Climate chain reaction risks hothouse Earth

Can we limit global warming to just 2C? Scientists have warned of catastrophic and "irreversible" climate change if temperatures keep rising. The tipping point may come sooner than we think.

Bellweather: South Africa's Western Cape has been suffering a crippling drought since 2015.

Scorching hot temperatures, entire regions of the Earth made inhospitable, and towering sea level rises: according to a new study by an international team of climate scientists, this is the bleak future we are heading for unless drastic measures are taken to combat global warming.

Average global temperatures have risen by 1C compared to pre-industrial levels. And they are still rising by about 0.17 degrees every decade. Researchers claim that if warming reaches 2C, the planet could become fixed into an "irreversible pathway" to a catastrophic temperature rise of 4 to 5 degrees.

The reason for this prediction is what scientists call "feedback processes". These are Earth's natural systems that help keep the planet cool.

For example, each year forests, oceans and soil absorb 4.5 billion tonnes of CO2 that would otherwise end up in the atmosphere. Polar ice sheets also store huge quantities of greenhouse gases and moderate global temperatures by reflecting sunlight back into space.

But scientists fear that once global warming passes a certain tipping point, these systems will fail — releasing the gas they had previously stored, supercharging global warming.

Earth would effectively become a "self-heater", claims Professor Johan Rockström, with the study predicting "massive, sometimes abrupt and undoubtedly disruptive" consequences.

So what can be done to avoid this scenario?

According to Rockström, carbon emissions must be stopped entirely by 2050, and the "whole world [needs to] embark on a major project to become sustainable across all sectors."

How likely this is to happen remains to be seen. In 2016, world nations signed the Paris Climate Agreement, in which they committed to keep global warming to "well below" a 2C rise.

However, the accord suffered a major blow last year when US President Donald Trump removed America — the world's second largest polluter — from the commitment.

Can we limit global warming to below 2C?

Red alert

Not a chance, some argue. Geopolitical tensions are rising across the planet, and world leaders are distracted with fighting domestic political battles at home. This leaves little hope for the international cooperation that is needed to fight climate change. Furthermore, kicking fossil fuels would require a revolution in how the global economy operates — an unlikely scenario, particularly by 2050.

Do not be defeatist, others respond. Human will and ingenuity are powerful. Renewable energy solutions will improve, and scientists are working on contraptions to suck excess CO2 out of the atmosphere. What's more, the unseasonable heatwave now sweeping the planet might be the wake-up call that politicians need. There is hope.

¿! Q & A

Q: What do we know?

A: The climate scientists prediction is not based on new research, but on a study of numerous other research papers. Across the world, humans emit approximately 40 billion tonnes of CO2 every year, and approximately half of that is absorbed by oceans, trees and land. Without these processes, the consequences of global warming would be more severe.

Q: What do we not know?

A: We do not know for sure if the period of hot weather we are currently experiencing is a direct result of global warming. We also do not know what level of temperature rise will cause Earth's "feedback processes" to fail. Nor do we know if governments and industries will be able to stop burning fossil fuels entirely by 2050.

YOU DECIDE

1. Is climate change humanity's greatest problem?

2. Will we ever stop burning fossil fuels?

ACTIVITIES

1. In one minute, write down as many things as you can think of that are powered by fossil fuels. For each thing, what alternatives are there that do not produce pollution? Is it possible for these alternatives to entirely replace the pollution-producing things?

2. Take notes on the two videos in Become An Expert. Then, draw a diagram which demonstrates how ice caps and forests contribute to keeping Earth's climate cool.

SOME PEOPLE SAY...

"Global warming isn't a prediction. It is happening."
James Hansen

WHAT DO YOU THINK?

WORD WATCH

Sea level rises – The paper predicts that in the worst case scenario sea levels could rise by 60 meters. See the *National Geographic* link in Become An Expert for more.

Climate scientists – Their study has been published in the journal *Proceedings of the National Academy of Sciences*. For more details, see the final link in Become An Expert.

2C – The study does not claim that this is the definite tipping point. The consequences described could potentially occur with a larger or smaller temperature increase.

Reflecting sunlight – Professor Peter Wadhams claims that the warming this reflection prevents is equivalent to 20 years worth of CO2 emissions.

Tipping point – The point at which a series of small changes or incidents becomes significant enough to cause larger, more significant change.

Second largest – The world's biggest polluter is China, which pumps out over 10 billion tonnes of CO2 every year. The US emits just over 5 billion tonnes.

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