with recently passionately described the biodiversity in his stone walls – walls that his grandfather built and maintained.

Our fossil pollen and insect data show us that biodiversity in the UK was lower before the advent of farming. Disturbance of the forest by Stone Age farmers increased biodiversity, by fragmenting the woodland and creating spaces for diverse ecological communities to develop.

Our species-rich meadows did not exist until grazing management

created the necessary conditions for their management.

Conservation and climate action should never be about returning the landscape back to a point in time. Society has moved on and our land use and socio-economic demands have moved too far. However, being able to recognise long-term processes is massively important – and given we have that evidence at our disposal, it would be foolish to ignore it. ●

*Ralph Fyfe is professor in geospatial information and associate dean of research at the University of Plymouth. His work in reconstructing past environmental change has led him to author more than 85 academic papers and book chapters. He is a fellow of the Royal Geographical Society, Higher Education Academy and Royal Society of Arts.*

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# “Europe’s war begs the question: Who owns our energy?”

By Philippa Nuttall

The war in Ukraine has brought to the fore the question of who owns our energy. Many European countries are suddenly uncomfortably aware of how reliant they are on Russian oil and gas. And while increasing numbers of people struggle with rising energy bills, fossil fuel companies are raking in record profits. Saudi Aramco recently overtook Apple as the world’s most valuable company.

These events take place against the backdrop of the climate crisis. Transitioning away from fossil fuels to cleaner energy sources is the solution to increasing energy security, lowering bills and reducing greenhouse gas emissions. The technologies to bring about this transformation largely already exist and their costs are falling rapidly. Greater amounts of solar and wind power are coming online, and electric vehicles are becoming a more familiar sight on our roads. Yet, this transformation is happening far too slowly to deal with the challenges facing the world.

“Renewables are the only path to real energy security, stable power prices and sustainable employment opportunities,” Antonio Guterres, the

UN secretary general, said in May. He was responding to the grimly predictable news from the World Meteorological Organisation (WMO) that greenhouse gas concentrations in the atmosphere reached record levels in 2021. Sea level rise, ocean heat and ocean acidification – caused by the ocean’s absorption of carbon dioxide – also reached new highs last year, underlined the WMO report.

These findings highlight how out of step we are with the task at hand. Climate science proves the world should be reducing emissions to have a chance of limiting global warming to the internationally agreed “safe” level of 1.5°C above pre-industrial levels. In 2021, the UK enshrined in law the hugely ambitious target of slashing emissions by 78 per cent by 2035. In addition to stressing the need for more clean energy, Boris Johnson’s government is pushing to open new oil and gas fields in the North Sea as a reaction to Russian aggression in Ukraine.

On the back of the WMO’s announcement, Guterres called for companies and governments to “jump-start” the energy transition, tripling private and public investments in renewables and ending fossil fuel subsidies, which amount globally to around \$11m a minute.

The invasion of Ukraine has given renewed impetus to the energy transition in the EU, given that many countries are highly reliant on Russian fossil fuels. The European Commission announced plans on 18 May to raise its renewable energy target for 2030 from 40 to 45 per cent. It also called for significantly more investment in wind, renewable hydrogen power, energy efficiency measures and heat pumps. While the plan was welcomed by most climate campaigners, they were also quick to point out that it contained provisions for new fossil fuel infrastructure.

Governments must ensure that homes and businesses can continue to function, but it is also their job to protect people. Just as it is the poorest and most vulnerable people who are suffering from high energy and food bills today, it will be the same sectors of society that will suffer most from the extreme weather that results from delaying the ramping down of fossil fuels. A report released in April by the UK Environment Agency concludes that people from more deprived areas “disproportionately face more flood risk” than those living in wealthier areas.

Who owns our energy systems is the key question for leaders as they decide how to support economies post-Covid, deal with the implications of the Ukraine war and the cost-of-living crisis, and squarely face the need to transition to a renewables-powered society. Ignoring it, or relying on business-as-usual solutions, will only cause more pain and suffering, for people and economies. ●

*Philippa Nuttall is the New Statesman’s environment editor*





ANDY BUCHANAN / POOL / GETTY IMAGES

Ukraine's President Zelensky addressing Cop26 last year

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# The climate diplomacy crisis

How energy security has trumped environment on the global stage

By Samir Jeraj

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Before becoming Ukraine's deputy minister for the environment, Irna Stavchuk had spent more than a decade campaigning for action on the climate.

Working at NGOs, she tells *Spotlight*: "We were [saying to] global governments that you should spend less on military equipment and more on climate change, because that's the real threat for the future. But this argument is not valid any more."

Stavchuk joined the government in 2019. She and her colleagues in the environment ministry had been working "extremely hard" to update Ukraine's nationally determined contributions (NDC) – climate plans mandated by the landmark 2015 Paris Agreement. In July 2021, Ukraine approved its NDC "after a lot of fights with other ministries and businesses".

It was "much more ambitious than all the previous kinds of targets before", Stavchuk says. Ukraine raised its target to reducing greenhouse gas emissions by 65 per cent by 2030; the previous target had been 40 per cent. This earned them the praise of the UN, with Manal Fouani of the UN Development Programme describing Ukraine as "a model for other countries".

The environment ministry was working on implementing those plans when Russia invaded Ukraine in February. "We jumped into humanitarian issues, so all the regular work that we had been doing before, it was just stopped," Stavchuk says. Months on from the start of the invasion, the ministry is resuming work on the climate, its policy informed by the changing geopolitics.

Before the war, Stavchuk says, Ukraine's climate policies were driven by the need to modernise infrastructure, make industry competitive and improve the well-being of citizens. Now the urgent issue of energy security is the main concern. On the global stage, Ukraine and its allies have pressed for Russia to be excluded from international climate and environmental mechanisms. "They cannot pretend that they care about [the] environment, and constructively participate while they put bombs on Ukrainian cities," Stavchuk says. Russia and its ally Belarus have already been expelled from the Umbrella Group, a negotiating bloc of non-EU developed countries. It is not easy, however, to exclude Russia from UN processes such as the UN Framework Convention on Climate Change (UNFCCC), particularly as it is a permanent member of the UN Security Council.

Indeed, energy security has become the priority for governments worldwide. "It's a very, very difficult international environment right now to make substantial progress," says Connie Hedegaard, the former Danish environment minister, European commissioner for climate action, and chair of the 2009 Copenhagen Cop negotiations. Under her tenure in government, Denmark was the first country in the world to

**"Russia can't pretend to care about climate while bombing cities"**



commit to a reduction in energy use, introducing policies to expand renewables, levy green taxes and support new technologies.

Hedegaard is concerned about whether the conflict will further strain the US's relationship with China, and the Biden administration's efforts to pass meaningful domestic policy on the climate. "I saw for many years how the US and China sort of played this game that I call 'after you,'" she says. While much has changed, that relationship can now also be described as "very, very difficult".

"What one would hope for is really that despite all the other challenges in that relationship, they would decide that they still want to have a constructive dialogue going on in the climate field, because it is [of] mutual benefit," adds Hedegaard.

ALEXEY FURMAN / STRINGER / GETTY IMAGES



Part of the problem is “overload on the plate of decision-makers”, she says. “It’s about the war; yes, it’s about supply chains; in China, it’s very much still about Covid and the lockdown; and then it’s inflation.”

Of course, global emergencies have trumped climate action before. Hedegaard recounts how the 2008 financial crisis derailed international efforts on the climate. This was followed by the landmark Paris Agreement in 2015, but the election of Donald Trump as US president once again threatened progress on the climate agenda. And now the Covid-19 pandemic and Ukraine have once again pushed global warming down the priority list.

“It may not be because of a lack of will, but simply the ability to cope with all these big challenges in parallel, and at the same time,” says

**Demydiv, a village north of Kyiv, was flooded to halt the Russian army**

Hedegaard, who adds: “I just think that an extreme effort is needed by leaders.”

She is optimistic, however, that there is more momentum across civil society and business for climate action today than when she led Cop negotiations in 2009.

“I think that there is some hope there that business understands, and that more and more investors start to understand that climate change is for real,” she says, citing advances in transportation, the circular economy and in environmental, social and governance (ESG) measures. “There is a chance now that we have come to the point where more and more leaders understand that however they are going to address the other challenges, they cannot neglect climate.”

Anthony Froggatt, deputy director of the Environment and Society Programme at the

◀ Chatham House think tank, points out that there is also a question mark over how the conflict in Ukraine will affect the G20, whose members represent 80 per cent of carbon emissions globally. The economic bloc played an important role in setting the “mood music” for Cop26 last year, with “powerful statements” from member states.

Another direct impact will be on climate finance, and the extent to which countries that are now increasing spending on their militaries will be able to meet commitments to adapting to and mitigating climate change. World leaders are due to meet in Sharm el-Sheikh in Egypt for Cop27 in November. “It is absolutely imperative,” says Hedegaard, “that the developed countries... deliver on their financial pledges” at that meeting.

Beyond this is the technical cooperation needed to develop new technologies. “Russia is important to some degree in terms of minerals, and so boycotts may make a difference,” Froggatt says.

There is concern, too, that Russia’s international isolation will bring Beijing closer to the Kremlin, which will impact global climate efforts. Froggatt says that China is “absolutely fundamental” when it comes to the development and deployment of new technologies for countering the climate crisis.

The other much-discussed knock-on effect is the impact on Europe’s energy transition as it reduces its reliance on Russian fossil fuels, forcing it to look elsewhere for sources of power. While some see the conflict leading to a shift away from Russian fossil fuels and hence faster decarbonisation in the long term, Froggatt warns about the short-term effects.

“It’s not all about renewables and efficiency; it’s also about the EU getting more liquefied natural gas (LNG) from other parts of the world,” he says, pointing out that tankers carrying LNG have started to be diverted towards Europe from other parts of the world. That hoovering up of energy supplies, together with rising food prices, is likely to create stresses across markets and could lead, for example, to countries falling back on using coal and perhaps setting less ambitious climate goals. “This is really hugely significant in terms of people’s ability to feed and heat themselves, get around, and therefore, potentially, political stability,” Froggatt says.

Back in Ukraine, Stavchuk and her team are starting to think about the bleak task of post-war reconstruction. Near Kyiv, there is discussion of restoring the wetlands where a Soviet-era dam was opened up at the start of the war in a desperate move to block the Russian army’s advance on the capital. Stavchuk’s team is still participating in international environmental and climate events, but despite the aforementioned attempts to have Russia expelled from various forums, they still often



**Cop15 chair and former Danish environment minister Connie Hedegaard**

**“We should not be naive – the war will pollute the climate field”**

find themselves across the table from the Russians, who, she says, use such meetings as a platform to justify the war or dismiss it.

“It’s very clear that nobody believes what they say, and they probably say it for their own audience,” Stavchuk says.

The conflict has already led to dramatic scenes elsewhere in the field of global diplomacy. At the UN in March, diplomats walked out of a Human Rights Council meeting during a speech by Russian foreign minister Sergei Lavrov. Meanwhile, representatives from the US, Canada and UK walked out of a meeting with the G20 in April, and US President Joe Biden reportedly wants Russia out of the global economic group.

“I don’t think we should be naive,” says Hedegaard. The war “will pollute the climate field”, particularly the longer the conflict persists. “My hope,” she continues, “would then be that... all these different things that we have initiated over the recent years will still help us to keep momentum.” ●

THOS ROBINSON / STRINGER / GETTY IMAGES

# Is your business ready for corporate climate reporting?

Why companies should use this new legal duty to show stakeholders they are serious about the climate

By Eleanor King and Laura Brankin

In association with **AECOM**

The Task Force on Climate-related Financial Disclosures (TCFD) are globally recognised as best practice in climate reporting by investors, the financial community, governments, and, increasingly, the wider public.

In the UK, reporting against the TCFD through the Financial Conduct Authority (FCA) has been a requirement for banks, building societies, and FCA premium listed companies.

On 6 April of this year, however, the Department for Business, Energy & Industrial Strategy (BEIS) made

reporting against the TCFD a legal requirement for all UK listed companies, large asset owners, limited liability partnerships (LLPs), and large private companies. To be fully aligned, companies must include climate-related information in mainstream annual financial filings (the location is slightly different for LLPs). The government will extend the TCFD-aligned reporting requirement to all UK companies by 2025.

Last year, AECOM conducted research to find out if firms were ready for this new duty.

### Our research shows that UK companies are unprepared

In March 2021, we conducted a review of climate-related reporting by large, private UK-registered companies on behalf of BEIS. The research revealed that a staggering 56 per cent of the 150 companies assessed had little or no disclosure on climate-related matters, while only 27 per cent had a “reasonable” or “strong” alignment with TCFD recommendations in their disclosures.

In general, stronger disclosure was identified in the TCFD pillars of “Governance” and “Metrics and Targets” rather than for the TCFD pillars of “Strategy” and “Risk Assessment”, suggesting that the forward-looking, future perspective of the TCFD as well as embedding climate risk into business strategy and financial risk appraisals may be less mature.

### Drivers and barriers to corporate climate reporting

In the research, companies interviewed cited several common barriers to climate reporting regardless of size, sector or maturity of reporting: lack of time and resources; costs associated with disclosure; data collection issues; and insufficient internal expertise or knowledge. The government’s recently published non-binding guidance is welcome; however, the extent of unreadiness highlighted in our research suggests many companies will struggle to overcome these barriers without significant organisational change, external support, and learning from others.

“Requests from stakeholders and investors” and “a regulatory requirement” were identified as two of the four most common drivers for reporting. The latter will only increase in importance as governments start to mandate.

However, companies that view the mandatory requirements as simply an annual report-writing exercise will be missing the point. Companies should view these new requirements as an opportunity to understand the benefits of incorporating climate into financial risk management and business planning, and to show stakeholders and investors that these risks are taken seriously. ●

*Eleanor King and Laura Brankin are sustainability experts at AECOM. Find out more at: [publications.aecom.com/sustainable-legacies](https://publications.aecom.com/sustainable-legacies)*

## The Policy Ask



# Carla Denyer: “I wanted to change the world faster than one wind turbine at a time”

The co-leader of the Green Party of England and Wales on working as a renewable energy engineer, declaring the first “climate emergency” and the need for a “dirty profits” tax

### How do you start your working day?

I usually wake up to Radio 4. I have a quick look at my phone to see if I have any urgent requests, then try to spend the first few hours of every day on big or difficult tasks – the “eat a live frog first thing in the morning” approach!

### What has been your career high?

So far, my successful motion on Bristol City Council in 2018 to declare a climate emergency and commit the city to going carbon-neutral by 2030. It was the first climate emergency declaration in Europe and set off a wave of hundreds of similar declarations in local and national government, education institutions, charities and businesses. Now the challenge is to hold those institutions to their ambitious new commitments.

### What has been the most challenging moment of your career?

The 2019 general election, which was the first time I stood as a parliamentary candidate. I came a healthy second place in Bristol West with 18,809 votes – the highest number of constituency votes the Green Party has ever received outside of Brighton Pavilion, where Caroline Lucas is MP. We worked incredibly hard for three months, but time wasn’t on our side; I had only been selected in September, and the snap election was called weeks later. The next election will be a different story – my goal is to be Bristol’s first Green MP.

### If you could give your younger self career advice, what would it be?

I never thought I’d be a politician. My degree was in mechanical engineering and I worked in renewable energy for six years, specialising in offshore and onshore wind. But I ultimately decided that I needed to try to change the world faster than one wind turbine at a time, and “green politics” was the best way for me to do that. I was first elected as a councillor in 2015. But even though it

wasn’t the most direct route into politics, I wouldn’t change anything. My engineering background often proves valuable – from interpreting graphs and statistics to asking probing questions and sniffing out greenwashing.

### Which political figure inspires you, and why?

Caroline Lucas, of course! But also dozens of other amazing women and non-binary people in the Green Party, including our deputy leader Amelia Womack and former leader (now House of Lords peer) Natalie Bennett.

### What UK policy or fund is the government getting right?

The Renters Reform Bill announced in the Queen’s Speech promises a long overdue rebalancing of power between landlords and tenants. It will abolish “no-fault” evictions and introduce an ombudsman and a register of landlords. But since abolishing “no-fault” evictions was promised by Theresa May in 2019, excuse me if I don’t hold my breath...

### And what policy should the UK government ditch?

Where do I start?! The choices are endless, but a particularly egregious one is the £27bn Road Investment Strategy 2 (RIS2) road-building programme, a transport policy that is clearly inconsistent with the government’s legally binding climate commitments.

### What piece of international government policy could the UK learn from?

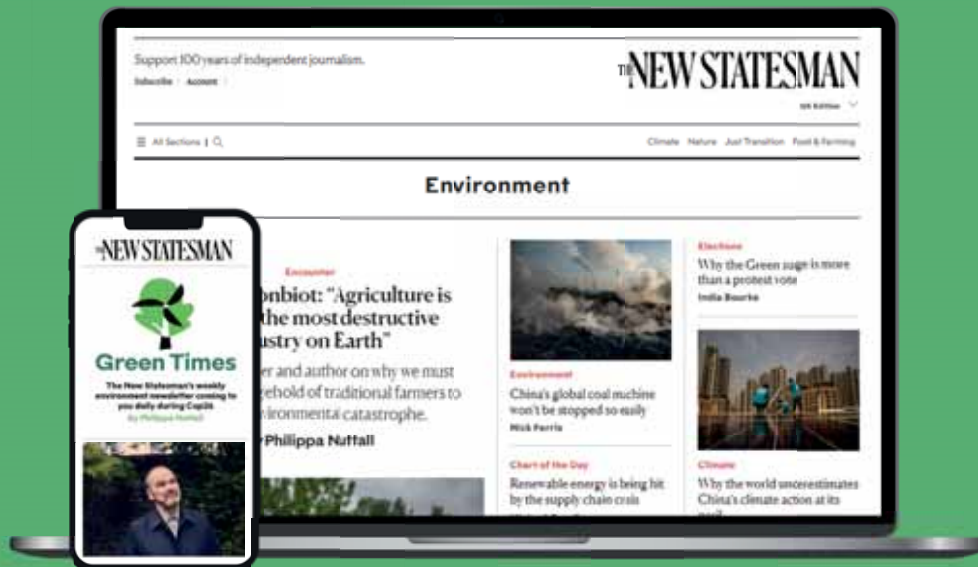
You don’t even need to leave the UK to find inspiration – Greens are in government in Scotland and have introduced free bus travel for under-22s, making sustainable travel the cheapest and easiest option for young people accessing work or education, and helping to cement lifelong habits of using public transport.

### If you could pass one law this year, what would it be?

A “dirty profits tax” on the obscene profits being made by fossil fuel companies, which would be a stepping stone towards a longer-term policy of a carbon tax to drive investment towards low-carbon technologies. Ninety-four per cent of Brits support a carbon tax on polluting industries. ●

# Green Times

The *New Statesman's* weekly environment newsletter



The politics, business and culture of the climate and nature crises

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