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What Changes Climate?

The reason our climate is changing is surprisingly straightforward: greenhouse gases are causing our planet to warm. The more of these gases in the atmosphere, the more the sun's energy gets trapped as heat – which means things keep getting hotter and hotter. And even small changes in the global average temperature can cause major and dangerous shifts in climate and weather. *Just think of the difference between 0 and 1 degrees Celsius (or 32 and 33 degrees Fahrenheit).*

The biggest factor in this change is carbon dioxide (CO₂). That's because, over the past century, our burning of fossil fuels for electricity, industry, and transportation has released large amounts of carbon dioxide into the atmosphere. This carbon has been underground for millions of years in the form of coal, oil, and natural gas. Once it's burned and goes into the atmosphere, it can stay there trapping heat for up to 200 years.

Burning fossil fuels isn't the only thing contributing to rising levels of carbon dioxide. Trees play an important role in regulating CO₂, absorbing and storing carbon as part of their natural processes. Deforestation – cutting down trees on a large scale for fuel, land, or other purposes – short circuits this critical process and leads to more greenhouse gases in the atmosphere as more trees are burned and fewer are in the ground to absorb excess carbon.

The result: Ever-warmer temperatures that disrupt natural systems.

If emissions continue to rise unchecked, the long-term risks are serious. Our lives are connected to the climate in ways many of us take for granted. The relatively stable climate we've enjoyed since the last ice age has served as the foundation for human civilization.

Just think: the farms that feed us depend on reliable growing seasons and predictable temperatures to grow specific crops in specific regions. We've built homes and cities to be right on the water – not in it, as they could be with sea levels rising. Running a business is one thing when you can expect devastating storms to wreak havoc once every 100 years; running a business when you could see one every other year is another matter altogether. The list goes on.

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What Do We Mean by “Climate Crisis”?

When we talk about the climate crisis, we’re talking about the changes scientists have seen in long-term temperature, precipitation, and wind patterns, thanks to higher levels of greenhouse gases in the atmosphere.

To put it in everyday terms, we’re talking about how average temperatures around the world keep rising. We’re talking about how intense storms and floods are becoming more frequent and devastating in some parts of the world. We’re talking about how droughts in some regions seem to stretch on longer than ever before. We’re talking about glaciers melting at record pace and sea levels rising and swallowing up coasts. We’re talking about effects on human health and migration due to these impacts.

And on and on. While the symptoms vary widely, the root cause is the same: rising levels of greenhouse gases in the atmosphere. And these come primarily from humans burning fossil fuels. Carbon dioxide is the chief culprit, but it’s not the only one as other gases like methane also have a dangerous role to play in unsettling the natural systems that regulate our seasons and climate and leading to more unbalanced weather (more on that below).

If this sounds like a big deal, that’s because it is. In fact, we can expect to see our world transformed during our lifetimes and if we do nothing, that transformation will be profound.

The first piece of good news here is that we’re not doomed. We have a choice in the future we create. And we can choose to limit rising temperatures well below 2 degrees Celsius, averting the worst of the climate crisis and protecting our planet.

The second bit of good news is that we know how to do this and we already have the technology to do it today. If emissions from fossil fuels are the primary driver of climate change (and they are), then the best way to cut emissions is to start burning less of them and ultimately stop altogether. Which means a global shift to clean energy technologies like solar and wind. And because these technologies keep becoming more affordable and accessible all the time, we can make this shift while driving healthy economic growth around the world.

Sure, it’ll take some doing and a lot of help from people like you to keep the pressure on world leaders to keep making progress. But as we saw in 2015 when millions spoke up to make the world’s first universal climate agreement a reality, when everything is on the line, nothing is impossible.

Want to learn more? Read on.

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Is the Climate Crisis Real?

In a word: yes. Scientists are crystal clear about the relationship between carbon pollution and the climate crisis.

Climate crisis deniers, however, would like for you to believe that they're uncertain. Many of the attacks on climate science have come from fossil fuel interests and their allies with financial motives for blocking clean energy and other climate solutions. They can't publicly say they want to protect their business, so they instead try to undermine belief in the science behind our understanding of the climate crisis.

Then there's the smaller part of the climate denial movement that believes that scientists and governments are engaged in a nefarious worldwide hoax. Never mind the evidence to the contrary right in front of their eyes.

Climate deniers willing to concede that the world is getting warmer will often argue that there is not "scientific consensus" that it's due to human activity.

This too is false.

The phrase "scientific consensus" refers to the collective judgment of a scientific community, and while it implies agreement, it does not require unanimity. Over 97 percent of the climate science community agrees that climate change is real and that it is being caused by our use of fossil fuels. That's [roughly the same](#) as the amount of medical scholars who believe smoking cigarettes causes lung cancer.

And just as the tobacco industry once attempted to confuse the public about the link between smoking and cancer, Big Polluters like oil and coal companies have spent decades running well-funded campaigns to mislead and deceive the public about what's really happening to the planet.

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How Do We Know?

We know the Earth is getting hotter.

Thanks to data from satellites and a host of other measurements, scientists have concluded that the world has already warmed about 0.8 degrees Celsius (1.5 degrees Fahrenheit) since 1880, and that 15 of the 16 hottest years on record have occurred in the twenty-first century. All at a time of decreased solar output, [according to NASA](#) (which is another way of saying we're not getting more heat energy from the sun to drive this warming — we're just trapping more of it thanks to higher levels of greenhouse gases).

While our understanding of the climate crisis continues to grow every year, we also have a good picture of what it means so far. By measuring air and ocean temperatures for decades, scientists have seen how rising average air temperatures have led to average ocean temperatures (of the top 700 m (2,300 ft)) rising [0.16 degrees Celsius](#) (0.3 degrees [Fahrenheit](#)) since 1969.

The consequences of oceans absorbing so much heat extend in several directions. First, warmer oceans mean less sea ice, particularly in the Arctic, where the extent and thickness of sea ice has declined rapidly over the last several decades. On land, things are no better: the Greenland and Antarctic ice sheets have shrunk in a big way.

In just the last decade, [2 trillion tons of ice](#) from the Greenland ice sheet has made its way into the Atlantic Ocean as fresh water. This melting ice — including glaciers across the world, which are retreating at an alarming rate — has accelerated sea-level rise, which is not great news for [the half of the world's population living within 60 km of the sea](#).

Less visible than melting glaciers and rising seas but no less important is the fact that higher levels of carbon dioxide in the atmosphere leads oceans to become more acidic. [In fact, scientists have measured surface ocean waters becoming 30 percent more acidic since the nineteenth century](#), as the oceans absorb greater levels of carbon dioxide and turn it into carbonic acid. The greater acidity prevents shellfish from building healthy skeletons and causes coral reefs to bleach and die off, with ripple effects up and down the food chain.

And that's just the oceans. Scientists have also traced strong connections between rising temperatures and greenhouse gases on one hand and increasingly frequent and dangerous storms, longer droughts, increasing danger from wildfires, and changes to the global water cycle on the other. And that's just for starters.

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Why Should We Care?

The simple fact is that global temperature rise throws natural systems out of balance.

Around the world, we are already beginning to see what a warmer future has in store for us – and it is not a pleasant sight. Intense rainstorms, severe droughts, powerful tropical cyclones, and extreme heat waves are becoming more frequent. Rising seas are flooding coastal areas and quite literally [swallowing entire islands](#). Some populations of animals have [started to die out](#).

The climate crisis has real and dangerous impacts on public health as well. This is especially true for the most vulnerable among us – children, the elderly, and the poor – who are at the most risk from heat stress, air pollution, and extreme weather events.

And unless we act, we could see these impacts become even more pronounced in the very near future.

Global sea levels have risen about 8 inches since 1880, but [are projected](#) to rise another 1 to 4 feet by 2100. Consider the threat this poses to the [nearly half of the world's population](#) that presently lives within 60 kilometers of the sea. Extreme weather events [are forecast](#) to become even more severe and/or more frequent. The Arctic Ocean likely will be [ice-free during the summer](#) before mid-century.

Going back to rising temperatures, if we keep burning fossil fuels without making any real efforts to cut emissions, we could see surface temperatures on Earth warm by more than 4 degrees Celsius (10.8 degrees Fahrenheit) by the end of this century. Put plainly, this would transform the planet in ways that undermine its capacity to support a large and thriving human population.

These are some of the practical reasons we should care. But then there are the moral questions to consider. Do we want to be the generation that let our beautiful home go to waste because we were afraid to act? Do we want to condemn our children, our grandchildren, and everyone who comes after to living in a world devastated by the climate crisis when the solutions were in our hands? Or do we want to be the generation that discovered the courage to act and rose to solve the greatest challenge humanity has ever faced?

It's our choice.

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How Sure Are Scientists?

In short, very sure. [More than 97 percent of climate scientists agree that the man-made climate crisis is a reality.](#) Virtually every national academy of science on Earth agrees.

In an urgent letter to the members of the US Congress, the executive directors of the American Association for the Advancement of Science and the American Meteorological Society; the presidents of the Association of Ecosystem Research Centers, Ecological Society of America, and the American Geophysical Union; and the leaders of 13 additional major scientific associations [wrote](#), “Observations throughout the world make it clear that climate change is occurring, and rigorous scientific research demonstrates that the greenhouse gases emitted by human activities are the primary driver.”

The Earth has experienced cycles of warming and cooling in the past, but experts believe the current warming trend is “[proceeding at a rate that is unprecedented in the past 1,300 years.](#)”

For comparison’s sake, [climate scientists have estimated](#) the planet has previously taken around 5,000 years to recover – by warming between 4–7 degrees Celsius – after an ice age has ended. This makes the 0.8 degrees Celsius increase in the Earth’s average surface temperature across the twentieth century alone an extreme outlier to the planet’s natural warming/cooling cycles. Indeed, it is roughly eight times faster than a typical post-ice-age-recovery.

And it is a cycle that is rapidly accelerating.

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What We Can Do?

The climate crisis is already happening. How much the climate warms in the future is up to us.

It's true that even if we completely stopped emitting carbon pollution today, average global temperatures would continue on their upward trajectory for some time. The carbon pollution that has caused the climate crisis stays in the atmosphere for hundreds of years, so it is difficult to stop the climate crisis in its tracks.

But achieving net zero carbon emissions by the second half of this century is essential to the long-term health of the planet. If we act now to transition to clean energy technologies like solar and wind, we can limit global warming to well below 2 degrees Celsius (3.6 degrees Fahrenheit), while also creating many, many new jobs in fields as diverse as construction, transportation, manufacturing, research and development, operations, engineering, and much more.

In addition to taking a [few small steps](#) to reduce your own carbon footprint and supporting businesses that are embracing clean energy, we can work together to [support leaders](#) of every rank who have prioritized making climate solutions a reality. Only through collective action will we be able to ensure our leaders enact the strong state and national policies needed to tackle a crisis of this magnitude.

The sustainable and prosperous future we all want is still well within our grasp. But to make it a reality, we have to act now.