

Climate change: a simple guide

It's easy to get confused about climate change when the endless headlines are as numbing as the endless inter-governmental meetings. The problem is presented as urgent and yet people are also told that the most serious consequences are decades away. You probably know too, that there is a lot of misinformation out there, with fossil fuel firms sowing seeds of doubt about the science or denying there is a problem. So, what's the truth?

Well, buckle up, because the following may enlighten and frighten you more than you imagine. It will help you understand why everything that societies are currently doing in response to climate change will fail. All those investments in wind farms, solar energy, electric cars, and recycling will, on their own, have almost no useful impact.

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Scientists have known for many decades that the planet's average temperature is rising, and that the pace is accelerating. They know too that what's happening is not natural. It's happening too quickly to be part of any normal cycle, and there has been no natural event, like a volcanic eruption, to explain it.

The warming is mostly down to the way humans produce energy and food. This creates gases, known as greenhouse gases (GHG), in greater quantities than nature can absorb. Most of the excess gases are getting stuck in the atmosphere where they trap some of the sun's heat. As a result, the average global surface temperature is now 1.6°C higher than it was 200 years ago (2024). While that might seem a small increase, the average global surface temperature is now higher than at any time in the last 3 million years.

The main GHG is carbon dioxide (CO₂). Before the industrial revolution, in the early nineteenth century, the concentration of CO₂ in the atmosphere was 280 ppm (parts per million). It had been like that for many hundreds of thousands of years. It started to rise when people began burning fossil fuels.

By early 2025 the concentration of CO₂ had risen to 427 ppm, 53% more than before. It is growing by 3 ppm a year exponentially. The tipping point that societies have to avoid, when a chain-reaction starts, is when the concentration reaches 450 ppm. If it reaches this level, the planet will gradually return to how it was 45 million years ago, which is the last time the CO₂ concentration was 450 ppm. Based on current trends, that tipping point will be reached in less than a decade, in the early 2030s.

If this happens, the great forests around the world will either burn or slowly die and the ice at the poles will melt much faster. Mountain glaciers and coral reefs will gradually disappear. As forests absorb CO₂ and ice reflects some of the sun's heat, the loss of both will accelerate the speed of warming, leading to a steady and uncontrollable rise in temperatures over many centuries. This will gradually make most of the planet uninhabitable.

What can you do? If you live in the rich world, what would happen if you found a way to live 100% emissions free? What impact would that have over the next decade?

The answer is that you would delay the start of the chain-reaction by a fifth of a second.

Even if *everyone* in America – all 330 million people – lived without generating any damaging emissions for the next decade, it would only delay the onset of accelerated warming by about two

years. This is because the US is only responsible for 15% of emissions (it has 4% of the global population). If those responsible for the other 85% continue as now, America's efforts would not be enough to stop what is happening. They would only delay it a short time.

And even this is before taking account of the rising emissions from the wildfires which are now pumping vast quantities of CO₂ into the atmosphere as well. Nor does it count the powerful nitrous oxide emissions (another important GHG) from fertilizer runoff, or the rising methane emissions (the second most important GHG) from abandoned coal mines, and garbage tips. Although the volume of these gases is much smaller than CO₂, they have a much greater warming effect.

Similarly, changing every car to an electric vehicle or closing every coal-fired power station in Europe and North America would not be anything like enough. Unless the response to the crisis includes China, Russia, Japan, India, and Australia, as well as North America and Europe, humanity cannot slow the pace of warming quickly enough now to avoid a disaster. We are battling the laws of chemistry on a planetary scale.

It is also important to understand that humanity cannot stop climate change in any time frame most people understand. All societies can now do is make sure the warming doesn't get out of control and, even then, because of lags in the atmospheric system, and the continued release of gases from wildfires, mines and garbage dumps, global temperatures will continue to rise for years to come.

The only way to avoid disaster is if almost everyone cuts their GHG emissions by at least 7% a year. In practical terms, this means 20% fewer cars in three years, as well as 20% fewer aeroplanes, 20% fewer coal-fired powered stations, and 20% fewer ships. In the following three years there needs to be another 20% reduction. And the longer societies take to begin this process, the steeper the cuts have to be.

For the cuts to have any chance of working, according to the UN, greenhouse gas emissions must be at least 60% lower in 2030 compared to 2019. By 2040 they need to be zero. Societies also need to change the way they grow food, and stop all deforestation. They will also need to build thousands of carbon capture and storage plants, and run them full-blast for decades, to bring the CO₂ concentration in the atmosphere back to safer levels. Even then, even if people do all this, humanity's chance of avoiding the chain-reaction is only 50:50.

And, just to be clear, a target of "net-zero", as some fossil fuel companies, airlines, and governments are suggesting, doesn't cut it. Trying to offset emissions in some way will not have anything like enough impact now.

To avoid a catastrophe, almost everyone needs to change the way they live, and they need to do this urgently, whether they want to or not and polluting businesses – fossil fuel firms and cement companies – have to be shuttered as fast as possible.

Put most simply: the way most of us live has to be dismantled, regardless of the economic and social consequences. Without a change on this scale there is no point in doing anything at all because the atmospheric changes that have been set in motion so far are way beyond the level that incremental changes can repair.

This is edited from the book "A Chicken can't lay a Duck Egg"