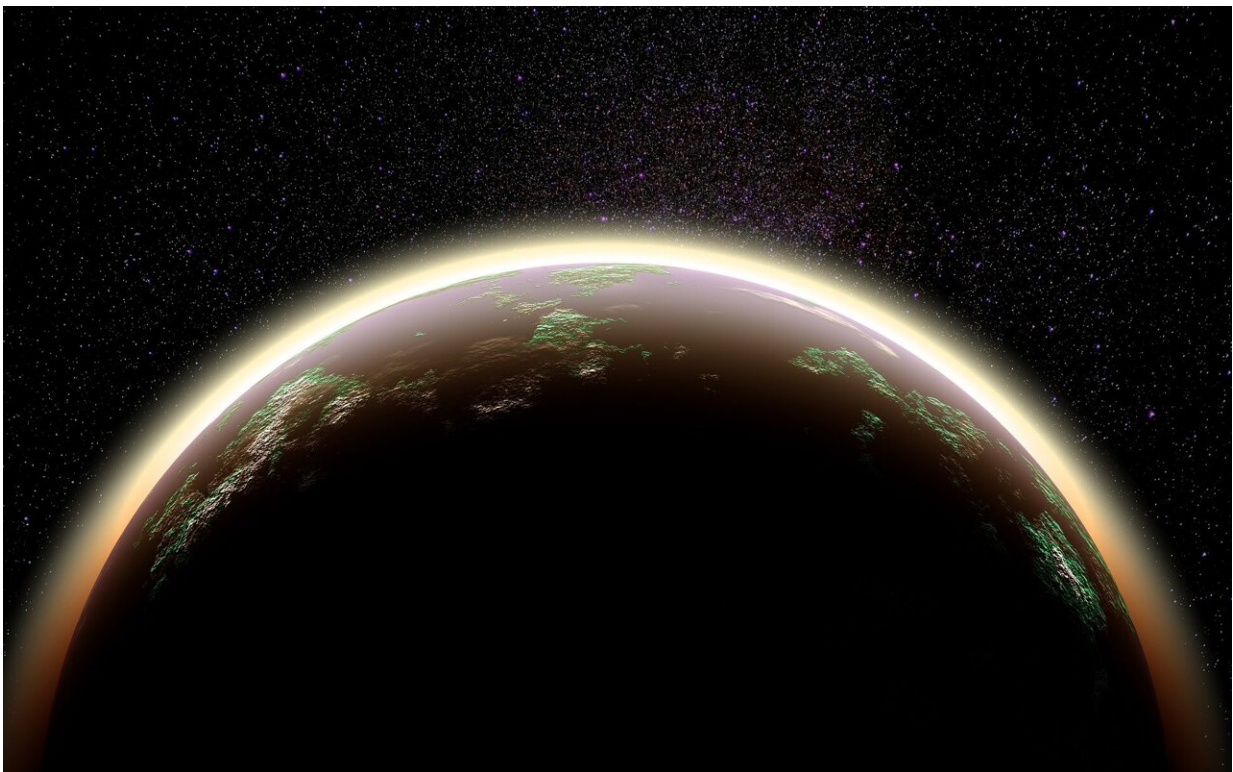


What is 'net zero,' anyway? A short history of a monumental concept

May 23 2024, by Ruth Morgan



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Last month, the leaders of the G7 [declared](#) their commitment to

achieving net zero emissions by 2050 at the latest. Closer to home, the Albanese government recently introduced legislation to establish a [Net Zero Economy Authority](#), promising it will catalyze investment in clean energy technologies in the push to reach net zero.

Pledges to achieve [net zero emissions](#) over the coming decades have proliferated since the United Nation's 2021 [Glasgow climate summit](#), as governments declare their commitments to meeting the Paris Agreement goal of holding global warming under 1.5°C. But what exactly is "net zero," and where did this concept come from?

Stabilizing greenhouse gases

In the early 1990s, scientists and governments were negotiating the [key article](#) of the UN's 1992 climate change framework: "the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-caused] interference with the climate system." How to achieve that stabilization—let alone define "dangerous" climate change—has occupied [climate scientists](#) and negotiators ever since.

From the outset, scientists and governments recognized reducing greenhouse gas emissions was only one side of the equation. Finding ways to compensate or offset emissions would also be necessary.

The subsequent negotiation of the [Kyoto Protocol](#) backed the role of forests in the [global carbon cycle](#) as [carbon sinks](#).

It also provided the means for well-forested developing countries to participate in the emerging carbon offset market, and to play their part in reaching the carbon accounting goal of "carbon neutrality." Under

those terms, the industrialized countries subject to the Kyoto Protocol could pay developing countries to offset their own emissions as a form of low-cost mitigation.

The Kyoto Protocol was unable to curtail soaring global greenhouse gas emissions, and a successor agreement appeared uncertain. As a result, interest turned in the late 2000s to the possibility of using [highly controversial](#) geoengineering techniques to remove greenhouse gas emissions. These proposals included sucking carbon dioxide out of the sky so the atmosphere would trap less heat, or reflecting sunlight away from the planet to reduce heat absorption. The focus on carbon sinks, whether through forests or direct air capture, would appear again in the idea of net zero.

Temperature targets

By this point, policymakers and advocates were shifting away from emissions reductions goals (such as Australia's unusual first Kyoto target to limit emissions to 108% of 1990 emissions by 2012).

Instead, temperature targets became more popular, such as limiting warming to no more than [two degrees](#) above pre-industrial levels. The European Union had already adopted the [2°C threshold](#) in 1996 and argued successfully for its relevance as a long-term objective for climate action.

What changed was scientists now had better ways of tracking how long carbon dioxide emissions would stay in the atmosphere, allowing better projections of our [carbon budget](#).

These findings allowed the IPCC's 2014 report to clearly state limiting warming to below 2°C would require "[near zero](#) emissions of carbon dioxide and other long-lived greenhouse gases by the end of the

century."

By this time, London-based environmental lawyer and climate negotiator [Farhana Yamin](#) had also set her sights on net zero by 2050. For Yamin, translating the 1.5°C ambition into climate negotiations meant [focusing on net zero](#): "In your lifetime, emissions have to go to zero. That's a message people understand."

The concept of net zero offered a simple metric to assess mitigation efforts and hold parties legally accountable—an instrument she and colleagues [proposed](#) for the negotiation of a new legally binding agreement to succeed the Kyoto Protocol.

By late 2014, net zero had gained traction, appearing for the first time at a [UN climate conference](#), the UN's [Emissions Gap Report](#), and in a [speech](#) by World Bank Group President Jim Yong Kim that stressed "we must achieve zero net emissions of greenhouse gases before 2100."

Zero in Paris

These efforts culminated in the [2015 Paris Agreement](#), which in addition to its well-known temperature targets of 1.5°C and 2°C, also added a complementary goal:

"To undertake rapid [emissions] reductions ... so as to achieve a [balance](#) between anthropogenic emissions by sources and removal by sinks of [greenhouse gases](#) in the second half of this century."

This is what "net zero" means—a "balance" between carbon emissions and carbon sinks. It was subsequently enshrined in the IPCC's [Special Report](#) on the importance of keeping warming under 1.5°C, in which 195 member states agreed to get to net zero emissions by 2050.

Slogan for greenwashing?

So, what's next for net zero? Countries [such as India](#) have questioned what it means for fairness and equity between developing and developed nations. Instead, they favor the well-established approach of "common but differentiated responsibility" to mitigation. This justifies India's aim to reach net zero emissions by [2070](#), as developed nations should lead the way and provide developing countries with funds and technologies necessary to support their mitigation ambitions.

The UN, by contrast, has warned the flexibility of net zero as a concept could make it a mere slogan for [greenwashing](#) by corporations and other non-state entities rather than a concrete objective.

As the chair of the UN's High Level Experts group put it: "It's not just advertising, bogus net-zero claims drive up the cost that ultimately everyone would pay. Including people not in this room, through huge impacts, climate migration and their very lives."

Given the chasm between pledges and practice documented in the [2023 UN Emissions Gap Report](#), there is a very real likelihood we will shoot past the temperature limits of the Paris Agreement.

Fossil fuel treaty

Net zero isn't the only approach to tackle climate change. Other concepts are growing in popularity.

For instance, optimists say the temperature "overshoot" we're on track for could be tackled with a "drawdown" of carbon emissions if we use "carbon dioxide removal" or "negative emissions technologies" such as carbon capture and storage, soil carbon sequestration, and mass tree

planting and reforestation.

But beware: the IPCC's [Special Report](#) cautioned that while some of these options might be technologically possible, they have not been tested on a large scale.

Can these untested technologies be relied on to halt and reverse the chaos likely to be unleashed by dangerous levels of global heating?

What does overshoot mean for the low-lying island nations who rallied around "[1.5°C to stay alive](#)"?

Momentum has been building for a Fossil Fuel Non-Proliferation Treaty since 2022, when [Vanuatu](#) called on the UN General Assembly to phase out the use of fossil fuels.

Such a treaty, Vanuatu President Nikenike Vurobaravu said, would "enable a global just transition for every worker, community and nation with fossil fuel dependence."

At the Dubai climate conference late last year, held in the wake of the International Energy Agency's revised [Net Zero Roadmap](#), the negotiations culminated in a [first](#) for the UNFCCC—an explicit statement endorsing:

"Transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science."

Will net zero become more than hot air? That remains to be seen. While the science behind the concept is broadly sound, the politics of achieving net zero are a work in progress.

Reducing greenhouse gas emissions to the point where they are zeroed out by carbon sinks by 2050 requires just and credible planning. We must prioritize the phase-out of fossil fuels sooner rather than later.

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