



CLIMATE CHANGE:

PROOF OF HUMAN-MADE climate change was first discovered in the 1960s by geochemist Charles Keeling, who measured carbon dioxide (CO₂) in the Earth's atmosphere and detected an annual rise. However, it's wasn't until the 1980s, journalists conclude, that the science behind the phenomenon was widely accepted as indisputable and existential. In honour of this recognition, in 1988, US *TIME* magazine named their Man of the Year as 'Planet of the Year: Endangered Earth'.

Over 30 years later, that cover story is just as timely. Mother Earth, the human race's habitat, is still endangered, only there is much less time to save it.

"Our negligence has catapulted climate change from an existential challenge to the dire crisis it is now," write Christiana Figueres and Tom Rivett-Carnac, the chief orchestrators of the historic

Paris Agreement, in their recent book 'The Future We Choose: Surviving the Climate Crisis'. They note that, while this period of human history has been "indelibly and painfully marked", it is not yet fully written and "humans hold the pen, more firmly than ever".

What kind of future is the human race writing for itself?

Climate change targets

In 2015, following a disastrous international summit in Copenhagen in 2009, 197 nations came together and forged the now historic Paris Agreement. The legally binding treaty hinges on some "very, very carefully chosen words", says Jim Skea, a professor at Imperial College London and co-chair of Working Group III of the Intergovernmental Panel on Climate Change (IPCC). Those words are: "To limit Earth's temperature rise to well below

2°C, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels."

The agreement, says Skea, bent the trend away from 'business as usual'. "Paris changed the way governments were interacting with each other, from top-down processes, whereby a global target was sliced up between countries, to bottom-up, and built on an international achievement of what individual countries would offer," he explains.

Despite the ambition, Dieter Helm, a British economist and academic, in his new book 'Net Zero: How We Stop Causing Climate Change', says the agreement has made no real difference, other than to allow leaders to tell their voters they are "taking action" when their pledges are little more than "fig leaves" for business as usual.

In reality, government pledges don't add up to the global

agreement and the US has pulled out of the treaty altogether.

In 2018, a landmark IPCC report outlined a model pathway to achieving 1.5°C. It said CO₂ emissions should "decline by about 45 per cent from 2010 levels by 2030, reaching net zero around 2050".

At the time, the report was widely interpreted as "12 years to save the world", says Skea, but he wishes to clarify: "If you were going to put emissions on a pathway to limiting warming to 1.5°C, you would probably, in the middle of the range, need to cut emissions by about 45 per cent by 2030."

What does net-zero entail?

After climate activist group Extinction Rebellion brought parts of London to a standstill in April 2019, the UK became the first major economy to pass laws to bring all greenhouse gas (GHG) emissions to net zero by 2050.

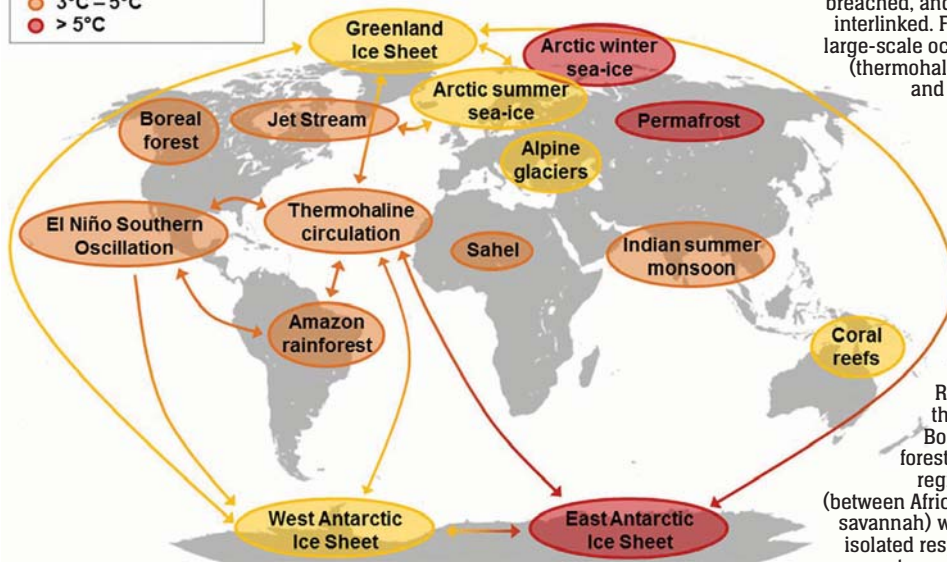
Extinction Rebellion has three demands for the government, including reducing greenhouse gas emissions to net-zero by 2025.



2020 belongs to coronavirus, but surely climate change will remain the hot topic for the years ahead. The world is responding, but is it enough? By **Heidi Vella**

THE HEAT IS ON

Tipping elements at risk:
 ● 1°C – 3°C
 ● 3°C – 5°C
 ● > 5°C



The diagram depicts at what stages of warming tipping points are expected to be breached, and how some are interlinked. For example the large-scale ocean circulation (thermohaline circulation) and the large-scale changes in temperature in the tropical Pacific (El Niño Southern Oscillation) play an important role in what is happening at the ice caps and even the Amazon Rainforest, while the vast northern Boreal (subarctic) forests and the more regionalised Sahel (between Africa's Sahara and savannah) will have a more isolated response to global temperature change.

2050. That's a less ambitious target than 2025, which the group had demanded, a timeframe Skea says is "completely implausible" due to the social consequences.

Along with the UK, the EU, France, Sweden, Denmark, New Zealand, and Hungary have all adopted a net-zero emissions target into law. Finland is the most ambitious and pledges to be carbon-neutral by 2035. In a significant move, China, the world's biggest polluter, recently committed to becoming carbon-neutral by 2060. Suriname and Bhutan have already achieved this, according to The Energy and Climate Intelligence Unit, which tracks the net-zero 'race'.

But what does 'net zero' mean? "In essence, it means getting emissions of all greenhouse gases as low as possible by the target date, with remaining emissions balanced by removals from the atmosphere," explains Jim Watson, professor of >

energy policy at University College London and adviser to the UK Committee on Climate Change. Removal of carbon from the atmosphere can be anything from planting trees to more engineered and controversial solutions such as direct air capture.

Interpretation of net zero varies, however. It may include, or not, international aviation and shipping, as well as offsetting domestic emissions only, or paying for emission reductions in other countries. The UK's plan includes the former, with domestic offsetting.

However, Helm says net zero fails to include carbon consumption, only production; it doesn't include the goods countries import and consume.

What happens if the world fails to meet its targets?

If the 2050 net-zero target is not met, countries would be emitting more than their fair share of CO₂. If this happens, the scientific projections are clear. Humans are already experiencing the destructive impact of climate change. As this article is being written, record-breaking wildfires rage across parts of the US, and the newly released 2020 WWF Living Planet Report says wildlife populations are in 'free-fall' and have now plummeted by 68 per cent since 1970, with no signs of slowing.

In their book, Figueres and Rivett-Carnac imagine what 2050 will look like if the world is headed for 3°C warmer by 2100, which it currently is.

"The air is hot, heavy... and clogged with particulate pollution... masks are routinely worn to protect from pollution... The coral reefs have vanished... the ice sheets in the Arctic have melted... There's a surge in extreme hurricanes and tropical storms because of more moisture in the air and higher sea levels... More people are displaced daily..." they write. "With each new tipping point passed, they [people] feel hope slipping away."

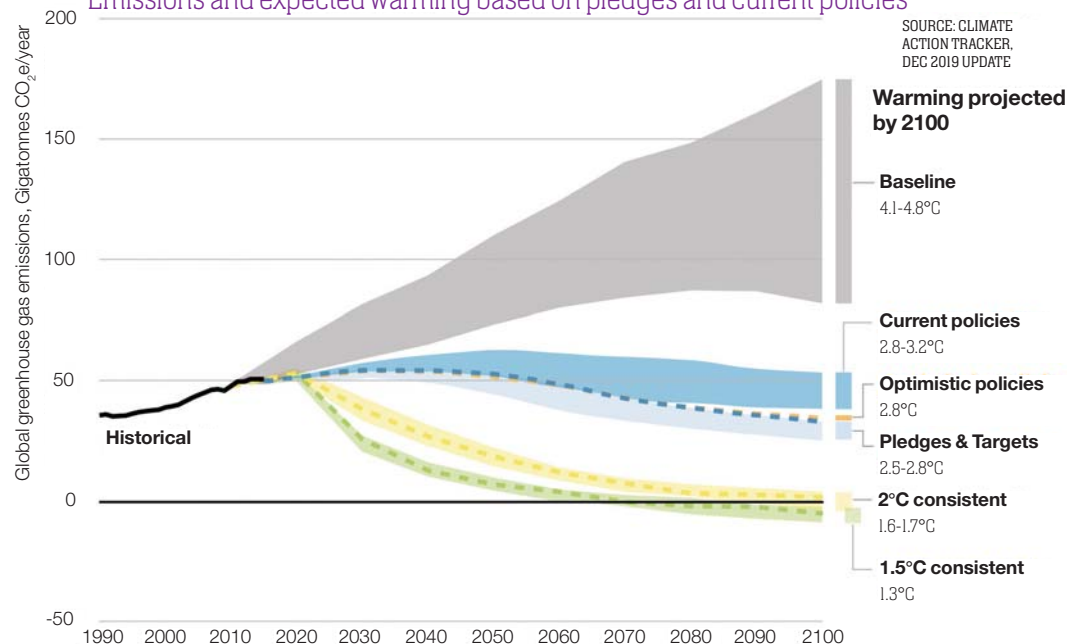
In 2018, scientists warned that 2°C will have significantly more impacts than 1.5°C and going beyond 2°C could potentially trigger natural processes and tipping points, such as the loss of the Amazon Rainforest or the West Antarctic ice sheet, which could create a domino effect and drive uncontrollable warming to as high as 4°C.

Both accuse governments of failing to grasp the severity of

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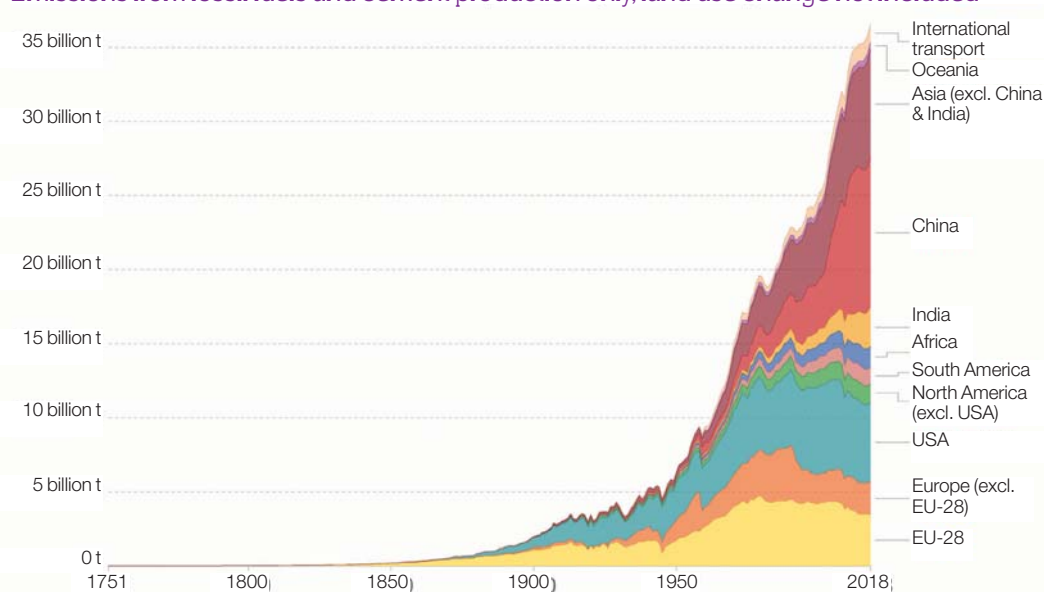
2100 warming projections

Emissions and expected warming based on pledges and current policies



Annual total CO₂ emissions, by world region

Emissions from fossil fuels and cement production only, land use change not included



SOURCE: CARBON DIOXIDE INFORMATION ANALYSIS CENTER (CDIAC), GLOBAL CARBON PROJECT (GCP), OUR WORLD IN DATA

the climate change situation. It's hard to argue with their assessment. An extensive report compiled by Stockholm Resilience Centre, Internet of Planet and Potsdam Institute for Climate Impact Research, and others, published in January 2020, called the Exponential Roadmap, says based on what countries are actually doing, there is a 97 per cent probability of exceeding the 2°C warming. Based on what countries have promised to do, this falls to 90 per cent. Only 16 countries have

national laws consistent with their emission reduction pledges.

Are we close to the target?

In recent years, the world has actually gone backwards. After three years of stable global emissions, in 2017 they grew by 1.6 per cent and were estimated by the Global Carbon Project to have grown a further 2.7 per cent in 2018. During the financial crisis, emissions did decline in some countries, such as Portugal and Ireland. This year emissions are expected to fall further due to

the coronavirus pandemic.

There has been some progress. In 2019, CO₂ emissions flattened, largely due to a decline from the energy sector in the US and Europe. In the last decade, levels of carbon emissions from power consumption in the UK fell by almost two-thirds, a trend that is being mirrored globally.

"Five or six years ago, renewables were 5-6 per cent of the global energy mix, now it's 10 per cent; if we keep doubling every five to six years, we will be at 50 per cent by 2030," says Owen

Gaffney, co-author of the Exponential Roadmap and a global sustainability analyst and writer at the Stockholm Resilience Centre.

China, the world's biggest CO₂ emitter despite an ambitious renewable energy and electric vehicle programme, was responsible for almost all of the 2019 growth in global emissions.

What's holding us up?

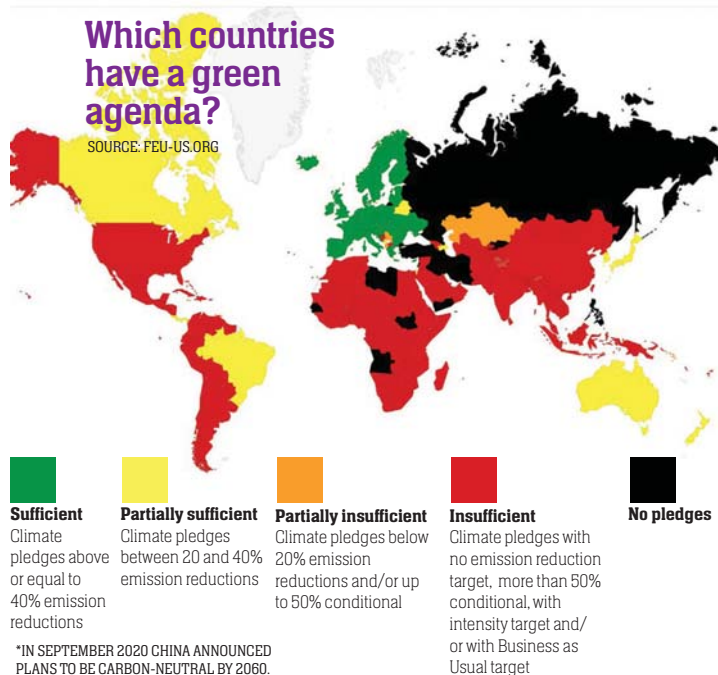
The experts agree that it's not just energy that needs to decarbonise, but other sectors such as food, transport, construction and agriculture, none of which have been sufficiently addressed globally. It's not technological innovation, but bold policymaking that is stifling progress and failing to provide the right investment signals to companies.

This is evidenced by the meagre budgets allocated to clean energy and decarbonisation by fossil fuel firms. Analysis at the beginning of the year by the International Energy Agency highlighted that in 2018, of the investments collectively made by the world's largest oil and gas giants, less than 1 per cent went towards low-carbon activities such as building renewable energy infrastructure or installing carbon capture, usage and storage.

Furthermore, Watson says, while avoiding the impacts of climate change makes economic sense – a 2017 report by The Economic Case for Climate Action in the United States estimated climate change impacts will cost the US at least \$360bn (£277bn) annually over the next decade – it requires a lot of money to be spent upfront on technology development. “While it's technically very feasible, the distribution of those costs matter; we need specific policies to give the incentives to deploy low-carbon technologies and develop those that are not yet commercially available,” he says.

This is even more challenging in developing nations, which are historically not responsible for the vast majority of CO₂ already released into the atmosphere, a fact which inevitably becomes a sticking point at international negotiations. The global South will need to act fast to reduce its emissions, but it also needs to raise living standards, which, as is evident in China, will likely see further spikes in emissions

Copper smelting in Russia - a country that is the world's fourth largest polluter and without pledges to reduce greenhouse gas emissions



due to growing middle classes with new consumer power.

“It's clear there couldn't be a full synchronicity in emissions reductions,” says Dr Christoph Bertram, a scientist at Potsdam Institute for Climate Impact Research. “But the good news is that low-carbon technologies are global and the prices are falling; when the global North has managed to transition to a clean energy future, the global South will follow.”

Naomi Klein, in her 2019 book ‘On Fire: The Burning Case for a Green New Deal’, has a more scathing assessment of global inaction. She argues it's due in large part to fossil fuel companies having easy access to governments, while indigenous communities that traditionally work with nature as part of their

culture are routinely ignored, displaced and even killed. Other factors she cites are the perpetual quest for growth, the election of populist governments and unfettered neo-liberalism.

Klein says the “blindingly obvious” roots of the climate crisis are: “globalisation, deregulation, and contemporary capitalism's quest for perpetual growth.”

Proposed solutions

There is still time to halt the worst impacts of global warming, if action is taken now. But it won't be easy and will require huge social and economic change. There is a lot to do.

The first good news is, for engineers and technologists, says Skea, it's not only about

renewables and energy efficiency or industrial engineering, such as the hydrogen economy and carbon capture and storage: it's about everything. “These are not alternatives to each other. The level of ambition is such, it needs to be everything, so there's a huge amount of work for scientists and engineers,” he says.

Furthermore, there are comprehensive, workable ideas and policy floating around to make the transition happen in a fair and sustainable way. They just need to be acted on.

The European Commission's Green Deal presented last December plans for a €100bn (£77bn) Just Transition Mechanism to help countries still heavily dependent on fossil fuels and carbon-intensive processes to transition to renewable energy sources. As well as reducing GHG emissions to 50 per cent of 1990 levels or even lower by 2030, it's hoped the deal, when progressed, will give investors the confidence to make long-term sustainable investment decisions.

In his book ‘Net Zero’, Helm lays out the progressive case for a ‘carbon border tax’, whereby countries exporting carbon-intensive products face a tax on a level playing field with home producers, encouraging them to introduce their own carbon price.

In the US, the Sunrise Movement is pushing for a Green New Deal to “mobilise every aspect of American society toward 100 per cent clean and renewable energy” and create a job guarantee. The Democrat election candidate Joe Biden has agreed to adopt a large part of the plans, along with \$1.7tn (£1.3tn) earmarked to achieve 100 per cent clean energy. Meanwhile, China continues to implement its ambitious climate change policies.

“I think we're at a tipping point,” says Gaffney. “In 2020, we could see the fastest economic transition in history, things are aligning to make it happen.”

But the consensus, ahead of the 2021 United Nations Climate Change Conference, is the public need to keep up the pressure.

“Now is the time for us to participate... If democracy is to thrive and survive in the 21st century, climate change is the one big test it cannot fail,” conclude Figueres and Rivett-Carnac. *

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