

Global Warming and Its Discussions

In 2018, the Intergovernmental Panel on Climate Change (IPCC) reported that global warming had reached 1.5°C above pre-industrial levels. Rising temperatures over the last century have resulted in significant disruptions to human and natural systems, such as increases in droughts, floods, biodiversity loss, and sea level rise. The populations most vulnerable to the effects of these disruptions live in low and middle-income countries.

According to Jason Smerdon in *Climate Change: The Science of Global Warming and Our Energy Future*, global warming cannot currently be explained by any known natural cause. Instead, scientists attribute it to the rise in emissions of greenhouse gases such as carbon dioxide, methane, nitrous oxide, and water vapor. Although these gases have built up since the Industrial Age, the concentration of carbon dioxide in the atmosphere was measured for the first time in 1958.

Climate change and its effects have been observed and studied since the early 19th century. Joseph Fourier, a French mathematician and physicist, postulated that the Earth's atmosphere acted like a greenhouse, receiving energy externally and storing it inside. Many decades later, Svante August Arrhenius—a Swedish chemist—found the relationship between temperature change in the Arctic and the rise in carbon dioxide levels. These findings gave rise to the contemporary effort to reduce greenhouse gases in the atmosphere to mitigate global warming.

In 1997, the Kyoto Protocol was created to call for a reduction in greenhouse gases in 41 countries by 5.2 percent below the 1990 levels from 2008 to 2012. However, in 2009, Susan Solomon and other scientists showed that climate change caused by the concentration of carbon dioxide will be largely irreversible for 1000 years, with even complete cessation of emissions.

In response to this issue, the IPCC, in 2013, recommended the net-zero solution: net anthropogenic additions of carbon dioxide into the atmosphere must reach zero. In other words, net-zero is achieved when the amount of greenhouse gases released is equal to the amount of greenhouse gases removed from the atmosphere. In 2021, countries representing 68% of the global economy have committed to the net-zero goal, but numerous obstacles remain.

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Information gathered from Jason Smerdon's *Climate Change: The Science of Global Warming and Our Energy Future* (Columbia University Press, 2018); Allen M. R. et. al.'s "Summary for Policymakers" in IPCC's *Global Warming of 1.5°C*, 2018; Passer, A. et. al.'s "Sustainable built environment: transition towards a net zero carbon built environment" in *International Journal of Life Cycle Assessment*, 25, 2020; Solomon, S. et. al.'s "Irreversible climate change due to carbon dioxide emissions" in *PNAS*, 106 (6), 2009; History.com Editors' *Climate Change History*, History, 2020; Energy & Climate (<https://eciu.net/analysis/infographics/net-zero-history>), and "What is net zero," nationalgrid (<https://www.nationalgrid.com/stories/energy-explained/what-is-net-zero>).

