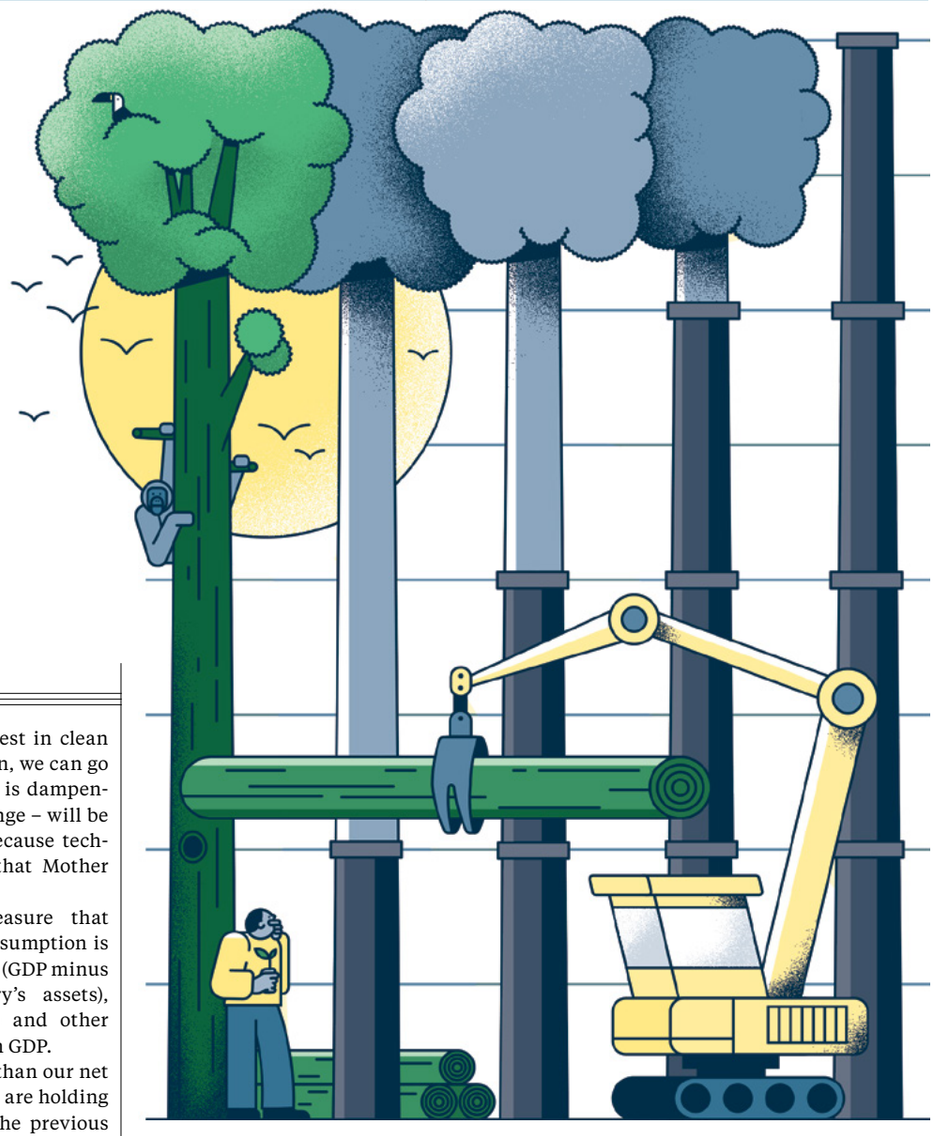
CLIMATE CHANGE

ECONOMICS

Short measure – the trouble with GDP

The standard yardstick of national wealth fails to account for the ecological costs of unbridled consumerism. Could the adoption of a more nuanced metric focus minds on tackling the climate crisis?



Heidi Vella

"We need to measure what we treasure," write former Unilever CEO Paul Polman and green business expert Andrew Winston in their new book, *Net Positive*. One of its key themes is that, to combat climate change effectively, the world must abandon measuring economic progress in "GDP, dollars, stock price and shareholder value".

They are not alone in their thinking. Several eminent economists have argued that GDP in particular is no longer fit for purpose. The monetary model, first proposed in 1937, has become the standard measure of value created through the production of goods and services in a country over a set period. It's the figure most prized by governments and analysts. Yet, according to its formulas, a 100-year-old carbon-capturing tree is worthless until it has been chopped down and sold as lumber. To GDP, nature has no value unless it's sold on the commodities markets.

In February, economist Professor Sir Partha Dasgupta published a government-commissioned independent report on the economic benefits of biodiversity. He observes that one of GDP's key failings is that it doesn't account for the depreciation of assets, especially natural ones.

"Because of this, we are living off our natural assets without recognising so," Dasgupta explains. "Nature is free. It provides not only climate regulation, but also waste decomposition, pollination and so on. Yet we haven't been paying for the carbon we dump that depreciates it."

And that's not all. As Polman and Winston write, GDP "counts everything that raises spending as a good thing: more cancer and medical costs, reconstruction after giant storms, wars and conflicts... But it does not measure peace, quality of education, mental health or the protection of natural capital needed for our survival."

Creating alternative ways to measure prosperity has not proved easy. Several formulas have been devised that focus mostly on societal wellbeing, including the UK's own Happiness Index. None of these has achieved the same status as GDP, though.

Dasgupta believes that the prevailing approach to tackling climate change serves to protect the traditional economics of GDP, without challenging the assumption that perpetual growth in consumption is desirable. Despite this, the Swiss Re Institute recently estimated that climate change could lop $23tn (£17tn) off the world's annual economic output by 2050.

"The idea is that, if we invest in clean technology to eliminate carbon, we can go for GDP growth because what is dampening that growth – climate change – will be tamed. This is misleading, because technology can't do everything that Mother Nature does," he argues.

Dasgupta proposes a measure that checks whether a nation's consumption is less than net domestic product (GDP minus depreciation on the country's assets), which would include nature and other assets not currently counted in GDP.

"If our consumption is less than our net domestic product last year, we are holding greater wealth than we did the previous year," he explains.

The Department for Environment, Food and Rural Affairs has started auditing the UK's natural assets. These clearly aren't easy to value, but a report by the World Wide Fund for Nature in 2018 estimated that the global natural capital underpinning all economic activity was worth $125tn.

Other experts favour another metric – sustainable domestic product – based on the United Nations' sustainable development goals (SDGs). This would measure the sustainability of individual products. For instance, the value of a unit of electricity would be measured against the SDGs and any negative environmental impact subtracted from that.

When Polman led Unilever in 2009-19, he attempted to decouple the company's growth from its environmental footprint and improve its impact on society through the so-called Unilever sustainable living plan. Given that his efforts were successful by most measures, he is urging businesses to take the initiative and become "net positive". By this he means adopting the ethos of "living within natural boundaries... Try to repair, restore, reinvigorate, and regenerate."

Polman continues: "Courageous companies can thrive by giving more than they take. It's not just about reuse and recycling, which are enormous steps themselves. It's also about creating a mentality of restoring nature through activities such as regenerative agriculture and reducing food waste. Companies must take ownership of both the positive and negative societal consequences arising from their activities. To do this requires leadership and a community mindset."

No big business has got to this point, but some are well advanced. UK carpet wholesaler Interface started its quest for true sustainability in 1994. In the latest annual *Sustainability Leaders* survey report published by GlobeScan and SustainAbility, it ranked as the fifth-most recognised firm by sustainability experts for its leadership in the field. Unilever topped the table.

Having achieved its target to have no negative environmental impact, Interface is now working on what it calls its "climate takeback" initiative. This aims to run the business in such a way that acts to reverse climate change. It entails adopting externally verified science-based performance targets; offering carbon-neutral products; treating nature as a stakeholder in decision-making; and sharing knowledge.

Interface's head of sustainability, Jon Khoo, admits that pioneers in this field are taking on "more financial risk, because they're paying for the innovation. But laggards waiting for regulatory compulsion face another risk: the fact that some of the solutions we'll have implemented cannot be adopted overnight."

> **Companies must take ownership of both the positive and negative societal consequences arising from their activities**

In 2013, Swiss agritech firm Syngenta Group adopted what it calls its good growth plan. This has established scientifically based environmental key performance indicators that are linked to managers' remuneration. These include improving resource efficiency and sharing knowledge with farmers and other stakeholder groups.

"We sell much less volume per acre applied of our products today than we did 20 years ago, but we don't make less money. That is because we have changed our value proposition," says the group's head of sustainable and responsible business, Juan Gonzales Valero. "If you want to stay in business, you need to make more efficient use of your resources."

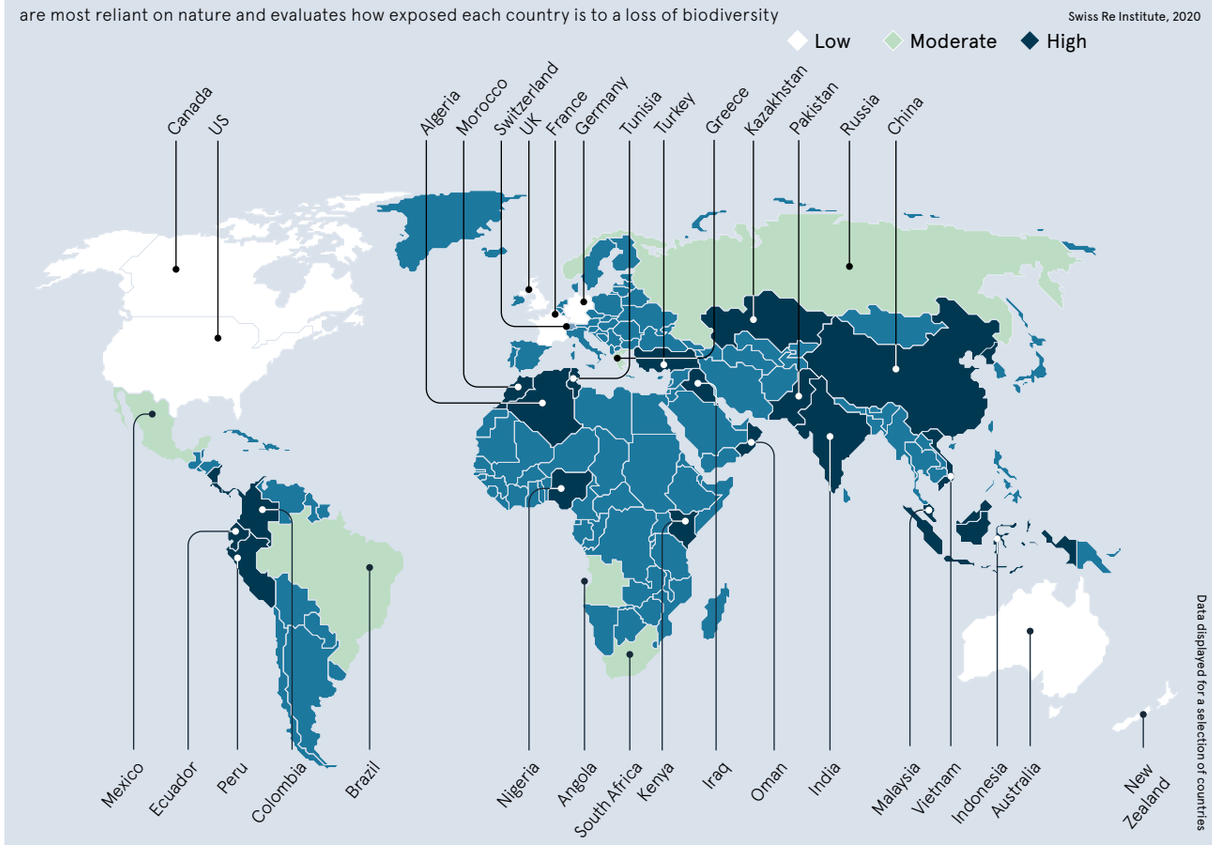
Many decision-makers in business and government will have to make a huge shift in mindset to stop focusing on pure economic growth, but it's a change that all of us need to make, according to Polman. What's more, he adds, while there is much evidence to show that unfettered consumption is incompatible with the fight against climate change, any alternative model will need work for everyone.

"Ultimately, we need to answer how we can have a sustainable economy, which decouples growth from resource consumption and environmental degradation, and also not have many people living in poverty," he says. "If we don't solve that as a total, nothing is going to work."

HOW DEPENDENT IS GDP ON NATURAL RESOURCES?

The Swiss Re Institute's *Biodiversity and Ecosystem Services Index* assesses which sectors of the economy are most reliant on nature and evaluates how exposed each country is to a loss of biodiversity

Swiss Re Institute, 2020



Distributed in
THE SUNDAY TIMES

Contributors

Nick Easen
An award-winning writer and broadcaster, covering science, technology, economics and business. He has produced content for the BBC World News network, CNN and *Time*.

Cath Everett
A journalist specialising in organisational culture and leadership, with a particular focus on technology's impact on business and society.

Sam Forsdick
Raconteur's staff writer, with a particular interest in technology and the future of work. He has written for I-CIO.com, *Press Gazette* and the *New Statesman*.

Sam Haddad
A journalist specialising in travel, with work published in *The Guardian*, *The Times* and *The Economist's 1843* magazine.

Mark Hillsdon
A contributor to titles such as *The Guardian* and BBC One's *Countryfile* programme, writing about subjects including sustainability, wildlife, health and sport.

Heidi Vella
An energy and technology writer, with work published in consumer and specialist publications including the Institution of Engineering and Technology's *E&T Magazine* and *Global Data*.

raconteur reports

Publishing manager
Reuben Howard

Managing editor
Sarah Vizard

Deputy editor
Francesca Cassidy

Sub-editor
Neil Cole

Head of production
Justyna O'Connell

Design and production assistant
Louis Nassé

Design
Pip Burrows
Kellie Jerrard
Celina Lucey
Colm McDermott
Samuele Motta
Nita Saroglou
Jack Woolrich
Sean Wyatt-Livesley

Illustration
Sara Gelfgren

Art director
Joanna Bird

Design director
Tim Whitlock

/raconteur.net
@raconteur
@raconteur_london

raconteur.net /climate-change-2021

THE GRETA EFFECT:

IS GEN Z REALLY DRIVING CLIMATE ACTION?

Prominent environmentalist Greta Thunberg – still only 18 years old – has been lauded as 'the voice of a generation'. But is that true? What do members of generation Z (people born between 1995 and 2012) really think about global warming and climate change? Are they the most active in advocating for mass policy reforms to improve the health of the ever-warming planet they're inheriting? While the tireless lobbying of the Swedish teen must be applauded, are her peers truly more green-minded than previous generations, as is widely perceived?

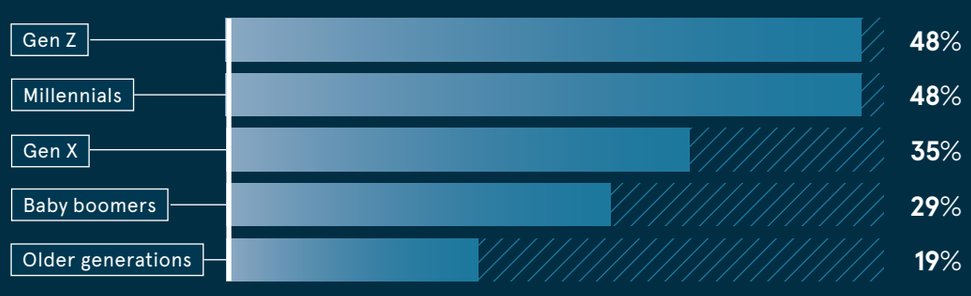
HOW INVESTED ARE DIFFERENT GENERATIONS IN SUSTAINABILITY?

Percentage of investors around the world, by age group, who say they would probably invest in an enterprise that opposed their personal values if they knew it would deliver significantly better returns than other investments

Schroders, 2020

WHO IS CHANGING HOW THEY BUY?

Percentage of European consumers, by age group, who say they are committed to buying secondhand clothes to reduce waste and carbon emissions

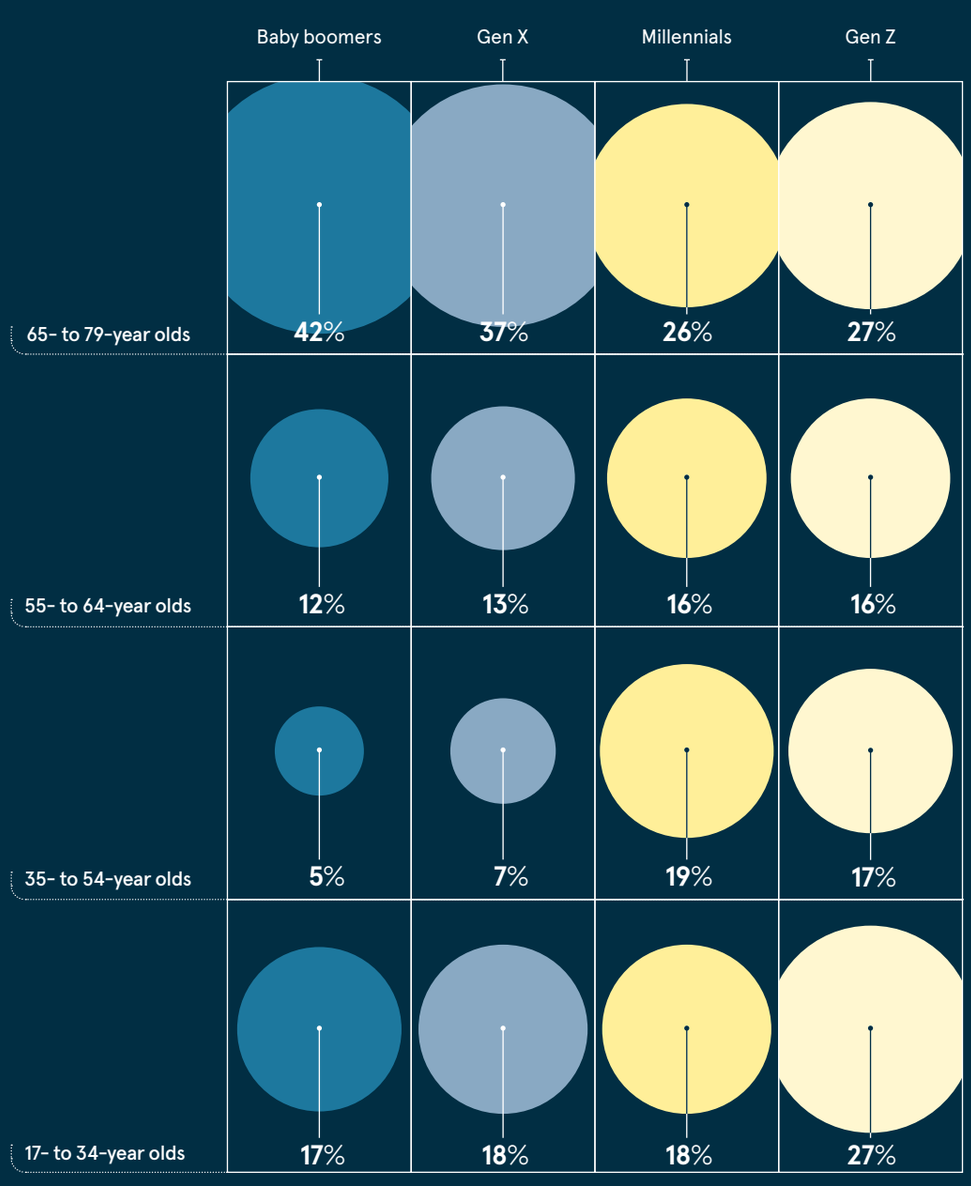


McKinsey, 2020

HOW THE GENERATIONS SEE EACH OTHER

Percentage of UK citizens, by generation, who say the following age groups are most likely to say that there's no point in changing their behaviour to tackle climate change because it would make no difference

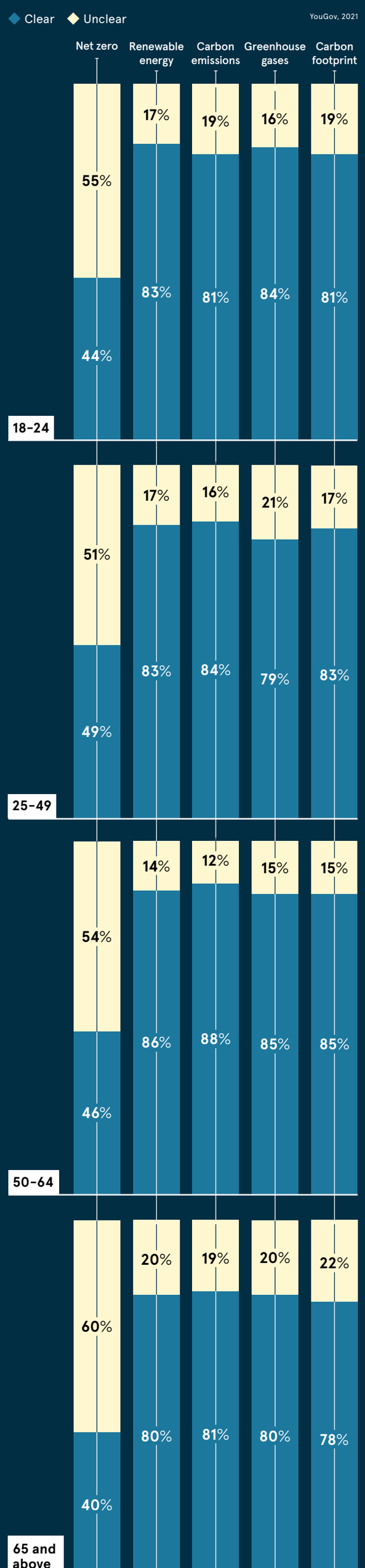
King's College London, 2021



WHICH GENERATIONS GET THE JARGON?

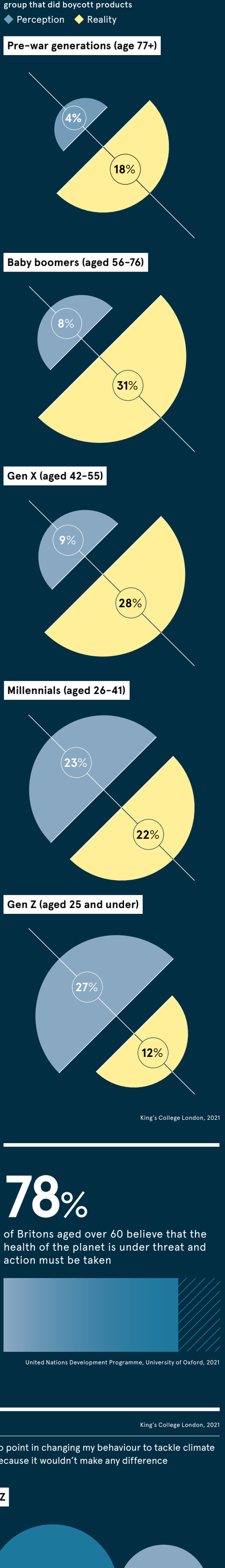
Percentage of Britons, by age group, who say they are clear about the meaning of the following terms

YouGov, 2021



WHO IS PUTTING THEIR MONEY WHERE THEIR MOUTH IS?

Percentage of each age group that the UK public think were likely to have boycotted products over the past year compared with the actual percentage in each age group that did boycott products



King's College London, 2021

78%

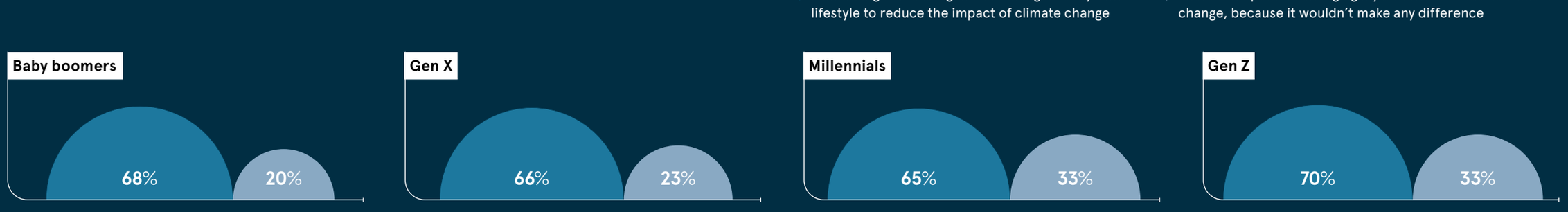
of Britons aged over 60 believe that the health of the planet is under threat and action must be taken

United Nations Development Programme, University of Oxford, 2021

WHO REALLY CARES ABOUT CLIMATE CHANGE?

King's College London, 2021

Percentage of Britons who agree with the following statements, by age group



WORKING MODELS

Hybrid working: not as green as it seems

Employers need to balance the social and environmental aspects of the ESG equation carefully if they are to meet their emissions obligations and attract the most skilled people

Cath Everett

Shridhar Gupta via Unsplash

The widespread shift to hybrid working among office-based employees is not as good for the environment as many commentators would have us believe, according to recent research published by Cushman & Wakefield. Although the company is a global real-estate giant that may have a vested interest in bolstering the commercial property market, its study's findings still give pause for thought.

Based on the experiences of Australian companies, the research has revealed that the hybrid approach produces more greenhouse gas emissions than the conventional five-day week based at HQ. The problem is that, while organisations are continuing to heat and power their offices, their employees are using more energy in their homes.

As a result, although many firms are cutting their own energy consumption and direct CO_2 emissions, their indirect (scope-three) emissions, which aren't widely measured, are on the rise. This situation is likely to cause compliance risks in future, as the regulatory pressure to report scope-three emissions builds around the world.

With these factors in mind, the greenest approach for employers would simply be to oblige their hybrid workers to return to HQ on a full-time basis, the report argues.

But doing that would go against what many knowledge workers say they want. The past 12 months have seen a trend that has become known in HR circles as the Great Resignation, as people have quit their jobs in record numbers. For the many organisations that are finding it hard to recruit and retain employees, the ability to offer flexible working arrangements is a key weapon in the war for talent.

So how can employers best balance these apparently conflicting interests? Gudrun Cartwright is director of climate action at Business in the Community, a UK charity advocating responsible enterprise. She believes that an "element of pragmatism" is required, not least because other studies have produced more mixed results, particularly when the ecological impact of commuting is considered.

For instance, the Carbon Trust's *Homeworking Report* in June concluded that it was more environmentally friendly for the average "teleworker" to operate purely from home for numerous reasons. The researchers added that it was difficult to plan for a "carbon optimum" under hybrid models, as patterns of employee travel and energy consumption are harder to measure.

The International Energy Agency (IEA) takes a similar stance. In June, its website published an article entitled "Working from home can save energy and reduce emissions. But how much?" This concluded there were some environmental benefits to be gained from employees working remotely for even one day a week, but added that longer-term effects of such arrangements were "uncertain".

While a more significant shift to remote working may reduce demand for office space, leading to an overall decline in both energy usage and CO_2 emissions, the IEA added that "habitual home working could lead to people living farther from their place of work, potentially offsetting the demand reductions in energy for commuting".

Cartwright believes that it's "probably too early to say what the real impact will be, although we do know there is a risk that hybrid working could make things worse environmentally. Only time will tell."

One company that believes taking a balanced approach will be key, particularly in keeping its 1,000 office-based staff engaged, is courier company Hermes UK. These employees are working three days at home and two days at its base on the outskirts of Leeds. The arrangement is giving the firm the flexibility it needs to attract recruits from a wider area.

The company's chief people officer, Penny Garnett, says that her approach is to "make decisions about people with one eye on our ESG agenda". The single biggest reduction that Hermes can make to its carbon footprint, she notes, is to continue replacing its fleet of diesel-fuelled delivery vehicles with greener vans equipped with route-optimisation systems.

As for hybrid working, the situation is "slightly more nuanced", according to Garnett. Here the focus is on optimising the use of office space and using smart systems, such as motion-sensor lighting, to reduce energy consumption on the premises. Her colleague Nancy Hobhouse, head of ESG, adds that the company is also planning a learning and support programme to help employees cut their emissions at home.

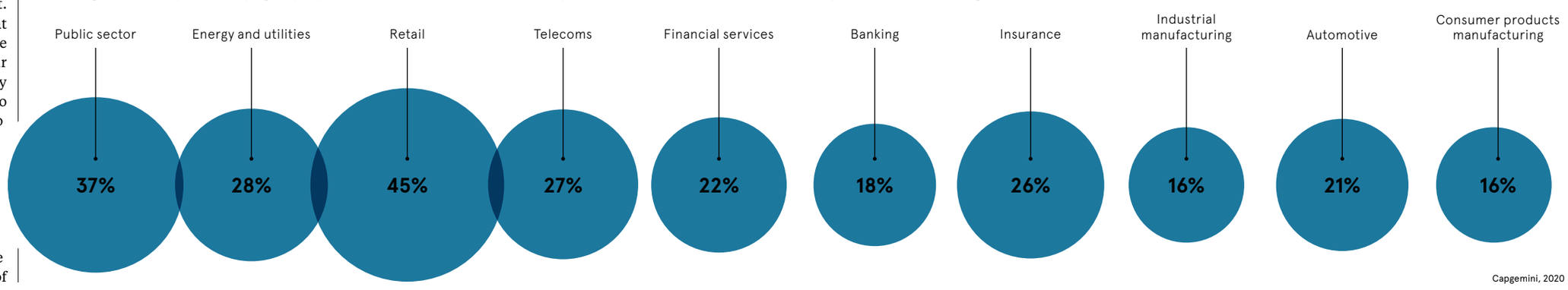
In October 2020, environmental consultancy EcoAct published a *Homeworking Emissions Whitepaper* offering a methodology for organisations seeking to get a grip on their scope-three impacts. It suggests a range of measures for reducing remote workers' carbon footprints. These include encouraging them "to switch to renewable-energy tariffs for their home energy; investing in more energy-efficient technology for colleagues working from home (this could involve setting green procurement requirements for all new laptops and other technology); and incentivising colleagues to move to more energy-efficient heating and cooling systems".

For Hobhouse, it's a matter of "ensuring that you balance the 'E' and the 'S' in 'ESG', because it's important to look at the situation holistically. This all boils down to ensuring that you understand the potential ramifications of your decisions as an employer. So, if you're thinking about bringing in more flexible working, for instance, you'll need to know all the potential effects of that decision, both on the environment and on employee wellbeing and inclusion."

Given that the shift towards hybrid working is still relatively novel, Cartwright observes that "there is still an element of everyone feeling their way". As a result, she concludes, there is a lot to be said for "taking the best of what was there before the lockdowns with the best of what we've learnt since then and blending the two. But this does mean that there'll be an element of trial and error before businesses get the balance right."

HOW GREEN IS GOING REMOTE?

Share of organisations, by sector, saying they expected a reduction in their carbon footprint of more than 50% as a result of their uptake of remote working



Capgemini, 2020

Commercial feature

How are organisations advancing ESG strategies through their supply chains?

Knowledge sharing, listening to consumer demands and investing in technology will all drive transparency and ethical practices, but there is much work to do, according to our expert panel

Oliver Pickup

Panel

Simon Finch
Supply chain director, Harrods

Michael Ford
Global lead environmental, health and safety and sustainability, Avetta

Aileen Wilkins
Head of procurement, The Midcounties Co-operative Ltd

Paul Williams
Group head of ethical trading and human rights, Princes Group

Q How has the supply chain landscape evolved in the last 18 months?

SF The coronavirus chaos exposed significant overconfidence in global supply chains and an absolute obsession with a lean inventory. Pre-pandemic, we were so used to being able to plan and move things quickly, and it was a big challenge when those plans were disrupted, and we couldn't move stuff. We have learnt to reintroduce agility and multiple inventory nodes, which supports the ESG agenda. In the last 18 months, we have had to dig a lot deeper with our suppliers because if you are not doing the right thing, consumers won't buy from you.

AW At Midcounties Co-operative, we had already embedded a procurement strategy that used local suppliers – rather than big national suppliers – before Covid-19 hit. This approach meant we could be agile, and the stock has been accessible throughout. In addition, we went against the grain and reached out to smaller businesses, including those were unable to trade during parts of the pandemic due to government regulations, to source PPE and spare stock. Because our supply chains are much smaller and more local than some other organisations, we have had good visibility, meaning minimal disruptions.

MF The pandemic fallout has changed the whole approach to supplier evaluation, which was primely focused on fiscal integrity and safety. Now things like business continuity are becoming part of evaluating suppliers, and it's created massive problems. Avetta is on a learning curve, too, but the social element of ESG concerns more clients. It's an area that needs a lot of development. There is no question the 'S' is as important as the 'E' and the 'G.'

PW I often wonder whether consumers are unaware of social sustainability risks in the supply chain. I sense there is an implicit expectation that companies are operating ethically. It's only when there are human rights exposés – such as exploited workers in textile factories in Leicester – that they start to ask more questions about responsible sourcing. Businesses have to go beyond compliance to better manage and mitigate these risks. At Princes Group, we have increased transparency through publishing our supply chain map of direct suppliers and working with third-party providers, such as Provenance, to bring to life the sustainability credentials of Napolina tomatoes. It is fundamental to know what's going on in the fourth and fifth tiers of the chain to tackle modern slavery and find the root causes of any issues.

Q What is the role of supplier evaluation in driving transparency?

MF Traditionally, when companies have evaluated suppliers, they have been one dimensional: to award a contract, they tend to look at their fiscal integrity, insurance and their safety record. Because of the pandemic – and Brexit – our clients, who realise there are environmental and reputational risks, want to scale things up to see far greater assessment levels, adopt a more holistic approach, and use technology to help facilitate more educated purchasing options. Tech pulls together the relevant data in different departments to provide a complete picture.

AW In many of our contracts now, we include an unannounced audit clause that allows two audits up to two years after the contract has ended because something in the news might have affected our business. This lets our suppliers know that we are taking this seriously and ensures that they comply with what we expect through our values and ethical trading. We also run modern slavery training for the suppliers, in conjunction with the community, to look out for the signs of anything unusual happening in the supply chain.

PW We have an award-winning initiative to offer survivors of modern slavery in Italy long-term employment opportunities with Princes, and building those relationships is very beneficial. In-person audits have been challenging during the coronavirus crisis, and virtual audits have their place, but at Princes, we try to demonstrate and embed best practices in-house to the supply chain. For example, all members of our procurement team are signed up on the International Chartered Institute of Procurement and Supply Ethics Register. We realise that no supply chain is perfect, but we recognise that we need to work together to solve these challenges. The net is closing in on unethical suppliers, and whistleblowing mechanisms are improving.

SF Deep supplier relationships are so important. As we learnt in the last year, picking up the phone and talking to suppliers to collaborate and work a way through strengthens bonds. I believe we will continue that closer collaboration as we move out of the pandemic. We're working much more with strategic partners across a range of products and taking a more pragmatic approach.

> **We have learnt so much from the pandemic fallout, and it's clear if you have a product closer to the customer, then it will naturally drive sustainability and reduce environmental impact**

Q How can companies build a sustainable supply chain today to win tomorrow?

PW Nobody wants to pay more than necessary for products, but the reality is that, at the moment, responsibly sourced products often do come at a premium. We could challenge ourselves as organisations about what weighing we need to give to ESG versus service availability and technical requirements, which cost more but hopefully high ESG standards are precompetitive and will become the norm for all responsibly sourced goods.

83%
of supply chain managers say Covid-19 accelerated supply chain sustainability or increased awareness of it

47%
say their companies were pressured to increase supply chain sustainability

MIT, 2021

AW Admittedly, it can be challenging to keep up with trends. Who can say what will be deemed unethical in 10 or 20 years? We have to listen to consumer demand and communicate with customers and across the industry to improve agility and drive more ethical practices. For those leading the way in terms of transparency, there is a competitive advantage to be gained, and they should be shouting about it to inspire others to clean up their acts.

SF We have learnt so much from the pandemic fallout, and it's clear if you have a product closer to the customer, then it will naturally drive sustainability and reduce environmental impact. Ecommerce has grown significantly, and by using technology, we have been smarter about our stock on harrods.com. As a global brand we are shipping worldwide, but with more distribution nodes through brand partnerships, we are nearer to where customers are buying the goods.

MF Many clients are starting on their ESG journeys, and many are struggling because the two key things we see at the moment are modern slavery and climate concerns. Additionally, people are struggling to get to grips with diversity. How do we create a more diverse supply chain? There is a lot of information out there, but there needs to be more simplification and communication of expectations. Finally, we should applaud what we are doing; we are realistic, but by sharing knowledge and working together, we can improve this industry.

Thomas Jackson via GettyImages

MARKETS

Why the climate crisis could precipitate a global financial crash

Economists fear that a lack of consistent and effective corporate climate impact reporting could contribute to an environmental 'Minsky moment', with dire consequences for the world's capital markets

Nick Easen

We may think we know what real economic volatility looks like, having witnessed the effects of the Covid-19 pandemic and, back in 2007, those of the global financial crisis. But we've seen nothing yet. Imagine a time when several climate risks come to pass in quick succession, resulting in a series of natural disasters around the globe. This could spark a collapse in market sentiment and asset values, with a massive repricing of risk and a spike in borrowing costs.

This would be a so-called Minsky moment, a term coined by US economist Paul McCulley in memory of one of his key academic influences, the late Hyman Minsky, to describe the point at which a number of factors combine to end a period of unsustainable speculation in spectacular fashion.

Mark Carney – a man not known for overstatement – even warned of the possibility of a climate-induced event of this kind when he was governor of the Bank of England in 2015.

Giulia Christianson is director of sustainable private-sector finance at the World Resources Institute, a not-for-profit research organisation. She agrees that "the climate crisis could absolutely induce a financial crisis. The onset of the pandemic gave us a glimpse of how an unforeseen shock can shut down economies, cripple supply chains and cause intense volatility in the financial markets."

It's difficult to assess risk in markets when very little high-quality information is being shared. Research by the Carbon Disclosure Project (CDP) in 2020 found that the combined carbon footprint of all the firms in the investment portfolio of the average financial institution was 700 times larger than that company's own footprint. Yet only a quarter of the 332 finance providers in the study said that they routinely reported on the emissions records of their investees, while nearly half (49%) admitted that they "do not conduct any analysis of how their portfolio impacts the climate at all".

> **Investors have historically lacked the tools needed to hedge climate risk in sovereign bonds**

Pietro Bertazzi is the CDP's global director of policy engagement and external affairs. He argues that both financial institutions and their investees are "failing to gather an accurate depiction of their impacts and the risks posed by the climate crisis. This leads to a much higher potential of reaching a climate Minsky moment, including a greater likelihood of stranded assets. The current regulation of environmental disclosure is not sufficient."

Businesses are therefore sleepwalking into a world that will be far warmer than the temperature target set by the United Nations (1.5ºC above pre-industrial levels) in its Paris agreement of 2016. If this risk is not enough to motivate the markets, the prospect of losing billions of pounds in another financial crisis just might be.

In September 2021, the Bank of International Settlements issued a warning about the risk of a bubble in the sustainable finance market. Government bonds are also heavily exposed to climate risk.

"Despite being in a multitrillion-dollar market, investors have historically lacked the tools needed to hedge climate risk in sovereign bonds," says David Harris, global head of sustainable finance at the London Stock Exchange Group.

Given the scale of the problem, there is a growing consensus that the reporting of climate risks should be mandatory in all jurisdictions (see panel, opposite page). This would arm investors with more data, says Cindy Rose, head of responsible capitalism at Majedie Asset Management. But she adds that "investors need to know how to interpret this properly. It's not just having the data that's important; it's what we do with it that matters. In the end, though, I hope that the market will be able to make better investment decisions."

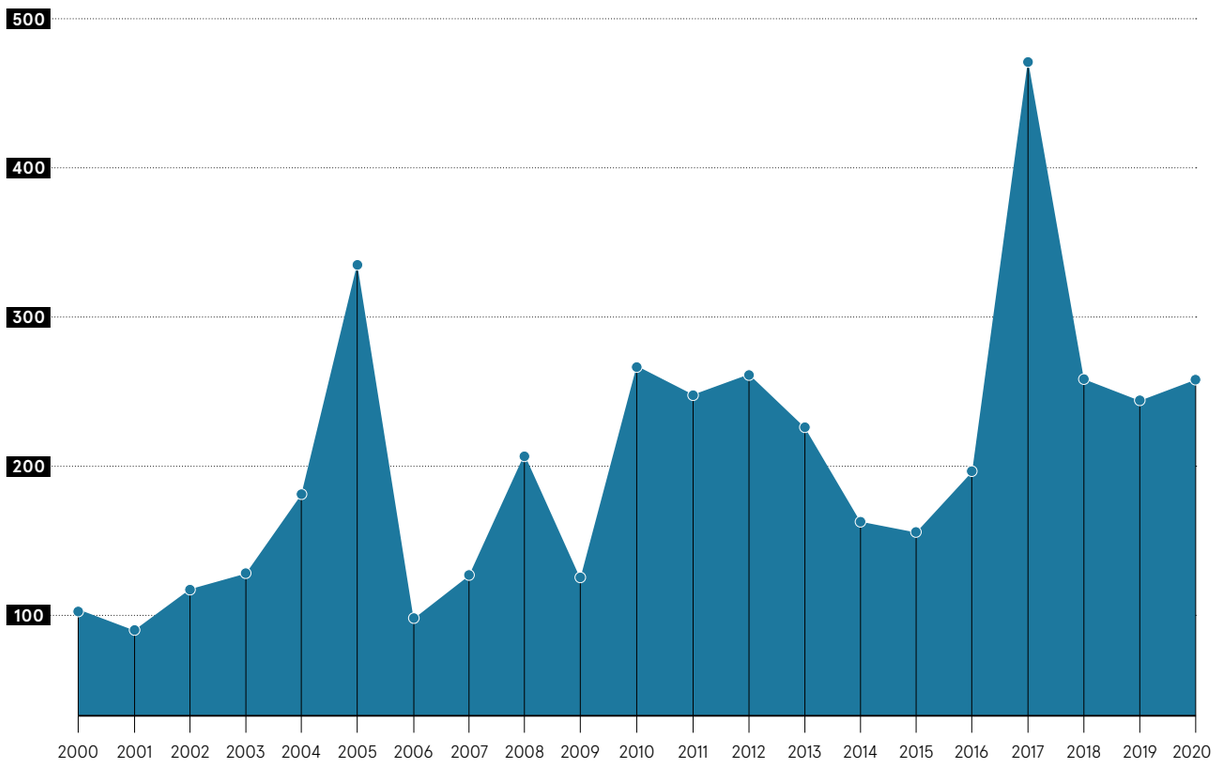
At this point there is no substantial body of evidence to indicate that climate risks could bring down the whole financial system. Much depends on new commitments by governments to slash emissions through measures such as taxation. The UN's COP26 climate conference in Glasgow could shed some light on member states' intentions. This would give the markets some of the assurance they require to manage the risk effectively over time.

The finance sector tends to treat climate change as a chronic condition rather than

THE REAL COSTS OF CLIMATE CHANGE

Global economic losses to weather-related disasters ($bn)

Aon, 2021



13%

Only 13% of risk management experts worldwide say climate change is the most significant risk associated with businesses in 2021

Allianz, 2021

an acute one, but a rapid succession of natural disasters could spook the markets. Beyond this factor, there are so-called transition risks. These occur when governments enact tougher policies and their economies can't adjust quickly enough. There are signs of this in China and the UK.

"We have rising energy demands, yet a lack of viable alternatives to fossil fuels, as well as slow green policy development by governments. This heady combination not only worsens our longer-term warming scenario; it also points to the possibility of a more severe financial fall-out," Rose says. "Ideally, governments would work together to address this, but the world is so factious that it makes collaboration difficult. There may be some elements of a Minsky moment that are unavoidable, simply because people are refusing to take responsibility and/or work collectively."

It shouldn't be this way. The release of tonnes of atmosphere-warming methane from intensive beef farming in one country, for instance, could affect the climate of another thousands of miles away. All markets, businesses and people are connected when it comes to climate change. The problem therefore requires countries to work in concert to find a solution.

"The way that governments galvanised themselves into action for the Covid crisis has not been replicated in the case of the climate crisis," says Mona Shah, head of sustainable investments at Stonehage Fleming. "Action on the climate crisis is lacking because it has not been coordinated globally. Governments need to pursue a set of systematic actions instead of simply setting their countries empty targets for future carbon neutrality."

She continues: "Governments must also conduct deep research to understand the vulnerability of GDP growth at each half-degree of global warming and at a sector-by-sector level. This understanding can be used to drive actions in every industry with respect to carbon reduction and offsetting. It seems to me that we're all suffering from politicians' cognitive dissonance, even though the environment is increasingly becoming a vote-winning issue."

> **The way governments galvanised themselves into action for the Covid crisis has not been replicated in the case of the climate crisis**

When there is a sketchy picture of how the climate evolves and affects the world's man-made assets over time, there could also be problems. Modelling this level of complexity is a real challenge, according to Stephanie Maier, global head of sustainable and impact investment at GAM Investments. "We are dealing with a lot of uncertainty – uncertainty about climate policy; uncertainty about the role of existing and future innovation; and uncertainty about companies' commitment and ability to transition," she says. "Are we going to avoid a climate Minsky moment? It is too early to know."

So what is being done to avert this moment? There are some positive trends. The gradual pricing of carbon risk into global markets is occurring and will at least continue over the medium term. Climate reporting is coming on in leaps and bounds – it's becoming increasingly reliable, providing more information about emissions throughout a company's global supply chain, as well as on the firm's direct emissions and energy consumption. Businesses are also adopting science-based targets apace.

All of these trends are enabling more ESG-related data to percolate up into boardrooms, where it can be used for strategic decision-making purposes. This is where it should make a real positive difference. The key to an orderly transition for financial institutions is engagement with the companies they fund and vice versa, in conversations where everyone is empowered by information.

"The transparent sharing of environmental impact data is critical to tackling the climate crisis," Bertazzi says. "We are seeing significant momentum in corporate action. In 2020, for instance, we had record numbers of companies disclosing their environmental data via CDP."

This groundswell of information, action and reaction concerning greenhouse gas emissions, decarbonisation and energy consumption should help capital providers to fortify markets, price in risk and finance change. Will that be enough to stave off a Minsky moment? Only time will tell.

TR STOK via Shutterstock

The case for mandatory environmental reporting across the board

We are still in the early days of developing internationally recognised standards that incorporate climate-related impacts into financial accounts. Yes, reporting standards are on the increase, but so too is the volume of corporate emissions data and climate-related disclosures. But full reporting of climate risk isn't uniform across the globe yet. And accounting for supply chains worldwide is another issue that needs to be addressed.

"Carbon accounting has been mandatory in the UK for listed companies since 2013 and is now standard practice in most developed countries, including the US, for quoted firms," explains Lucian Peppelenbos, climate strategist at asset management company Robeco. "It does, though, need to be adopted more widely by all companies outside the stock markets. This may be difficult for smaller unlisted businesses, for which the process remains voluntary."

To date, disclosures on climate risk have largely been shaped by the market in a trend that could be termed 'pre-regulation'. It means that there is now a de facto cost of access to capital markets in many regions. Companies have to invest more on the ESG front to access funds.

The EU has legislated in this area with its carbon border adjustment mechanism, a complex system that imposes a levy on specific imports. This will affect mainly high-emission countries, such as India and China, but more needs to be done.

"Regulation on environmental disclosure increases transparency and would help to accelerate the sustainability transformation of capital markets and economies, which is urgently needed to combat the environmental crisis," says Pietro Bertazzi of the Carbon Disclosure Project. "There's also an urgent need for consistent, comparable, complete and confirmable reporting. Yet 2021 marks a turning point for standards. The scene is set for a unified global comprehensive reporting system, led by the International Financial Reporting Standards Foundation. This is a very welcome development. A mandatory disclosure system would create regulatory certainty, which would push those that do not currently disclose voluntarily to do so."

Whether the UK needs a climate-reporting watchdog to ensure compliance remains to be seen. No one in industry likes the heavy hand of regulation bearing down on them. Politicians are talking about cutting red tape to spur low-carbon innovation, not about creating more. The issue is whether financial markets are doing enough sufficiently quickly.

"It's not that we need a new set of regulators. We need existing regulators to mainstream climate change into their mandates and activities," argues Giulia Christianson of the World Resources Institute. "This requires leadership and political will, as well as new capacity and know-how. But it can and should be done –sooner rather than later."

It is likely that, as reporting becomes important enough to the markets, investors and the public, more oversight will be put in place to ensure that the rules are respected.

It's time we reimagined our energy future

The UK has the potential to be a world leader in the new global energy landscape, but it must be done in the right way

The strong momentum and awareness around climate change is now being felt across every industry, globally. This is most apparent in our energy systems. The momentum to transform and decarbonise has never been greater. Yet the journey is far from over.

A renewable and low-carbon powered future may be firmly on the agenda for many governments and industry players, yet over 80 % of the world's energy still comes from fossil fuels. The transformation needs much greater impetus. The challenge is immense. We need to generate four times as much clean power by 2050 if we're to hit net zero, according to the Climate Change Committee.

"What does a sustainable energy platform for our future look like? This is the big question. The UK and others are embracing renewables, but it's intermittent in its supply. It's an issue. We need to think more broadly. We need to displace the heavy carbon assets we've been accustomed to and transition to a greener, cleaner energy system much more quickly," explains Ben Sawford, global vice-president at KBR Advisory Consulting, which delivers science and technology solutions to governments and companies around the world.

"For instance, the UK has one of the world's best sources of wind power in the North Sea, this could be used to create a domestic green hydrogen industry. This represents a significant opportunity for British entrepreneurship, as well as utilising and exporting best-in-class technology. We could also monetise this source of zero-carbon energy and sell it around the world. We need a rapid transition, but no one is going green overnight - decarbonisation is a complicated journey."

Certainly, this process needs government policies, legislation and the right regulation in place so that it does not stall, and it requires understanding that the sun doesn't shine or the wind doesn't blow all the time. A more sustainable, yet realistic energy ecosystem is needed. For instance, nuclear power is the UK's only proven source of clean, always-on, emissions-free energy, and the only source that can produce low-carbon heat.

"Nuclear is also an enabler of other renewables and is vital to the country's future energy needs. It can provide the baseload capacity to deal with the intermittency of wind turbines or solar farms. Yet six out of seven of the UK's nuclear power stations will be retired by 2030. We need to think hard about our future energy security in the context of climate change. Energy is a massive economic enabler," points out Ian Hudson, director, business development for nuclear at KBR, a company that employs 29,000 people worldwide with customers in more than 80 countries.

The government has already targeted 40 gigawatts of offshore wind by 2030, one large-scale nuclear project could be online by then, with further investments earmarked in advance and small modular reactors. Working with industry, the UK is also aiming for five gigawatts of low-carbon hydrogen production capacity by 2030.

"A revitalised energy strategy that's more climate-friendly is one thing. But it must also provide opportunities, real jobs, as well as entice domestic and overseas talent. Making the UK an attractive place to invest in energy innovation and technology should be a key goal. There is also a need to transition people and expertise from legacy industries into this new energy transition. This is exactly what we're doing as part of the team decommissioning the Sellafield nuclear site," details Hudson.

> **We need to think hard about our future energy security in the context of climate change**

"We've got the potential to be a world leader in this new global energy landscape. If the UK builds supply chains and domestic capabilities, it can export these beyond Britain's borders. The potential for sustainable energy exports is also vast. We have blue-chip, world-class regulation here. The government also has a firm view on where it wants to be with a low-carbon future. So, the building blocks are in place."

Countries around the world, including Singapore, Australia, Japan, Canada and Korea are now committing significant resources to the development of energy transition strategies. Asia also has a growing demand for energy, particularly of the low-carbon kind, including hydrogen. Sovereign wealth funds and direct government funding are therefore eyeing up investments that reflect this worldwide.

"There's a huge demand globally to evolve. Those who are able to be a net exporter of low-carbon energy as opposed to a net importer will be winners. There lies an incredible opportunity for the UK. The market for greener energy will mushroom over time. This will also depend on strategic relationships around the globe focused on realising this new energy ecosystem," points out Sawford from KBR, which also operates in 40 countries across the globe.

"It's not just about a new market and energy products, but also the technology that enables this. The supply chains and infrastructure are enormous. We're talking about a massive transition to where we want to be - the S curve is huge. We have the capability in the UK to drive this technological change and support it."

As the UK hosts COP26, the United Nations Climate change conference, in Glasgow in the coming weeks, the potential for the UK to take leadership, not just on climate change, but also the global energy transition is palpable.

"The UK should look to be the Silicon Valley of green energy, it's an admirable goal - but totally achievable. We may be behind the curve. But we have a strong entrepreneurial spirit. Could you imagine the excitement and legacy that would be created if it was achieved?" Hudson explains.

"But it's about pace. We are in a global race. We have an opportunity to catch up. At KBR we have proven expertise and advice and solutions able to achieve these goals. We've been through a massive global transformation from a business focused on fossil fuels to one looking at solutions on sustainability and energy, with a strong delivery focus, excelling at building partnerships with customers and supply chain to deliver long term benefit. We are in a good position to understand this transition. There's no Planet B - so let's get it right."

The energy transition needs leaders, find out more at: kbr.com

SMALLER BUSINESSES

How to attain carbon neutrality on a budget

Smaller firms may have fewer resources than their corporate counterparts to throw at the task of decarbonisation, but their combined efforts are likely to prove just as important

Sam Forsdick

After a tough 18 months for small and medium-sized enterprises, in which survival has been the priority for many, environmental concerns may have slipped down the agenda. A YouGov survey of more than 1,000 British SMEs in January found that 40% didn't have a plan in place for becoming more sustainable, while 30% had no intention of forming one.

As attention turns to the United Nations' COP26 climate conference in November, the hope is that both percentages will fall sharply. They will need to: firms employing fewer than 250 people account for more than 99% of the UK's 6 million businesses. Collectively, they produce almost a fifth of the nation's total greenhouse gas emissions, according to the Carbon Trust.

"After a period when small businesses have been focused on surviving the pandemic, COP26 provides a moment that can inspire further action," says Friederike Anders, policy adviser at the Federation of Small Businesses (FSB). "It's an opportunity to think about taking those next steps towards net zero."

Anders acknowledges that one of the biggest challenges for many SMEs is knowing where to start, adding that they "do want to play their part in the transition to a net-zero economy, but clearly don't have the same level of resources that a big corporation would have to devote to the task."

One organisation that's hoping to help more SMEs on their way to net zero is sustainability consultancy Small99. Its founder, Adam Bastock, believes that "a lot of the advice out there is overly technical and inappropriate" for smaller firms.

"The idea that reducing your emissions is costly is a bit of a misnomer," he says. "People assume that it's expensive, but they aren't talking about how it can increase your profits over time."

Bastock advises businesses to break down the process into a series of smaller, more manageable tasks. "Achieving net zero completely can be difficult, but getting started is very easy," he says. "One of the best places to begin is to switch to a supplier of renewable energy. That's normally going to make up a fair chunk of your firm's emissions."

But many SMEs will encounter barriers that larger companies can often simply sidestep. Take it from Cumbrian gin producer Shed 1 Distillery, which has already made it to net zero and describes itself as a "climate-positive business".

Zoe Arnold-Bennett is the joint founder and owner of this family micro-enterprise, which started trading in 2016. She points out that SMEs often don't own the premises they operate from, which tends to limit the number of practical improvements they can make.

"Our business is based in an old calf shed at the Ulverston Auction Mart. The age of the building has meant that we can't install solar panels on the roof," she says.

This setback has simply encouraged the business to become more innovative in other areas. For instance, it has devised a closed-loop cooling system to minimise the amount of water wasted in the manufacturing process. It has also invested in a cardboard shredder, which enables the reuse of material for packaging.

Despite Shed 1's achievements so far, Arnold-Bennett wants to push things further by targeting the supply chain, the main source of the firm's so-called scope-three emissions. For SMEs in particular, this is often the hardest place to achieve positive changes.

For instance, to avoid having to import its bottles from Europe, Shed 1 sought to source them from within the UK. But all the minimum initial orders quoted by potential suppliers were too large, in terms of both cost and storage space requirements, to be viable for a small-batch distiller.

"This is the problem with the whole net-zero conversation," Arnold-Bennett says. "Small businesses are being told that they have to make changes that they're not in a position to influence."

Paul Ridden has faced similar problems in his capacity as CEO of software firm Smarttask, another SME that has achieved carbon neutrality. "We have looked at all of the areas where we can reduce our footprint, but we can't eliminate 100% of emissions because of our reliance on technology providers whose solutions aren't always carbon neutral," he says.

To achieve its net-zero goal, Smarttask has switched to green utility providers, improved the efficiency of its office equipment and installed electric vehicle chargers. A grant that it secured under the government's Low Carbon Workspaces scheme has been an important enabler.

"It allowed us to make those fundamental changes more quickly," Ridden says. "Most sustainable solutions do give a return on investment, but it can often take a while. As a smaller firm, you must always balance your cash flow, so it was very attractive to us to reduce the ROI period."

The experiences of Arnold-Bennett and Ridden highlight the problems an SME can face when reducing its scope-three impact. A firm's emissions in this category (which include those generated by customers using its products) often account for most of its footprint, yet they're usually the hardest to monitor and control.

Only 10% of SMEs in this country measure their carbon emissions, according to a survey published in August by the British Chambers of Commerce and O2. Reporting on emissions is something that FSB members "would like to be helped with. It's too complex at present," Anders says. "It requires transparency in every part of the supply chain, but small businesses, which don't have the same reporting resources as large companies, find this very hard."

It's not hard to see why many smaller firms feel that they're stuck in the middle. While the big businesses that they supply put them under pressure to become greener, SMEs have less bargaining clout to oblige their own suppliers to do the same.

"There is a stark difference in the power dynamics," notes Bastock, who advises SMEs facing such problems to act in unison. "If everyone's asking the same sustainability questions of their suppliers, more of them will pay attention. That's the power of collective action."

The feats of Shed 1 Distillery and Smarttask prove that carbon neutrality is within the reach of SMEs, despite the undoubted challenges they will face.

"Small business owners have a lot on their plates, but the green agenda doesn't have to be another headache for them," Anders says. "Approached correctly, it can help you to save money and time, while also burnishing your reputation. It's definitely worth the effort to engage."

> **If everyone's asking the same sustainability questions of their suppliers, more of them will pay attention. That's the power of collective action**

Anna Efetova via GettyImages

GREENWASHING

Why it's high time to end the ESG spin cycle

As companies face growing pressure to come clean about their true environmental impact, the marketing industry is having to take a long, hard look at its role in corporate greenwashing

Mark Hillsdon

Life is about to get tougher for companies that indulge in greenwash – and for the marketing agencies that support them in their deceitful ways.

Conscious that the world's gaze is turning to the UK as the United Nations prepares to start its COP26 climate conference in Glasgow, the government's competition watchdog, the Competition and Markets Authority, has published a *Green Claims Code* for businesses (see panel, right). This guidance is designed to address the authority's own findings that 40% of green claims made by companies online are misleading.

The Advertising Standards Authority has also signalled its intention to clamp down, as it assesses the advertising industry's role in addressing the climate crisis. It is particularly interested in cutting through jargon, so that the public can understand what advertisers mean when they bandy about terms such as 'carbon neutral' and 'net zero'.

This backlash against greenwash means that marketing agencies may have to make some tough decisions, as the pressure grows on them to refuse work that smacks of ecological sophistry.

According to Solitaire Townsend, co-founder of the Futerra agency, the marketing industry has largely kept out of the firing line regarding its own accountability for greenwashing. It has used the very skills that it's known for to manage the narrative and bury its role as a cheerleader for the fossil-fuel industry, for instance.

She believes that some agencies are no longer using advertising for its intended use: to influence and inform consumer choice. Instead, "they are trying to influence us as citizens. They are lobbying through advertising."

Duncan Meisel is campaign director of Clean Creatives, an alliance of marketing professionals who "believe that fossil-fuel clients represent a threat to our shared future". Earlier in his career, he felt the full force of the oil industry's marketing might when he was working with NGOs on campaigns to spread awareness of the climate crisis and its causes.

"Every time we tried to do something that was good, we would come up against really well-funded and well-run PR and advertising campaigns advocating for what was bad," Meisel recalls.

But now Clean Creatives has hit back by publishing *The F-List*, a register of the 90 biggest marketing agencies known to have clients in the fossil-fuel industry.

This initiative is about "bringing transparency to an area that the advertising industry tries to hide", Meisel explains. "The agencies that work for fossil-fuel companies aren't particularly proud of it. For most part, they don't share this information on their websites."

Townsend agrees. "Our industry is terrible at transparency," she says, adding that even the oil majors tend to be far more willing to talk about their activities than the agencies they hire are to discuss theirs.

In November 2020, Clean Creatives asked agencies to sign a pledge declaring that they would decline any work offered by fossil-fuel companies. More than 150 have since done so, many reporting that they had turned down opportunities to pitch for new business.

"The question for agencies is: which side are we on?" Meisel says.

There is more pressure too from the Change Something, Change Everything campaign. Created by ATI, an alliance of Latin American marketing companies, with support from like-minded European businesses, this is challenging agencies to "stop selling carbon" and drop any accounts that promote the use of fossil fuels.

> **Are the short-term revenue gains of working with oil and gas worth the loss of a wealth of future marketing talent?**

"The story has to change," says ATI member Marian Ventura, founder and CEO of the Done! agency in Buenos Aires. "As experts in connecting with the public, we have a major responsibility to act differently."

Townsend believes there are three key factors that will, sooner or later: "squeeze all agencies that work with destructive clients". The first concerns a fundamental generational change: the best young people entering the industry simply don't want to work on oil and gas briefs.

"Are the short-term revenue gains of working with oil and gas worth the loss of a wealth of future marketing talent?" Townsend says.

The second factor concerns the views of existing clients. Futerra is a pioneer of client disclosure reporting, in which marketing agencies list their sources of income. So far, more than 300 agencies have bought into this idea, bringing much-needed transparency to the industry, according to Townsend. But she adds that the biggest players have not followed suit, because they wouldn't want any of the purpose-led clients on their books to know that they also do business with companies in the fossil-fuel industry.

Consumer-goods companies that have positioned themselves as offering sustainable solutions would be "very uncomfortable with being in that kind of company", Townsend says.

She adds that many such firms have strict policies to improve sustainability in their supply chains, yet they are seeking "more transparency from smallholders in sub-Saharan Africa, say, than they're asking from their global creative agencies". Townsend believes that this situation is ripe for change.

The third area is regulation. The local government of Amsterdam, for instance, has banned all ads promoting the use of fossil fuels in the city centre and on the subway system. France is set to follow suit next year, while similar moves are being discussed in Norway and several US states.

Meisel believes it will simply become too difficult for these companies to advertise effectively, with bans and limits on creativity – such as the need to disclose environmental data – making it harder for them to get a clear message across.

Most of the proposed advertising bans would affect firms that make more than a certain percentage of their income from oil and gas. This is important, Meisel says, because it should make agencies that claim to represent the 'green arm' of an energy company think twice.

"It's not responsible to be promoting an oil and gas major's renewable products in a world where that company will be devoting 95% of its capital expenditure to new oil and gas," he argues.

Even if agencies do decide to shun the fossil-fuel industry en masse, won't the big players simply take the creative work in house, given that they have plenty of money to throw at the problem and marketing teams of their own?

Go ahead, says Townsend. "If they can't work with the best agencies, with the best people and the best insights, doing it themselves is very much second best."

Meisel agrees: "That would significantly diminish their ability to reach the public. Their work would become more partisan, more marginalised and less effective."

The six principles of the *Green Claims Code*

The Competition and Markets Authority has published the code to tackle misleading advertising. It has given companies until the end of 2021 to comply.

1. Claims must be truthful and accurate.
2. Claims must be clear and unambiguous.
3. Claims must not omit or conceal important relevant information.
4. Comparisons must be fair and meaningful.
5. Claims must consider the full life-cycle of the product or service.
6. Claims must be substantiated.

Competition and Markets Authority, 2021

40%

of green claims made by advertisers online are misleading

Competition and Markets Authority, 2021

DEBATE

Forest flaw: does carbon offsetting actually work?

An inherently unsound exercise or a reasonable temporary measure on the path to net zero? Experts in this controversial practice offer contrasting views about its value to the planet

Sam Haddad


Kirill Rudenko via GettyImages

If you type the words "is carbon offsetting" into a Google search field, the first three autofill suggestions it will make for completing your query are "effective", "a con" and "greenwashing". This gives some idea of the public's scepticism towards the practice, in which organisations compensate for their greenhouse gas emissions by buying 'carbon credits'.

In May, Greenpeace criticised offsetting projects for allowing companies to continue with their business as usual without making an "absolute reduction in carbon emissions entering the atmosphere". Yet demand for offsetting has never been higher in the corporate world. The chancellor has even expressed his desire for the City of London to become a global hub of trading in this market.

Robin Rix is chief policy and markets adviser at Verra, a US-based not-for-profit body that administrates a widely used standard for carbon offsetting. He reports that his organisation is "on track to issue 300 million credits this year, compared with 140 million in 2020 and 110 million in 2019". Rix attributes this jump in demand to the increasing number of net-zero commitments by companies and governments around the world, along with a growing realisation that the climate crisis is already more severe than many had imagined.

He warns businesses seeking carbon credits to ensure that these are "real and independently verified", arguing that "high-integrity supply will be a key challenge" in meeting the demand for offsetting mechanisms. Verra was founded in 2007 with that very goal in mind, intending to provide more effective quality assurance in the voluntary carbon markets. Unlike some offset schemes, it doesn't offer credits based on future emission reductions.

"All the credits we issue are for emissions that have been reduced or removed," Rix stresses. "Let's say that you plant some trees and forecast that you will sequester 10 tonnes of carbon for the next decade. Under our system, you don't get credits now. But in year three we'd calculate how much carbon has been sequestered, get that verified and only then issue credits."

> **The first priority for every single emitter should be to address its own emissions**

Much of Verra's offsetting work is in forestry. Its activities include afforestation, forest conservation and reforestation.

"Forests in many countries are under threat from big mining, big logging and big agriculture," Rix says. "If you're a smallholder in some of these places, these are powerful forces to be working against. Our projects offer economic incentives for people to prevent their forests from getting chopped down."

Verra has also been investigating several other areas where offsetting can be achieved – particularly the so-called blue carbon sphere, in which marine ecosystems are used to absorb CO_2 from the atmosphere. Activities include the farming of kelp and the restoration of seagrass meadows and mangrove swamps.

Aviation is a key contributor to global greenhouse gas emissions. In May, easyJet holidays became the first large tour operator in the UK to announce that it was offsetting emissions directly associated with its holidays, including fuel used by flights and transfers, and energy consumed by guests in their accommodation. It uses Verra's carbon accounting system and the widely used Gold Standard system to certify its offsetting activities.

"We pay to participate in the highest-standard offsetting projects, which are globally respected," says the firm's CEO, Garry Wilson. But he adds that this is an interim measure pending the development of new zero-emission tech in aviation.

"Right now, offsetting is an important part of what's available to us and our best way of addressing the carbon we emit by flying," Wilson says. "We'll continue to research and implement other ways to cut emissions, such as removing weight from our aircraft and taxiing on one engine. We are also supporting the development of zero-emission aircraft with partners such as Airbus. We're committed to transitioning to these as soon as they become viable, which could be as soon as 2035."

Wilson's acknowledgment that offsetting is merely a temporary measure reflects a broader change of approach in the private sector, according to Rix.

"The ground has shifted," he says. "It used to be a case of: 'Just neutralise your carbon emissions and offset, full stop.' But now the whole concept is to give primacy to internal reductions. The first priority for every single emitter should be to address its own emissions."

In February, Dr Robert Watt, a lecturer in international politics at the University of Manchester, published a research paper entitled *The Fantasy of Carbon Offsetting*. He says that he considers the practice well suited to the "post-truth period we find ourselves in".

Why is that? "Carbon offsets are political misdirection," Watt argues. "Firms turn towards carbon credits because they can, for a price, pretend to be carbon neutral or say that they're net-zero emitters. Even though such statements aren't credible, they obscure the issues and confuse the public. It allows people to think that things can carry on more or less as before."

Isn't that better than nothing? "That's a common response," he says. "But this buys into the idea that we simply have to accept the situation as it stands. It's inherently depoliticising, when what's needed in response to the climate crisis is a much more substantial shift."

Watt also doesn't believe that carbon offsetting can ever be truly fair and verifiable, owing to the power dynamics involved in establishing such schemes. But he adds that changing how we speak about the practice – particularly when addressing its limitations – could prove beneficial.

"I think it could be quite useful if we can stop talking about offsets and credits being a guarantee of emission reduction," he says. "By getting away from that kind of language of carbon neutrality, you can start creating a different type of discourse."

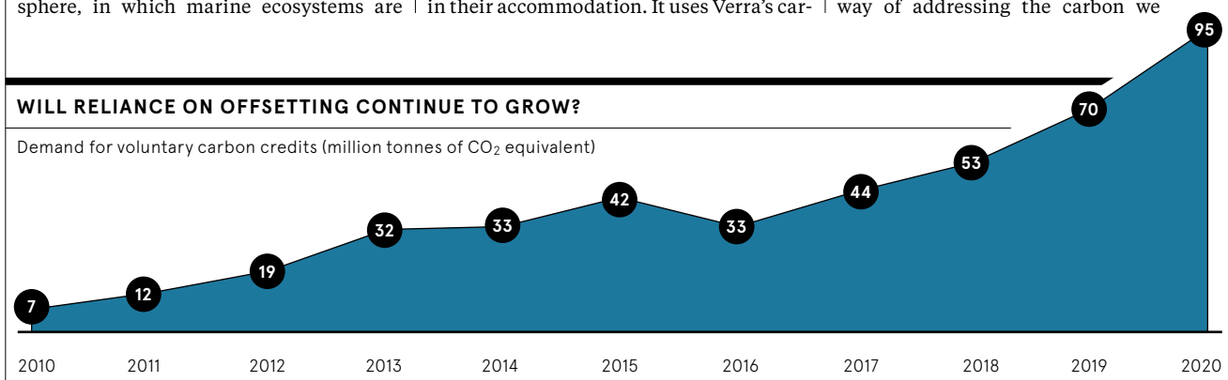
Verra has noticed that a growing number of companies are changing their approach to offsetting and using their carbon credits for new and different purposes.

"For instance, they're quantifying the impact of their CSR activities, not necessarily offsetting anything. They want to give millions of dollars to fight the climate crisis. We'd encourage that, as we see market mechanisms as vehicles for delivering results-based finance," says Rix, who adds that urgently cutting emissions in such a way is the best response to the emergency.

After all, he observes, "the alternative isn't that businesses are going to magically shutter all their factories". ●

WILL RELIANCE ON OFFSETTING CONTINUE TO GROW?

Demand for voluntary carbon credits (million tonnes of CO_2 equivalent)



Trove Research, University College London, 2021