Home Page:

Heading: “Climate Change”

Body text: “**Climate change** includes both the **global warming** driven by human emissions of [greenhouse gases](https://en.wikipedia.org/wiki/Greenhouse_gas), and the resulting large-scale shifts in weather patterns.[[1]](https://en.wikipedia.org/wiki/Climate_change#cite_note-1) Though there have been [previous periods of climatic change](https://en.wikipedia.org/wiki/Climate_variability_and_change), since the mid-20th century the rate of human impact on Earth's climate system and the global scale of that impact have been unprecedented.[[2]](https://en.wikipedia.org/wiki/Climate_change#cite_note-2)

That human activity has caused climate change is not disputed by any scientific body of national or international standing.[[3]](https://en.wikipedia.org/wiki/Climate_change#cite_note-3) The largest driver has been the emission of greenhouse gases, of which more than 90% are [carbon dioxide](https://en.wikipedia.org/wiki/Carbon_dioxide) (CO  
2) and [methane](https://en.wikipedia.org/wiki/Methane).[[4]](https://en.wikipedia.org/wiki/Climate_change#cite_note-4) [Fossil fuel](https://en.wikipedia.org/wiki/Fossil_fuel) burning for [energy consumption](https://en.wikipedia.org/wiki/World_energy_consumption) is the main source of these emissions, with additional contributions from [agriculture](https://en.wikipedia.org/wiki/Agriculture), [deforestation](https://en.wikipedia.org/wiki/Deforestation), and [industrial processes](https://en.wikipedia.org/wiki/Industrial_processes#Chemical_processes_by_main_basic_material).[[5]](https://en.wikipedia.org/wiki/Climate_change#cite_note-5) Temperature rise is accelerated or tempered by [climate feedbacks](https://en.wikipedia.org/wiki/Climate_change_feedback), such as loss of [sunlight-reflecting snow and ice cover](https://en.wikipedia.org/wiki/Albedo), increased [water vapour](https://en.wikipedia.org/wiki/Water_vapor) (a greenhouse gas itself), and changes to [land and ocean carbon sinks](https://en.wikipedia.org/wiki/Carbon_sink).

Because land surfaces heat faster than ocean surfaces, [deserts](https://en.wikipedia.org/wiki/Desertification) are expanding and [heat waves](https://en.wikipedia.org/wiki/Heat_wave) and [wildfires](https://en.wikipedia.org/wiki/Wildfire) are more common.[[7]](https://en.wikipedia.org/wiki/Climate_change#cite_note-7) Surface temperature rise is [greatest in the Arctic](https://en.wikipedia.org/wiki/Polar_amplification), where it has contributed to melting [permafrost](https://en.wikipedia.org/wiki/Permafrost), and the [retreat of glaciers](https://en.wikipedia.org/wiki/Retreat_of_glaciers_since_1850) and [sea ice](https://en.wikipedia.org/wiki/Sea_ice).[[8]](https://en.wikipedia.org/wiki/Climate_change#cite_note-8) Increasing atmospheric energy and rates of evaporation cause [more intense storms](https://en.wikipedia.org/wiki/Tropical_cyclones_and_climate_change) and [weather extremes](https://en.wikipedia.org/wiki/Extreme_weather), which damage [infrastructure](https://en.wikipedia.org/wiki/Infrastructure) and [agriculture](https://en.wikipedia.org/wiki/Climate_change_and_agriculture).[[9]](https://en.wikipedia.org/wiki/Climate_change#cite_note-9) Rising temperatures are limiting ocean productivity and harming fish stocks in most parts of the globe.[[10]](https://en.wikipedia.org/wiki/Climate_change#cite_note-10) Current and anticipated effects from undernutrition, heat stress and disease have led the [World Health Organization](https://en.wikipedia.org/wiki/World_Health_Organization) to declare climate change the greatest threat to global health in the 21st century.[[11]](https://en.wikipedia.org/wiki/Climate_change#cite_note-WHO,_Nov_2015-11) Environmental [effects](https://en.wikipedia.org/wiki/Effects_of_global_warming) include the [extinction](https://en.wikipedia.org/wiki/Extinction_risk_from_global_warming) or relocation of many species as their [ecosystems](https://en.wikipedia.org/wiki/Climate_change_and_ecosystems) change, most immediately in [coral reefs](https://en.wikipedia.org/wiki/Environmental_issues_with_coral_reefs), [mountains](https://en.wikipedia.org/wiki/Montane_ecosystems), and the [Arctic](https://en.wikipedia.org/wiki/Climate_change_in_the_Arctic).[[12]](https://en.wikipedia.org/wiki/Climate_change#cite_note-12) Even if efforts to minimize future warming are successful, some effects will continue for centuries, including [rising sea levels](https://en.wikipedia.org/wiki/Rising_sea_levels), rising [ocean temperatures](https://en.wikipedia.org/wiki/Ocean_heat_content), and [ocean acidification](https://en.wikipedia.org/wiki/Ocean_acidification) from elevated levels of CO2.”

## [Link to:] Physical drivers of recent climate change

## [Link to:] Greenhouse Gases

Physical drivers of recent climate change:

## Heading: Physical drivers of recent climate change

Body Text:By itself, the [climate system](https://en.wikipedia.org/wiki/Climate_system) experiences [various cycles](https://en.wikipedia.org/wiki/Climate_variability) which can last for years (such as the [El Niño–Southern Oscillation](https://en.wikipedia.org/wiki/El_Ni%C3%B1o%E2%80%93Southern_Oscillation#On_global_warming)) to decades or centuries.[[46]](https://en.wikipedia.org/wiki/Climate_change#cite_note-46) Other changes are caused by an imbalance of energy that is "external" to the climate system, but not always external to the Earth.[[47]](https://en.wikipedia.org/wiki/Climate_change#cite_note-47) Examples of [external forcings](https://en.wikipedia.org/wiki/Climate_system#External_climate_forcing) include changes in the composition of the atmosphere (e.g. increased concentrations of [greenhouse gases](https://en.wikipedia.org/wiki/Greenhouse_gas)), [solar luminosity](https://en.wikipedia.org/wiki/Solar_luminosity), [volcanic](https://en.wikipedia.org/wiki/Volcano) eruptions, and [variations in the Earth's orbit](https://en.wikipedia.org/wiki/Orbital_forcing) around the Sun.[[48]](https://en.wikipedia.org/wiki/Climate_change#cite_note-48)

Attribution of climate change is the effort to scientifically show which mechanisms are responsible for observed changes in Earth's climate. To determine anthropogenic attribution, known internal [climate variability](https://en.wikipedia.org/wiki/Climate_variability) and natural external forcings need to be ruled out. Therefore, a key approach is to use computer modelling of the climate system to determine unique "fingerprints" for all potential causes. By comparing these fingerprints with observed patterns and evolution of climate change, and the observed history of the forcings, the causes of the observed changes can be determined.[[49]](https://en.wikipedia.org/wiki/Climate_change#cite_note-49) For example, solar forcing can be ruled out as major cause because its fingerprint is warming in the entire atmosphere, and only the lower atmosphere has warmed, which is what is expected from greenhouse gases (which trap heat energy radiating from the surface).[[50]](https://en.wikipedia.org/wiki/Climate_change#cite_note-:1-50) [Attribution of recent climate change](https://en.wikipedia.org/wiki/Attribution_of_recent_climate_change) shows that the primary cause is greenhouse gases, and secondarily land-use changes, and aerosols and soot.[[51]](https://en.wikipedia.org/wiki/Climate_change#cite_note-51)

(Image) Background Image: “**Climate change is the greatest threat to our existence** in our short history on this planet. Nobody’s going to buy their way out of its effects.”

(Image)Earth Image: **JPEG** is often applied for the processing and storage of full-color images with realistic elements and brightness and color transitions. It is the most convenient for transmission of compressed images on the Internet, because it takes less space in comparison to other formats.

(Image)Data Image: **PNG** handles the progressive display of image data and the storage of gamma, transparency and **textual information**, and it uses an efficient and lossless form of data compression.

[Link to:] Home page

## [Link to:] Greenhouse Gases

### Greenhouse gases

Heading: “Greenhouse gases”

Body content: “The Earth absorbs [sunlight](https://en.wikipedia.org/wiki/Sunlight), then [radiates it as heat](https://en.wikipedia.org/wiki/Radiative_cooling). Some of this [infrared](https://en.wikipedia.org/wiki/Infrared) radiation is absorbed by greenhouse gases in the atmosphere, and because they re-emit it in all directions part of the heat is trapped on Earth instead of escaping into space.[[52]](https://en.wikipedia.org/wiki/Climate_change#cite_note-52) Before the Industrial Revolution, naturally-occurring amounts of greenhouse gases caused the air near the surface to be about 33 °C (59 °F) warmer than it would have been in their absence.[[53]](https://en.wikipedia.org/wiki/Climate_change#cite_note-53) [Without the Earth's atmosphere](https://en.wikipedia.org/wiki/Black_body), the Earth's average temperature would be well below the freezing point of water.[[54]](https://en.wikipedia.org/wiki/Climate_change#cite_note-54) While [water vapour](https://en.wikipedia.org/wiki/Water_vapour) (~50%) and clouds (~25%) are the biggest contributors to the greenhouse effect, they increase as a function of temperature and are therefore considered [feedbacks](https://en.wikipedia.org/wiki/Feedback). On the other hand, concentrations of gases such as CO  
2 (~20%), ozone and nitrous oxide are not temperature-dependent, and are hence considered external forcings.[[55]](https://en.wikipedia.org/wiki/Climate_change#cite_note-55) Ozone acts as a greenhouse gas in the lowest layer of the atmosphere, the [troposphere](https://en.wikipedia.org/wiki/Troposphere) (as opposed to the stratospheric [ozone layer](https://en.wikipedia.org/wiki/Ozone_layer)). Furthermore, ozone is highly reactive and interacts with other greenhouse gases and aerosols.[[56]](https://en.wikipedia.org/wiki/Climate_change#cite_note-56)”

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[Link to:] Physical drivers of recent climate change