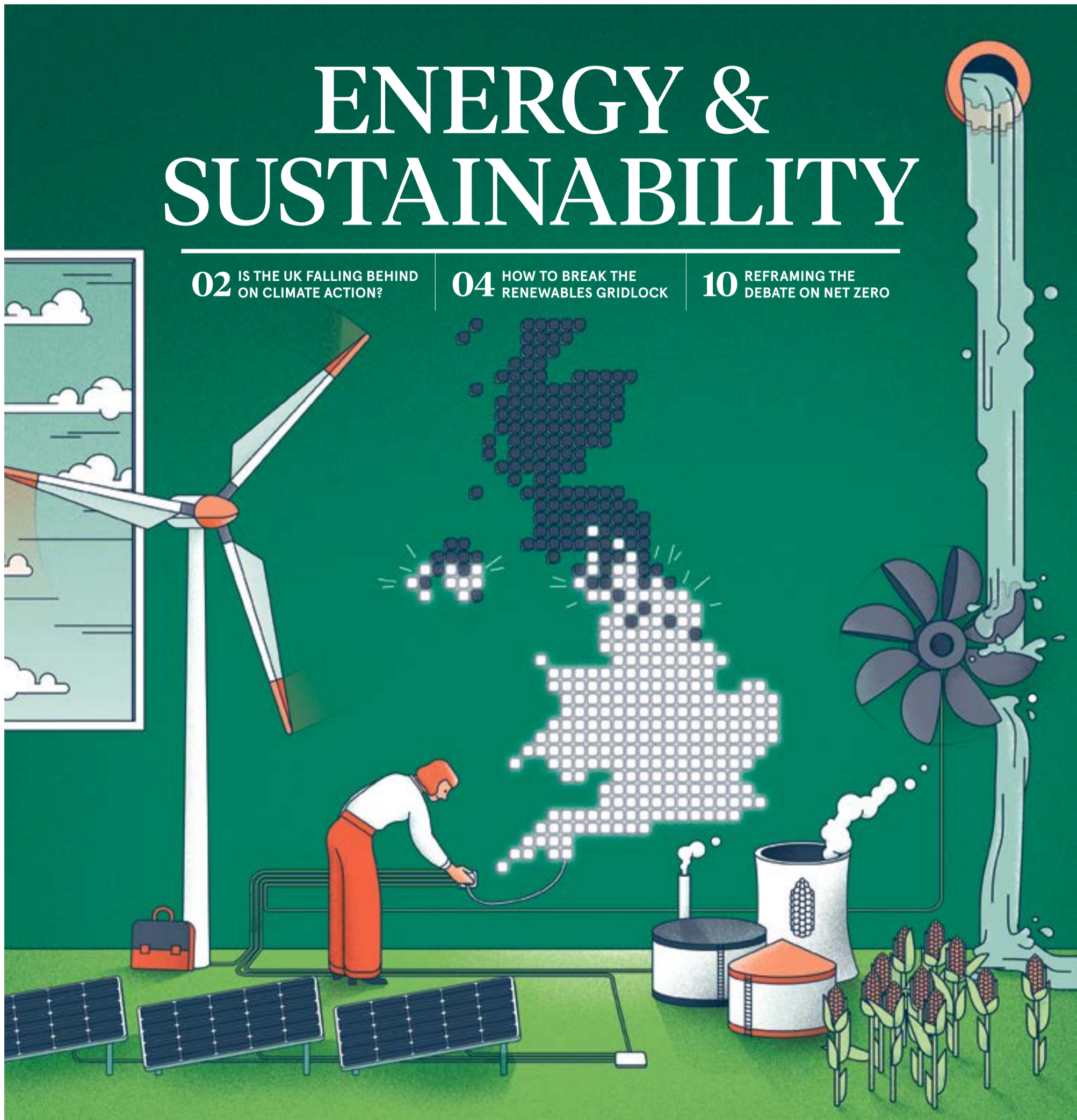
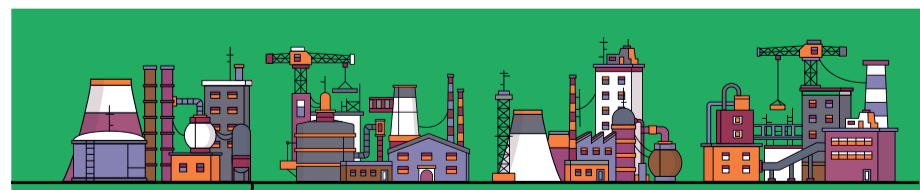


ENERGY & SUSTAINABILITY

02 IS THE UK FALLING BEHIND ON CLIMATE ACTION?

04 HOW TO BREAK THE RENEWABLES GRIDLOCK

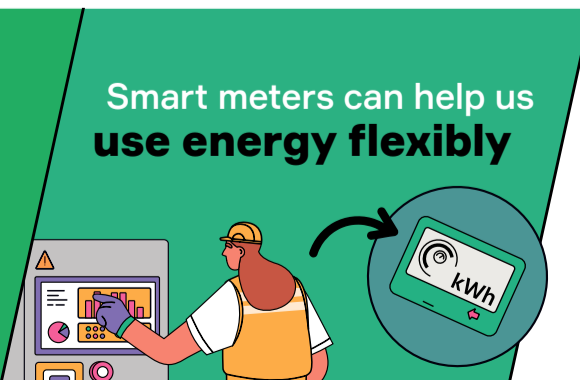
10 REFRAMING THE DEBATE ON NET ZERO

Over £2.5B cost

We could need **4 new gas-fired power stations** in 2030 if we don't start using energy more flexibly

Smart meters can help us use energy flexibly




smart meters

Find out more inside 

ENERGY & SUSTAINABILITY

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TECHNOLOGY

How cleantech could save the UK's status as a climate leader

This dynamic sector is a source of hope in the crisis, but it's clamouring for effective help from Westminster. Given the government's recent choices, that may not be forthcoming

Christine Horton

At the end of June, the Climate Change Committee (CCC) published its annual report on the government's progress in cutting greenhouse gas emissions in the UK. Its overall verdict was about as scathing as it gets from an independent non-departmental public body. The CCC's chair is Lord Deben, who served as environment secretary in the Major government during the mid-1990s when he was better known as John Gummer. He wrote an open letter to Rishi Sunak summarising the report's main findings. In it, he stated that the government's "failure to act decisively in response to the energy crisis and build on the success of hosting COP26 means that the UK has lost its clear global climate leadership. Game-changing interventions from the US and Europe, which will turbocharge the growth of renewables, are leaving the UK behind."

Lord Deben added that the problem was being compounded by the government's "continuing support for further unnecessary investment in fossil fuels".

Indeed, its recent release of hundreds of new North Sea oil and gas extraction licences has been decried by many for delaying the UK's transition to renewables and sending mixed signals to the energy industry and beyond.

Sylvie Russell, COO of Cambridge Cleantech, a membership organisation for firms in the cleantech sector, is one such critic. She believes that tackling climate change is not high enough on the Westminster agenda, having observed "a worrying degree of ambivalence" about the issue in the upper echelons of government.

The Deben letter also called on the prime minister to "act urgently to correct the failures of the past year and reclaim the UK's clear climate leadership role".

The good news is that the UK still has a chance to be a global leader in cleantech according to experts in this field. This country has a thriving innovation scene and remains one of the world's most important cleantech markets. In fact, it was second only to the US for hosting climate tech startups and scale-ups last year, according to research published by Tech Nation, which estimated that the UK was home to about 5,200 climate tech pioneers.

Yet being an R&D hotbed for new technologies simply isn't enough,



Laurenca Dutton via Shutterstock

according to Peter Bance, founder and CEO of cleantech firm Origami Energy. He argues that, if the UK cleantech sector "aspires to be more than simply a target-rich environment for acquisitive foreign companies, we need to back our successful innovators all the way through to global success".

Bance thinks that, while the UK may have missed the chance to establish itself as an important base for the large-scale production of solar panels and wind turbines, it is well placed to become a global leader in critical "enabling solutions". These are likely to add considerable value over time and will not be readily commoditised.

He explains: "Exciting areas include battery management systems, data science and analytics, and green trading. The solutions that will thrive and see the global stage will be sensitive and adaptable to changes in technology; modular and customisable to the needs of customers; and resilient to the

security risks of an increasingly digitalised energy system."

Public-private partnerships can play a key role in securing the future of British cleantech. That's the view of Hannah Scott, co-founder and CEO of Oxfordshire Greentech, a business network supporting the growth of the county's low-carbon sector. She reports that "several partnerships of this type have had great success, including the Energy Superhub Oxford – Europe's largest charging hub for electric vehicles – and Local Energy Oxfordshire, which is one of the most ambitious trials of its kind in the UK. These initiatives, which use the government's policy and grant-funding abilities in tandem with the private sector's dynamism and our universities' world-leading research capabilities, are hugely important."

Although public-private partnerships can clearly boost the development of cleantech, they are unlikely to make this country a world leader in this field on their own. Much

more would have to be done across the board. For instance, the UK doesn't have an equivalent of the US Inflation Reduction Act 2022. Within 12 months, this legislation has stimulated about \$278bn (£222bn) in new clean energy investments since it was enacted, creating more than 170,000 jobs in the process, according to environmental campaign group Climate Power.

"Many are calling this act the most significant piece of climate legislation in US history," Scott says. "In the UK, we have yet to see a piece of legislation that has caused an equivalent uptick in renewables investment and development."

Cleantech for UK is an initiative aiming to establish a dialogue between policy-makers and those funding, creating and developing cleantech businesses. Its founding coalition features investors controlling combined funds exceeding £6bn. The organisation has estimated that the UK would need to "spend a total of £33bn in cleantech over the next 10 years to spend the GDP equivalent of the Inflation Reduction Act", but there is no government plan in place to support anywhere near that level of investment at present.

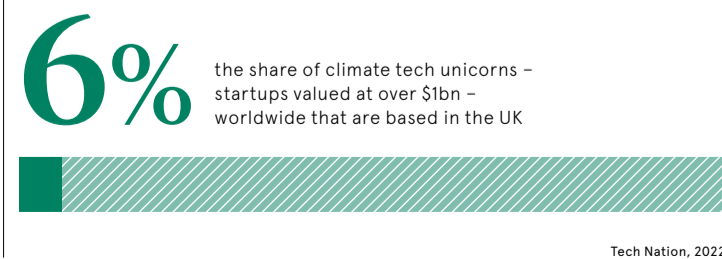
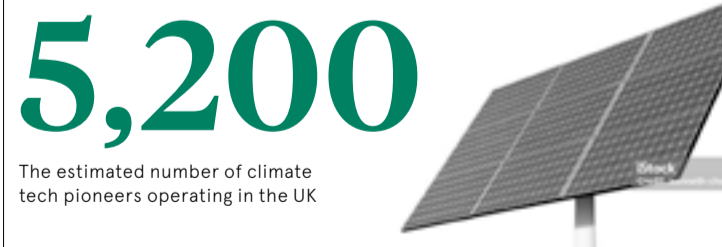
Cleantech for UK recently wrote its own open letter urging ministers to consider a three-pillar strategy to maintain the UK's competitiveness in the field.

"As the world enters a new era of cleantech competition, the UK has a once-in-a-generation opportunity to build its economy, unlock thousands of jobs and deliver a net-zero future," it argued, noting that the EU, the US, China and Japan "are all moving quickly to capture their share of the cleantech market. The UK needs to respond to the international competition and provide a clear delivery plan to develop net-zero industries."

The organisation believes that the government must focus on creating an agile and supportive regulatory system; support projects with public money and innovative funding models; and devise a long-term policy framework.

Ultimately, this calls for an ecosystem approach that can rival what's happening in other economies, where policy, enterprise and innovation go hand in hand.

As Russell notes: "There are plenty of smart and motivated people in this sector who are willing to contribute to that. They simply need the government to ask them." ●



Tech Nation, 2022

INSIGHT

'Committing to the energy transition has become about business survival'

Uptake of renewables must accelerate if climate goals are to be met. **Sam Kimmins**, director of energy at The Climate Group, says that the onus is on strategic decision-makers

The global energy landscape is on the cusp of a historic transformation. Solar has become the cheapest form of electricity, with wind close behind as their costs keep dropping. This presents a golden opportunity for governments and businesses to achieve sustainable economic growth and a cleaner, more prosperous future.

That's exactly what we're discussing with business leaders and politicians at Climate Week NYC. The aim is to drive climate action – fast.

Yet not all markets are taking full advantage of this seismic shift. While the costs of renewable energy are hitting record lows in some countries – mainly China, the US and EU member states – other nations are being held back by antiquated energy market structures. It's high time for governments and businesses to commit fully to the transition to renewables. Any that hesitate risk getting left behind.

This might sound like an exaggeration, but it isn't. Companies such as AB InBev, Apple, Nike and Unilever are asking suppliers to use 100% renewable electricity. And, with the introduction of measures such as the EU's carbon border adjustment mechanism, committing to the energy transition has become a matter of commercial survival.

With corporate giants clearly indicating the direction of travel, other businesses and governments should have the confidence to act too.

Some political leaders are taking action. President Tsai Ing-wen of Taiwan has described our RE100 initiative, under which firms commit to sourcing all their electricity from renewables, as a key consideration in her government's industrial policy. Some Asian companies have remarked that RE100 is their passport to international trade.

Yet too many remain complacent. South Korea, for instance, has abundant offshore wind opportunities and it's aiming to produce just over 30GW of solar electricity a year by 2030 – yet renewables accounted for only 5.4% of its electricity production last year, compared with 40% in the UK. Companies report that sourcing renewable energy in South Korea is difficult and costly. This is almost entirely down to a failure of market structures to benefit properly from the low cost of producing wind and solar electricity.

So what's next? As the world electrifies its transport, heating and industrial systems, demand for renewable energy is rocketing. To stay on course for a 1.5°C temperature rise, the world's renewable energy capacity needs to triple to more than 11,000GW by 2030, according to the Global Renewables Alliance. It's possible to meet this demand with relatively simple changes. Many capacity additions can be inexpensive with rapid paybacks. These are increasingly using private capital and they often don't require subsidies.

But that's the easy part. The energy transition will require a full, system-level approach. Countries must not only increase generation capacity; they must also upgrade their grids and other infrastructure to ensure that enough electricity can get to where it's needed. Balancing a 100% clean grid is entirely feasible with today's technology.

Countries that get it right will enable their businesses and citizens to benefit from international interconnectors, such as those being developed between Morocco and the UK, ensuring that there is almost always wind or solar somewhere in the grid. They'll benefit from storage innovations such as using electric vehicle fleets as a distributed mega-battery to smooth out peaks and troughs in demand and generate income for owners. And AI-driven demand management will ensure that we're using only the energy we really need in the most efficient possible way.

All this requires a thoroughly planned and integrated approach – and governments and businesses must act now. Those that don't will get left behind, encumbered by costly and dirty fossil-fuel-based systems that aren't fit for purpose. ●



Sam Kimmins
Director of energy, The Climate Group



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INFRASTRUCTURE

Grid locked: why the UK's green transition is stuck on amber

The country's decarbonisation objectives are in jeopardy unless National Grid can cut the queue of renewable electricity generators seeking a connection. There is much riding on its new strategy

Simon Brooke

The UK's renewable energy generation capacity has increased hugely in recent years. In Q1 2023, the sector's share of the nation's total electricity generation hit a record 47.8%, according to the Department for Energy Security and Net Zero. But that proportion would be even higher if it weren't so hard for new renewable generators to plug into the national grid.

Before exploring how, it's important to be clear about the terminology. National Grid, the company, has been two entities since April 2019: National Grid Electricity Transmission (NGET) and National Grid Electricity System Operator (NGESO). NGET owns the transmission network in England and Wales – the high-voltage infrastructure linking the main generators to the biggest consumers and to the lower-voltage local distribution networks that feed homes and businesses. The transmission and distribution networks are usually referred to collectively

“There hasn't been enough pre-emptive investment in our electrical infrastructure to allow for the current level of expansion

as the national grid. NGESO is the transmission system operator for Great Britain, constantly adjusting the grid's output to ensure that demand is always matched.

Traditionally, big generators such as nuclear power stations and offshore wind farms feed into the transmission network. About 70% of Great Britain's electricity is connected this way. Smaller projects will tend to plug into the local distribution networks. The big problem is that there is a lengthy waiting list for new projects seeking a connection, wherever that may be on the grid. Some applicants are being told that they'll have to wait as long as 15 years for the infrastructure to be upgraded to a level at which they would be able to join it safely.

“The connections process was originally designed for a small number of large generators, whereas today it's handling a huge number of applications from a wide range of smaller green projects,” explains Roisin Quinn, director of customer connections at National Grid. A lack of foresight and funding over many years has been one of the main causes of this problem, according to Nikki Pillinger, specialist connections manager at independent grid consultancy Roadnight Taylor.

“There hasn't been enough pre-emptive investment in our electrical infrastructure to allow for the current level of expansion of renewable generation,” she says.

But Pillinger adds that awareness of the problem is at least growing, largely because some influential players in the industry have been pushing it up the agenda.

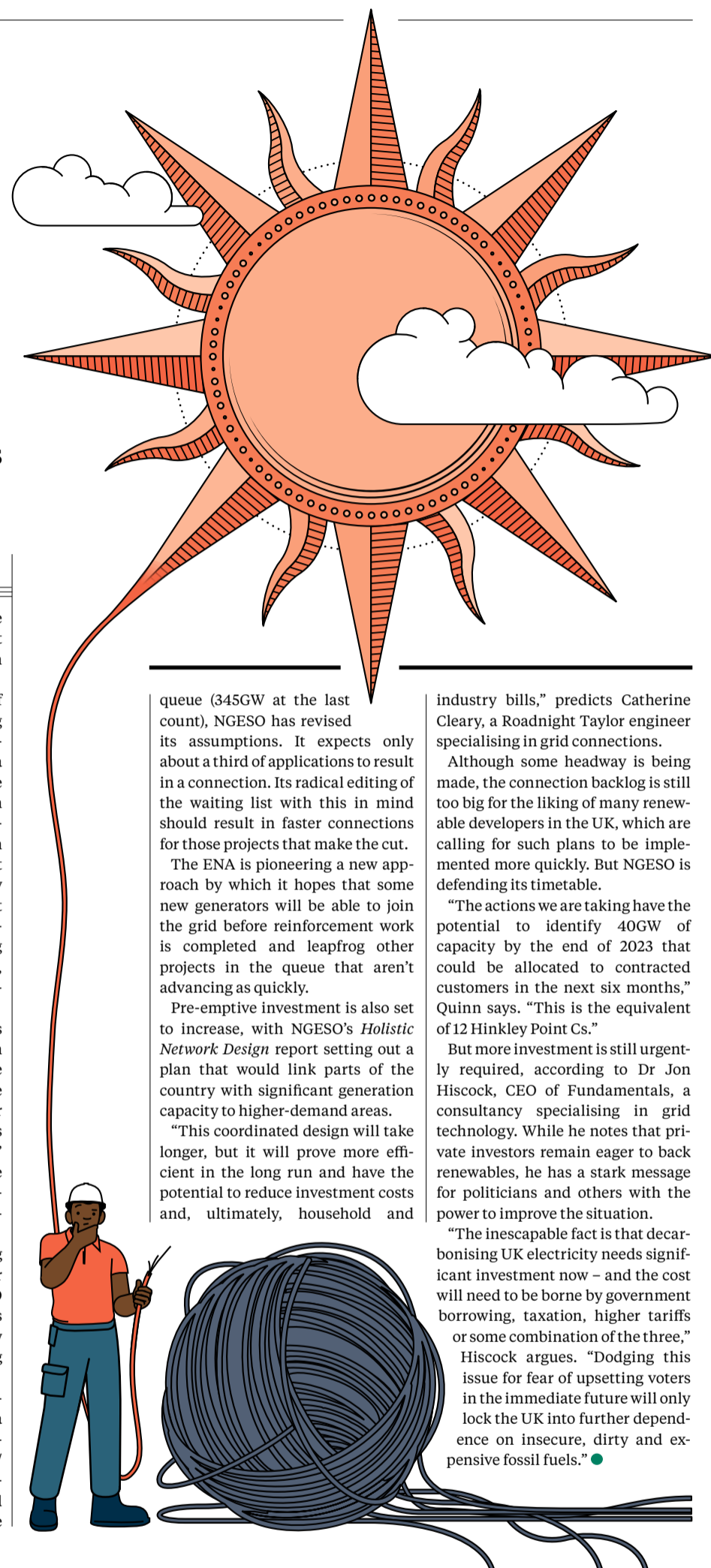
Other countries, especially in the West, are also struggling to connect renewable generators quickly enough to meet their sustainability pledges.

“The US has a huge backlog of low-cost renewable generators trying to connect to its transmission network.” So says Mathias Einberger, a manager focusing on carbon-free electricity at the Rocky Mountain Institute, a not-for-profit organisation working to accelerate the clean energy transition. He cites recent research by the Lawrence Berkeley National Laboratory indicating that there's about 2TW of mostly renewable generation and storage waiting to join the US grid. For comparison, the nation's total installed generation capacity is roughly 1.25TW.

“The best and least costly sources of electricity in the US, which happen to be zero-carbon resources, are to be found far from where most people live and consume electricity – for example, wind on the Great Plains and solar in the Desert Southwest,” Einberger says. “We must therefore update and expand the grid, especially the long-distance transmission lines that span several regions.”

Many industry insiders are calling for an urgent upgrade along similar lines in the UK. That's why NGESO and trade body the Energy Networks Association (ENA) revealed new plans in Q1 2023 aimed at slashing connection waiting times.

One of NGESO's original assumptions was that all projects seeking a connection would succeed, but experience has told it that planning and/or funding problems will cause several withdrawals. Given this fact and the scale of capacity stuck in the



queue (345GW at the last count), NGESO has revised its assumptions. It expects only about a third of applications to result in a connection. Its radical editing of the waiting list with this in mind should result in faster connections for those projects that make the cut.

The ENA is pioneering a new approach by which it hopes that some new generators will be able to join the grid before reinforcement work is completed and leapfrog other projects in the queue that aren't advancing as quickly.

Pre-emptive investment is also set to increase, with NGESO's *Holistic Network Design* report setting out a plan that would link parts of the country with significant generation capacity to higher-demand areas.

“This coordinated design will take longer, but it will prove more efficient in the long run and have the potential to reduce investment costs and, ultimately, household and

industry bills,” predicts Catherine Cleary, a Roadnight Taylor engineer specialising in grid connections.

Although some headway is being made, the connection backlog is still too big for the liking of many renewable developers in the UK, which are calling for such plans to be implemented more quickly. But NGESO is defending its timetable.

“The actions we are taking have the potential to identify 40GW of capacity by the end of 2023 that could be allocated to contracted customers in the next six months,” Quinn says. “This is the equivalent of 12 Hinkley Point Cs.”

But more investment is still urgently required, according to Dr Jon Hiscock, CEO of Fundamentals, a consultancy specialising in grid technology. While he notes that private investors remain eager to back renewables, he has a stark message for politicians and others with the power to improve the situation.

“The inescapable fact is that decarbonising UK electricity needs significant investment now – and the cost will need to be borne by government borrowing, taxation, higher tariffs or some combination of the three,” Hiscock argues. “Dodging this issue for fear of upsetting voters in the immediate future will only lock the UK into further dependence on insecure, dirty and expensive fossil fuels.”

Smart meters: helping Britain decarbonise flexibly

As the UK works towards its ambitious goal of reaching net zero by 2050, homeowners are set to take centre stage. That means managing their increasing demand for electricity in an adaptable way

It's easy to miss it, but meeting net zero isn't just about industry and big business. Homeowners also have a critical role to play – for example by adopting a more flexible approach to how, and when they use electricity.

The importance of flexibility to decarbonising Britain is revealed in new analysis from Cornwall Insight and Smart Energy GB. It shows that by shifting electricity usage away from peak times, not only can consumers cut their own bills, they can also help to reduce carbon emissions and the strain on the national electricity supply too, while simultaneously boosting the UK's energy security by cutting our reliance on imported fossil fuels.

“This is a defining moment in our energy journey,” says Anna Moss, a senior consultant at energy market specialists Cornwall Insight. “Britain is moving along the path to a more electrified future, where household engagement with flexibility will enable us to reach net zero at lower cost, allowing consumers to realise the financial benefits associated.”

“By embracing household flexibility, we can not only revolutionise our electricity landscape but also rejuvenate our commitment to a greener, more sustainable future.”

The data in the report reveals some startling benefits for Britain. Household energy flexibility has the potential to deliver £14bn of savings for Britain in 2040, and those households that embrace it could see the wholesale electricity costs in their bills drop by a staggering 52%. Even those consumers

who can't or don't actively participate will see bills drop by as much as 38%, thanks to a more efficient system.

“The energy system of the future will have consumers and flexibility at its heart,” says Fflur Lawton, head of policy and public affairs at Smart Energy GB, the not-for-profit campaign tasked with raising awareness and understanding of smart meters in Britain.

The report also suggests that by shifting electricity use away from peak periods, we could avoid the need to build the equivalent of four gas-fired power stations in 2030, saving an estimated £2.5bn.

“The debate around how we can meet the country's growing demand for electricity often focuses on the need to create more national infrastructure,” continues Lawton. “But this report clearly shows that there is another side to this debate: enabling and incentivising consumers to use the energy we generate in a more flexible way.”

During the week, there is usually a surge in energy demand between 4pm and 7pm, as household use ramps up and industry continues to draw power. To meet this peak demand, gas-fired power plants are often called into action, adding to carbon emissions and providing electricity that is more expensive than renewable options such as wind and solar.

This drives up wholesale electricity costs and ultimately hits consumer bills, says Lawton. And given the anticipated increase in electricity demand from electric vehicles and heat pumps over the next few years, this issue is



“By embracing household flexibility, we can not only revolutionise our electricity landscape but also rejuvenate our commitment to a greener, more sustainable future

poised to become even more acute. “Finding ways to work around these peak times is at the core of the new flexible system,” she adds.

More than half of UK households now have a smart meter, the foundation of a flexible energy system future. “They're a cornerstone technology,” she continues. “They provide the data and the information that is critical to creating benefits for people, the environment and the energy system.”

As well as giving consumers greater visibility of their energy use and costs, they provide energy suppliers with the near real-time data they need to more accurately buy the right amount of energy to meet customers' needs. This will also allow them to make more use of renewable energy resources, making the whole UK energy system more resilient.

Smart meters allow homeowners to access time-of-use tariffs too, when suppliers offer different prices to encourage consumers to use electricity at times of the day when it is cheaper. They also mean that households can sign up to initiatives such as the National Grid ESO Demand Flexibility Scheme, which was trialled for the first time last winter. More than 1.6 million households took part in the project, which offered financial rewards and incentives for avoiding the use of energy-intensive appliances at high peak times. An expanded scheme is set to run this winter.

“Realising the benefits of household flexibility is going to become easier as

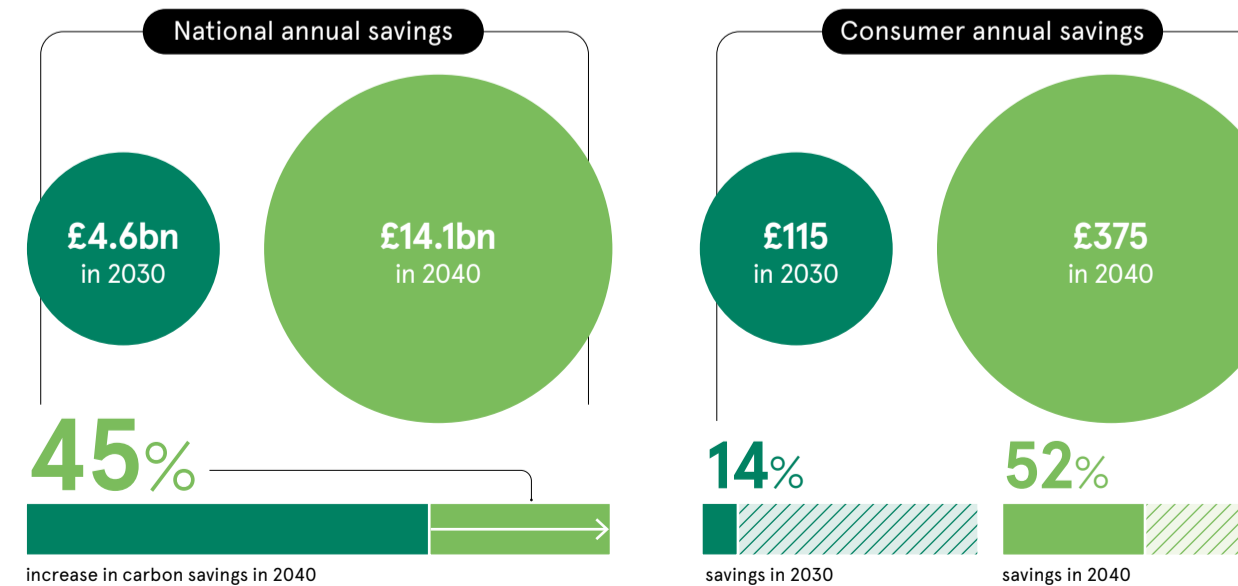
more technology becomes automated and smart-enabled,” says Lawton. And while some of these technologies may currently be unaffordable for many consumers, the report suggests that changes in policy, financing and costs are expected to drive greater levels of uptake in the future.

Importantly, it's likely that many new technologies will make it easier to shift when electricity is used or when appliances are charged. For example, electric vehicles (EVs) could be charged when electricity is cheaper and there is lower demand, based on parameters that would ensure they are always 50% charged. Likewise electric heat pumps could be programmed to respond to price signals from energy suppliers, reducing running costs while still ensuring a comfortable home environment.

“The beauty of this flexibility is that you can be an active participant in helping the UK to decarbonise without actually having to do anything,” adds Lawton. “Using energy more flexibly at home is a win for consumers, for the environment and the resilience of our energy system.”

WHAT'S THE OPPORTUNITY FOR HOUSEHOLDS?

Even households that do not actively participate in household flexibility will see an overall reduction in their bill, as a result of a more efficient system



Search 'get a smart meter'*
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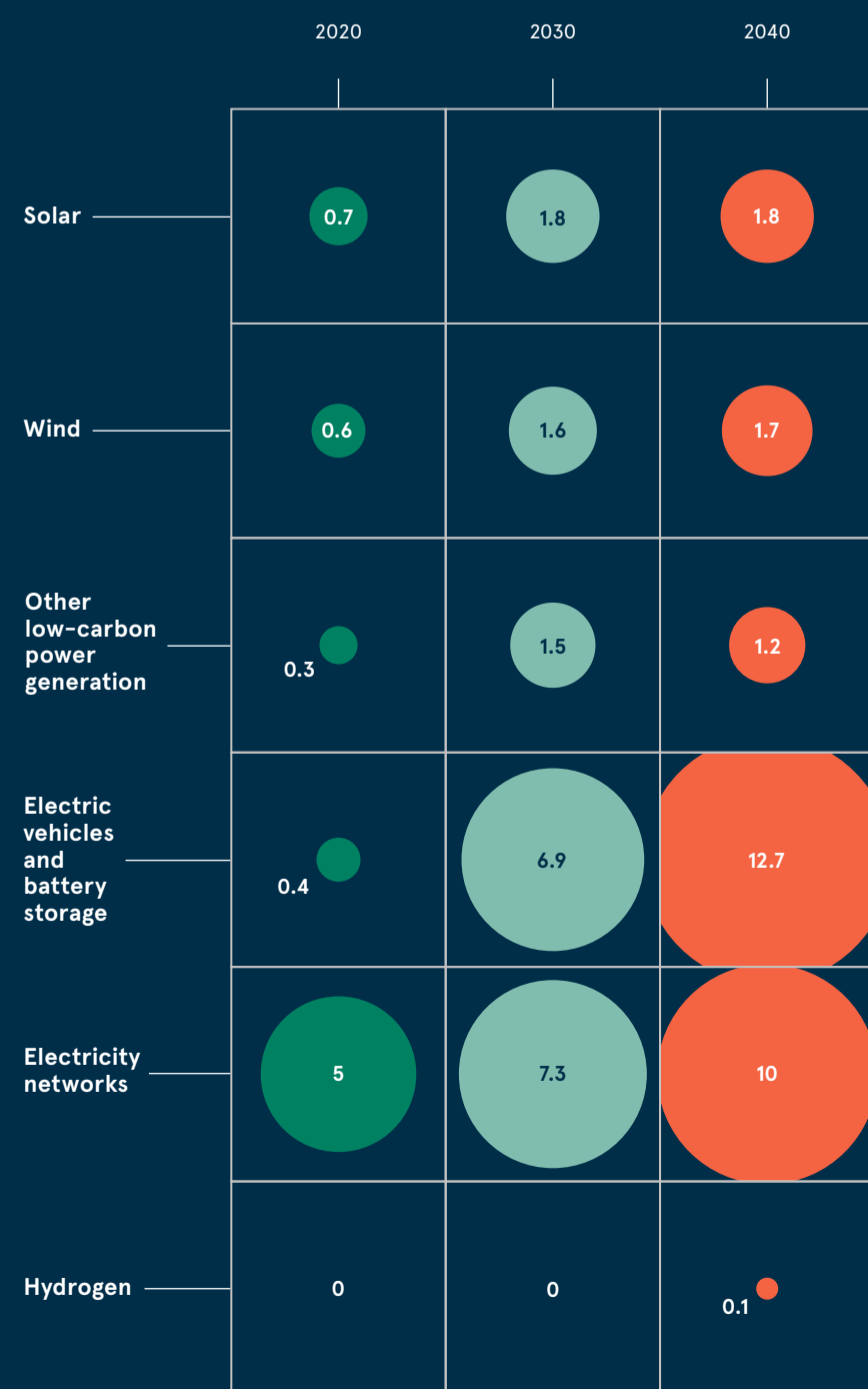
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MISSION-CRITICAL MINERALS

Renewables are clearly key to the global energy transition, but significant development work is needed if sources of clean power are to replace fossil fuels. We'll need more batteries, solar panels, wind turbines and hydro plants. One essential – and perhaps underappreciated – ingredient in all of this is critical minerals. Batteries need lithium, for instance, while turbines require lots of zinc and copper. Can the world keep pace with the demand?

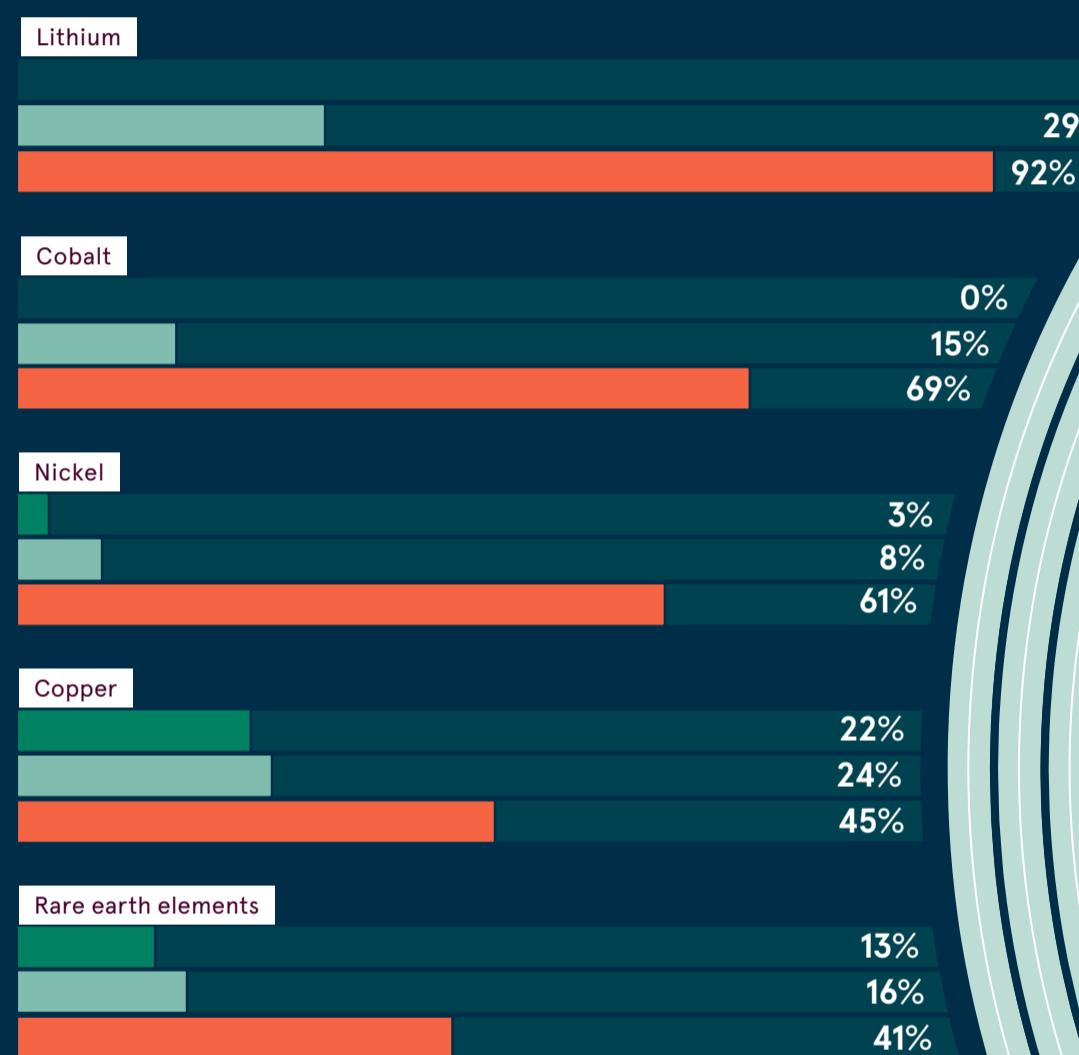
GLOBAL DEMAND FOR CRITICAL MINERALS IS SET TO RISE SHARPLY IN A SUSTAINABLE DEVELOPMENT SCENARIO

Actual and projected mineral demands of clean energy tech worldwide in 2020, 2030 and 2040, applying the International Energy Authority's model (million tonnes)



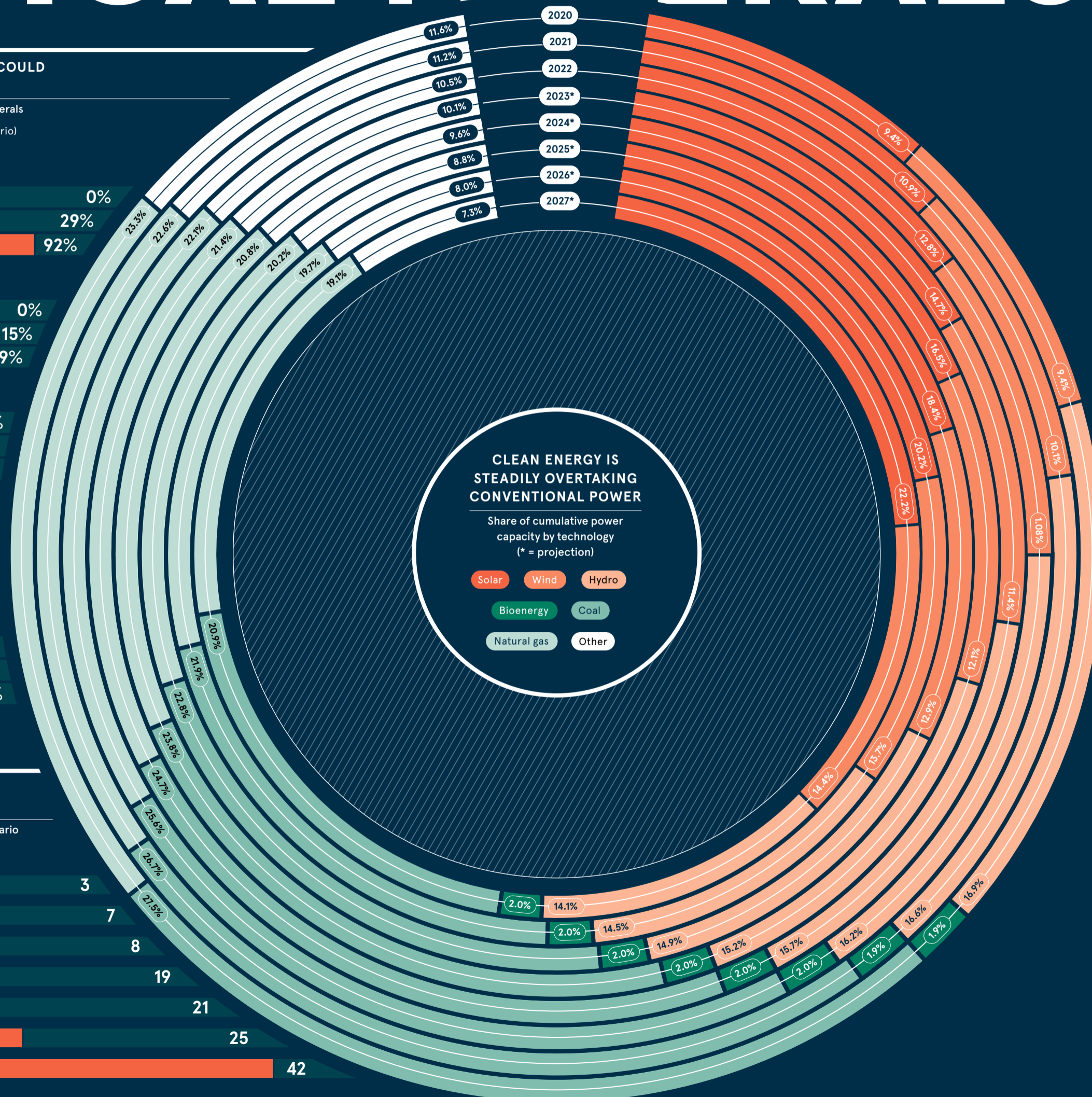
BY 2040, MORE THAN 90% OF THE GLOBAL DEMAND FOR LITHIUM COULD COME FROM CLEAN ENERGY TECHNOLOGIES

Clean energy technologies' actual and projected share of total global demand for selected minerals



DEMAND FOR CERTAIN MINERALS WILL INCREASE SIGNIFICANTLY THROUGHOUT THE GLOBAL ENERGY TRANSITION

Growth in demand for selected minerals by 2040, under the IEA sustainable development scenario (index score where the recorded demand in 2020 equals 1)



MONITORING

What makes a good emissions tracker?

Under pressure from investors and regulators, firms are increasingly monitoring their own greenhouse gas emissions. Here are the key factors to consider when selecting a tool for this job



Clara Murray

More and more companies are making net-zero or carbon-neutral promises. But behind these headline-grabbing pledges is a lot of complex data. Tracking emissions across business lines, suppliers and products, and then reporting against various frameworks and regulations, might take a team armed only with spreadsheets several months.

It is therefore little surprise that cash is pouring into tech solutions to expedite all this tracking and reporting work. Carbon accounting platforms attracted a record \$970m (£774.5m) of investment last year, according to Sifted. Among the best known on the market are EcoVadis, Greenly, Persefoni, Supercritical, Plan A and Watershed.

Most promise a streamlined, cloud-based way to count up the carbon footprint of an organisation, product or supply chain. Mauro Cozzi, co-founder and CEO of Emitwise, describes his company's tool as providing "everything a sustainability manager would have been doing already in Excel or pivot tables in an easy-to-use platform, but with increased repeatability and without human error."

The benefits, according to vendors, include faster accounting and reporting, clear audit trails and lower costs than bringing in consultants. But Hugo Kimber, CEO of the Carbon Responsible consultancy, advises caution, warning that many of these platforms are new and have therefore yet to be thoroughly tested.

"A lot of people have decided that climate tech is the next big thing," he says. "There's probably less substance than there is noise in this market at present."

For firms trying to deal with pressure from investors, avoid accusations of greenwashing and anticipate moves from regulators, the cost of getting carbon tracking wrong could be steep. How do you tell which tool is worth investing in?

First, consider if your firm needs one, advises Mark Lumsdon-Taylor, a partner and ESG specialist at accountancy firm MHA.

"I recommend SaaS tools only to businesses that are multi-sited and have divisions that are spread geographically or are multi-jurisdictional," he says. "If you're just based in the UK with a single central facility, why invest so much?"

Several providers, though, do target SMEs on a budget. While most are tight-lipped about the fees they

typically charge, the cheapest start from about £300 a month.

If you are committed, there are several factors to consider. Most software should offer the same basic functionality: a way for users to enter or upload data, view it on dashboards and produce summary reports. What exactly is measured and how, though, might vary widely.

"What a lot of organisations that don't work sector-agnostically fail to realise is that there isn't a one-size-fits-all for how you report your carbon emissions," observes Ellen Salter, sustainability director at consultancy thinkBeyond.

For instance, construction firms must calculate the life-cycle carbon cost of specific buildings, while manufacturing businesses prioritise reporting by supplier. Companies might also want the flexibility to tot up emissions by year, site or scope, and to report these against a range of international frameworks.

Some consultancies and enterprise software providers – including

PwC, IBM, Salesforce and Microsoft – offer carbon-tracking solutions that can be customised to your business. A more budget-friendly option might be adopting a sector-specific tool such as CarbonCloud, which works with food and drink companies, or Trace, which is aimed at the events industry.

George Roffey, chief sustainability officer at Centrus, a corporate financial adviser, is in the process of choosing a carbon accounting platform. He says the most impressive options have not only had experience in his firm's sector; they can also advise on forthcoming regulatory changes that might affect it.

In either case, the accounting method should be audit grade and include a way to export data to avoid being locked into one tool. You should also consider how it will integrate with your existing applications, such as broader ESG trackers or financial accounting software.

Transparency is also vital. Vendors must provide details of any

models, methods or data sets used to calculate emissions. That includes estimates, such as the 'average' energy use of an employee who works from home, which should be clearly labelled within the platform.

Many systems offer not only tracking capabilities but also the ability to represent data in user-friendly visual formats. Salter says that her clients often find this helpful when seeking senior leadership support for sustainability-related decisions.

"Carbon accounting, like climate change, is a theoretical concept for a lot of people. Unless they can actually see it, they can find it difficult to buy into the practical realities." She adds that a "solid" accounting tool should give users "the support and the ability to manipulate the data to understand the 'why' behind it rather than the 'what' – which many tools don't do."

For instance, rather than simply seeing that a particular site has high emissions, users should be able to explore the factors behind this in greater detail. More advanced tools will also let users experiment with different variables – such as water consumption or transport methods – to see how they could affect the organisation's overall footprint.

Experts urge caution with tools that claim to provide detailed guidelines on reducing emissions. Specialist advice is probably still needed to produce useful, tailored insights. Kimber says there should always be a human behind a sustainability strategy so that firms are "not just left with some shiny portal that they shovel a whole load of data into and then a report comes spinning out of the back of it".

Be more careful still when a provider offers carbon offsetting. The usefulness of such schemes has been questioned in any case, but bundling this service with an accounting platform might incentivise providers to inflate emissions.

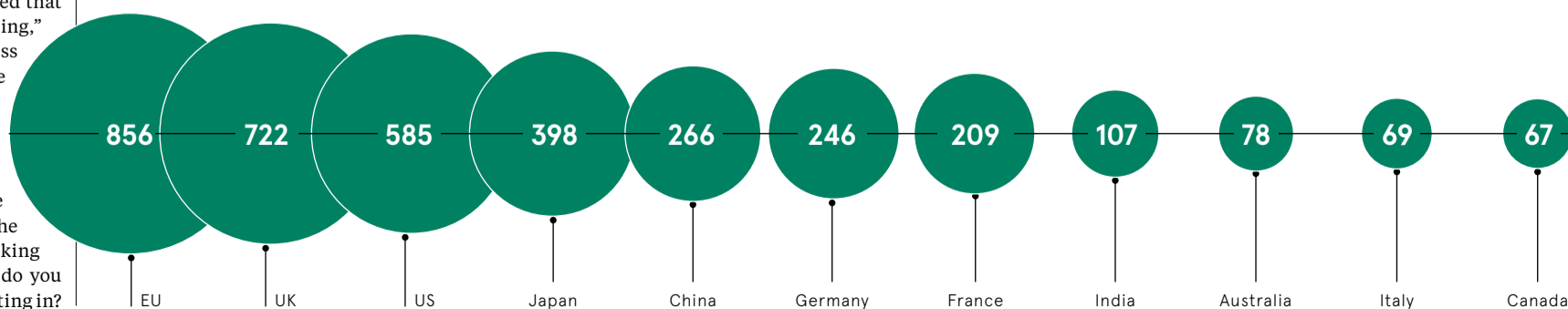
Lastly, good vendors should provide training for anyone who will use the system. While many platforms claim to be "plug and play", users still need to know what data to enter.

As Lumsdon-Taylor notes: "If you put rubbish in, you'll invariably get rubbish out of the other end." ●

THE UK AND THE EU LEAD THE WAY IN CORPORATE EMISSIONS INITIATIVES

Science Based Targets Initiative, 2022

Total number of companies worldwide with approved science-based emissions targets and commitments in December 2022, by jurisdiction



'Wind and solar energy face a perception problem'

A massive expansion of renewable energy generation is needed to secure a sustainable future for the world, according to **Pascal Storck**, head of renewable energy at Vaisala Xweather, but take-up is still slow. What can be done to overcome people's doubts?

One of the largest transitions in human history is currently underway – the switch from fossil fuels to renewable energy – but time is running out to reverse, or even slow, the impact of climate change. The Earth has just had its hottest three-month period on record, and "surging temperatures demand a surge in action", says António Guterres, secretary-general of the United Nations.

So, why is renewable energy still providing only a small fraction of global energy demand? Why isn't it growing more quickly?

Well, many people have a deep-seated conviction that wind and solar energy can't deliver a stable supply of electricity because they depend on weather conditions that can vary from day to day. However, as we will see, this is fundamentally not a weather problem, but a perception problem.

Indeed, there is nothing stopping the large-scale, global use of renewable energy right now other than the inertia of the status quo. If we fail to overcome this – and fast – the clean energy revolution will be too slow to have the crucial climate impacts we urgently need.

Wind and solar power only appear to have a predictability problem because electricity markets favour power generation from fossil fuels first. Producers are told to stop generating carbon-free electricity if they are doing so at a time when grid demand is already being met by other, carbon-emitting sources – which is the opposite of how it should be.

To reduce global warming, carbon-free electricity should always come first, and its generation should be curtailed only when the total amount of renewable energy being produced exceeds the demand for electricity.

Producers can also usually get a better price for their electricity if they can sell it in advance rather than at the last minute. This benefits natural gas generators, who can decide how much electricity they produce – and when they produce it. However, the sun and the wind are not under the control of renewable operators, and this lack of control can result in them not being able to supply the agreed amount of electricity at the agreed time – and being fined for it.

Renewable producers shouldn't be penalised if the wind and sun don't show up. Rather, this should be another cost borne by society, just as governments all over the world today subsidise oil and gas to artificially lower their price.

There should always be sufficient flexible power generation to make sure that demand is met, but we must change the order in which we prioritise energy sources. To prevent the worst impacts of climate change, there should never be a moment when electricity is produced burning carbon when it could have been produced carbon-free.

The electricity grid of the future should be incentivised to use all the carbon-free electricity it can. But supporters of the status quo argue that the variability of renewable energy production is too great for the grid to handle. However, the grid is already used to dealing with variability and the uncertainty of predictions.

For instance, no one knows when you are going to get out of bed in the morning and turn on the coffeemaker. That is entirely up to you. But we have predictive models that estimate the demand for electricity from millions of individuals at any given time because – as with any prediction problem – the more you focus on the big picture, the more accurate it becomes.

What happens if we predict the total supply of renewable energy in a region as well? Rather than expecting a single wind or solar farm to precisely predict its output – and

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THE MAJORITY OF PEOPLE BELIEVE ACTION IS NEEDED IN RESPONSE TO CLIMATE CHANGE

Respondents to a survey of consumers across 50 countries

64%

of people believe climate change is a global emergency

Among this group →

59%

said that the world should do everything necessary and urgently in response

UN Development Programme, 2021

RENEWABLE ENERGY IS THE MOST EFFECTIVE SOLUTION TO REDUCE CO₂ EMISSIONS

Gigatons of CO₂ equivalent reduced or sequestered between 2020 and 2050 for each solution under a scenario in which global temperature rises are limited to 1.5°C above pre-industrial levels by 2100

Solution	Gigatons of CO ₂ equivalent reduced or sequestered
Onshore wind turbines	143.56
Utility-scale solar photovoltaics	111.59
Plant-rich diets	103.11
Reduced food waste	102.20
Tropical forest restoration	85.14
Clean cooking	76.34
Family planning and education	68.90
Distributed solar photovoltaics	64.86
Refrigerant management	57.15
Alternative refrigerants	48.75

● Renewable energy solutions ● Other solutions

Project Drawdown

THE FIVE MOST POPULAR CLIMATE POLICIES, GLOBALLY

Consumers asked which of 18 climate policies they would like their country to pursue

Policy	Percentage
Conserve forests and land	54%
Use solar, wind and renewable energy	53%
Use climate-friendly farming techniques	52%
Invest more money in green business and jobs	50%
Use more clean electric cars and buses, or bicycles	48%

UN Development Programme, 2021

punishing it if it gets it wrong – what if we just let that electricity come onto the grid as it will and use data and machine learning to predict the total supply at grid level from thousands of wind and solar producers?

Texas is a poster child for renewable energy in the US. Historically known as the home of oil and gas, Texas now has one of the highest concentrations of renewable energy in the world.

The energy output of a single wind farm in Texas may look like a rather violent rollercoaster, with sudden drops and surges that take you by surprise. When you look at the output of the whole state, however, it looks more like ocean swells breaking on the shore. The pattern is much more consistent and predictable.

Over a large state like Texas, renewable energy forecasts are accurate, with the same margin of error that our current demand forecasting models have. Nothing really changes; we simply move from forecasting

demand and incentivising supply to forecasting supply and incentivising demand. This should motivate suppliers to increase the production of renewable energy and leave us with a small number of on-demand generators to fill in the remaining gaps.

The next step is battery storage, which promises to make renewable energy supply less prone to peaks and troughs. This technology allows – for example – a solar power producer to store energy during the sunniest part of the afternoon and put it onto the grid when demand is high (and the sun is low) in the early evening.

One of the most market-competitive assets you can build right now is a large solar project with a battery – and those costs are only going to come down even more. The take-up of battery storage is a few years behind wind and solar but catching up fast.

The uncertainty of weather is no more of a problem for renewable energy than the complexity of subsurface geology was for the oil and gas industry. Just as the oil and gas industry made a huge investment in advanced surveys to find natural gas and oil reserves, the renewable industry is combining high-speed computing and big data to help producers find the sunniest and windiest locations, even to the extent of understanding how the characteristics of the energy produced at each location will line up with the expected demands of the market.

The same approach that provides insight into the weather of the past can

“There should never be a moment when electricity is produced burning carbon when it could have been produced carbon-free

For more information please visit www.xweather.com/renewable-energy



INTERVIEW

‘Modernisation and efficiency should be at the forefront’

Focusing on decarbonisation is an inherently flawed exercise, argues **Bertrand Piccard**. The Swiss environmentalist, psychiatrist and explorer explains how reframing the end goal will help us to achieve net zero

Oliver Balch

The world looks different when you’re 4,500m above it: flatter, quieter, blurrier. There’s also a unique perspective that comes at such an altitude: landscapes shrink; unexpected connections emerge. So it is for the eminent sustainability expert, aviator and adventurer Bertrand Piccard when he observes humanity’s scramble to reach net-zero CO₂ emissions. Our approach to the energy transition is fundamentally flawed, he argues. Why? Because it has been framed with decarbonisation as its end goal, “whereas modernisation and efficiency should be at the forefront instead”. Establishing the correct destination is crucial to any journey, especially one that’s fraught with risk. Piccard knows that better than most. In 2016, he and fellow pilot André Borschberg completed the first global circumnavigation by a totally solar-powered manned aeroplane, the Solar Impulse. His beliefs about the misdirection of net-zero efforts derive from two distinct convictions. The first is conceptual: Piccard abhors waste. Again, he should know. When you’re

flying an aircraft weighing more than 1.5 tonnes on solar power alone, efficiency is everything. “The waste of energy, of natural resources, of food is happening worldwide,” he says. “If we are facing problems, it’s because we waste too much. We’re inefficient.” The science supports his point. Studies have demonstrated that most standard processes of generating energy, converting it into a usable form and then consuming it are hugely profligate, pumping waste heat into the environment. Piccard’s second conviction has its origins in human psychology. If you say the word “decarbonisation”, people instinctively hear a call to do less of certain things or to stop doing them altogether, he explains. The word “efficiency”, by contrast, evokes more positive sentiments. “If you put on the table all the solutions that let the world become more efficient, modern and profitable, people won’t resist them. They will embrace them,” Piccard argues. If this sounds like pop psychology, it isn’t. Piccard has spent much of his career working as a psychiatrist and psychotherapist. Never one to



underestimate the power of imagination, he depicts a future in which energy generation is clean, affordable and local. Your electric car powers your household appliances in off-peak hours, for instance, while your neighbours draw electricity

“We need to throw everything at this problem as quickly as possible. If we try to map it all out perfectly, we’ll never get there

from their own micro solar or hydro generation projects. “This isn’t a world of sacrifice and punishment,” he says. “It’s a modern society where residents are going to feel comfortable and pleasant.” The same logic extends to business. Well-meaning as some companies may be, conserving the world for future generations will never be their guiding rationale. Most are focused on minimising cost, maximising profit and keeping their investors happy. “You could tell them: ‘Do this for the planet,’ and they would say: ‘We have thousands of salaries to pay at the end of the month,’” Piccard reasons. “But, if you tell them that their factory is losing heat and they can cut their energy bill by 40% through a heat-recovery system, they’re suddenly interested.” Of course, such arguments stack up only if the building blocks for a low-carbon future exist. Do they? Very much so, stresses Piccard, who says he could point to about 1,500 cleantech innovations that are technically proven, financially attractive and deployable on a large scale. These are linked to the Solar Impulse Foundation, the not-for-profit organisation that he and Borschberg established 20 years ago to support the development and uptake of such solutions.

The projects cover a wide range of sectors, including core energy and infrastructure services, agriculture, transport and waste management. The viability of each one is verified by EY against exacting economic and environmental criteria. One of the many success stories that Piccard highlights is that of Celsius Energy, a French company that uses drilling techniques honed in the oil and gas industry to tap geothermal heat deep in the ground and redirect it to buildings. Other projects are at earlier stages of development. One is Generma, an Italian firm that has invented a system to convert the energy of sea waves into electricity. Another is Sun-Ways, an early-stage Swiss venture that places mini solar power plants on railway sleepers.

Piccard’s background in psychology reveals itself again when he discusses these innovations. Emphasising the efficiency savings they can offer will always resonate better with a business than presenting them as, say, ways of ensuring regulatory compliance. Similarly, when talking to potential adopters in the public sector, he’ll focus on the benefits that cleantech can offer in terms of creating more green jobs and improving public health. When it comes to aligning innovation and opportunity with net-zero strategies, Piccard is not a fan of the neat pathways typically presented by governments and companies. He advocates a more experimental and piecemeal approach. This may sound “untidy”, but the urgency of the climate crisis dictates it. “We need to throw everything at this problem as quickly as possible,” he argues. “If we try to map it all out perfectly, we’ll never get there.”

That’s not to say he’s averse to having a plan. Policy-makers have a huge role to play in enabling innovation and the uptake of cleantech. To this end, Piccard has been making the most of his profile as a successful adventurer to help secure meetings with influential politicians around Europe. In recent months he’s spoken with Spain’s environment minister, Poland’s under-secretary of state for climate and Romania’s energy minister.

Piccard explains: “Our argument to them is always: ‘Look, these are some of the things you can do to become more efficient and profitable.’ That way they can reach their energy and climate policy targets in a very ambitious manner without speaking of controversial issues such as coal.”

Many people contend that, at some stage in the transition to net zero, the private sector will have to make sacrifices and incur significant costs. The idea that the climate crisis can be solved without massively disrupting how most companies go about their business is simply naive, according to environmental campaigners.

Sasja Beslik, chief investment strategy officer at private equity firm SDG Impact Japan, agrees with this argument. The influential ESG investor says that, while any plan for a “win-win” future that doesn’t include “painful changes” might sound compelling, it’s unrealistic.

“The core point of sustainable optimisation is to address the shortcomings of the existing system,” Beslik says. “This sometimes includes very costly implications, such as impacts on short-term profits or fundamental changes to a company’s core operating model.”

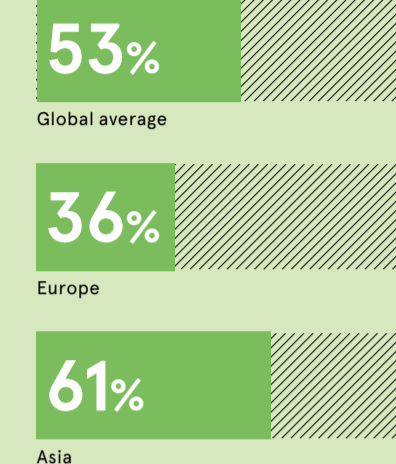
Piccard doesn’t dispute the shortcomings of incentive-based systems; he simply chooses not to focus on them. If senior decision-makers care about profitability and job creation, he says, so should any argument designed to persuade them of the need for change.

“My goal is to remain realistic,” he concludes unapologetically. “I am not losing my strength trying to alter the entire capitalist system. I am using it to obtain a faster ecological transition.” ●

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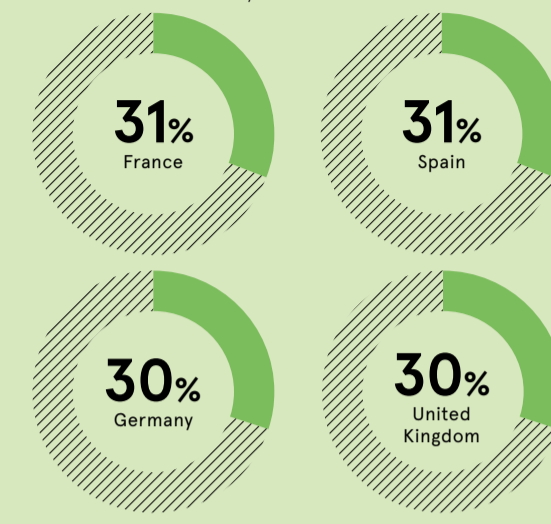
CONVENIENCE STILL MATTERS FOR CONSUMERS

Share of respondents who say they would only make sustainable product choices if they were convenient



WESTERN CONSUMERS QUESTION SUSTAINABILITY CLAIMS

Share of respondents who say they “very much do not trust” businesses’ sustainability claims



Yonder Consulting, 2023

Becoming a sustainable business rests on consumer buy-in

New research shows that consumers want to live a more sustainable lifestyle but are hampered by a lack of trust and high prices

Most people now recognise the positives that living a more sustainable life will bring for both them and society as a whole. And they’re increasingly willing to do their bit for the planet – if new practices, actions, decisions and habits can be easily adopted and adapted into their regular daily lives. That’s the view demonstrated by new research from Alibaba Group, in which nearly three-quarters of consumers in 14 markets across Asia, Europe and the Middle East said they actively want to live a more sustainable lifestyle.

However, the survey results also show that businesses must play a wider and more significant role to be trusted and to make it easier for consumers to achieve their sustainability goals.

Indeed, one of the survey’s main findings is that making conscious sustainable choices when purchasing products or services is now a priority for consumers, but they still face many barriers. The 2023 Sustainability Trends Report from Alibaba Group reveals that half of those questioned would only go sustainable if it’s convenient.

What’s more, a third believed that sustainability was not affordable, with

45% suggesting that the prices of sustainable products were too high. As many as 48% also raised the lack of information on products detailing how sustainable they are.

These findings offer an opportunity for businesses, believes Liu Wei, Alibaba Group’s ESG strategy lead. “Sustainable consumption is crucial for the environment, and in the meantime it provides a great opportunity for businesses, as well as the digital economy as a whole, to contribute towards long-lasting development and a sustainable future for all,” he says.

As a company at the forefront of building the future infrastructure of commerce, Alibaba Group is “committed to driving sustainable consumption”. Liu Wei acknowledges that this is “not only crucial for the environment”, but also for ensuring “long-lasting contributions to our business and the digital economy”.

Alibaba Group’s latest ESG report highlights one way it is achieving this, with more than 180 million consumers participating in carbon emission reductions through its carbon ledger platform. This encourages consumers – via points rewards – to make

low-carbon choices when purchasing within Alibaba Group’s ecosystem by, for example, buying energy-efficient appliances, recycling boxes or declining disposable utensils with takeaway orders.

Liu Wei adds that Alibaba Group’s commitment to ESG will never change, because it is a critical part of its mission to be a “good company” and a “leader in sustainable development”.

The company hopes that more and more peers will explore the future of sustainable development together, creating value beyond business, and jointly build a healthy, comprehensive and mutually prosperous ecosystem.

The need for businesses to support consumers on this sustainability journey is clearly shown in Alibaba Group’s research.

Those respondents living in emerging Asian markets were particularly keen on sustainability, with a huge majority of 87% wanting to live a more sustainable lifestyle.

However, to win hearts and minds in promoting consumer sustainability, businesses will need to do three things, the survey suggests: making sustainable products more affordable (61%), making fewer products using single-use plastics and packaging (55%), and having a wider selection of sustainable products and services (47%).

Crucially, this must be done in such a way that doesn’t look like greenwashing or being just for show. The research found that 38% of consumers were cynical towards the underlying motivation of businesses when it comes to “sustainable” products. In the UK, 30% of those questioned said they “very much do not trust” businesses’ claims around the sustainability of their products.

It is possible to reverse this mindset though, Liu Wei suggests: “We believe companies can do more to earn trust from consumers on their sustainability claims, by being more transparent and committed, and backing their sustainable practices with data.”

For more information please visit alibabagroup.com



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