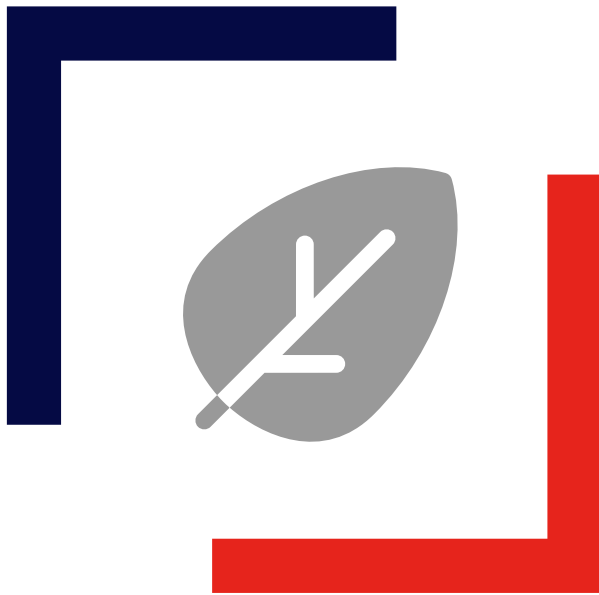


06

Section



Environment



Environment

Introduction. Human life depends on an environment that can provide for the most basic human needs. But climate change is increasing the earth's temperature, melting glaciers, raising sea levels, and likely shifting ocean currents. This, in turn, appears to be reducing biodiversity and increasing the intensity of extreme weather, such as floods, droughts, wildfires, hurricanes, and excessive heat days. The quality of the air we breathe is also critical to our existence.

Climate change and air quality are driven mainly, although not entirely, by human activity. Climate change is also creating fast-rising financial losses from property damage as well as increased prevalence of asthma, dementia, heatstroke, exhaustion, and other health ailments. Some argue that the future effects are somewhat uncertain and that future technological developments might reduce greenhouse gas emissions or offset warming with technologies that cool the earth. However, given the major risks involved and the uncertainty about future technologies, there is broad agreement that greenhouse gas emissions are a significant problem. The actions we take on climate change also have a global impact. Each country's emissions affect everyone else, and US emissions affect our ability to lead on this issue.

Summary of Results. We are the world's second-largest annual emitter of greenhouse gases and the largest cumulative emitter over the last century. While we have made some improvements, greenhouse gases accumulate in the earth's atmosphere, so the fact that we have lowered our annual emissions means that we are only making the problem worse more slowly than in the past. We are also improving air quality, though not as fast as other higher-income countries.



Net Greenhouse Gas Emissions

Specific measure: Net greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, fluorinated gases), including discharge from land use and deforestation. (Source: Environmental Protection Agency).

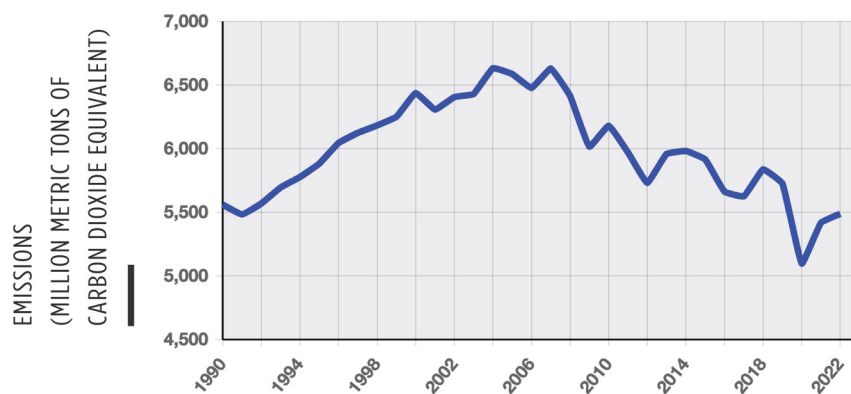
National
Trend
↕

% of
countries
the US
outperforms
1%

Intl.
Rank
Trend
➡

Why did we include this measure? Greenhouse gases trap the sun's rays and cause the earth to warm, resulting in several predictable environmental effects. The number of extreme heat days increases, causing dehydration, exhaustion, and heat strokes and making us less healthy and productive. Warming also increases extreme weather events. The rising number and severity of droughts and floods make it difficult to grow crops, while the increasing severity of hurricanes, superstorms, and wildfires destroys homes and businesses and sometimes costs lives. Climate change is a concern in part because a large share of the nation's—and the world's—population lives near large bodies of water. Climate change is melting glaciers, raising sea levels, and likely increasing the severity of hurricanes, all of which particularly affect coastal areas.

Figure 14: Greenhouse Gas Emissions (National Trend)



How does the US rank globally?

- **Specific Measure:** (Same as above.) (Source: Authors' analysis of Climate Watch data).
- **Percentage of countries the US outperforms:** 1% (out of 114 countries)
- **International Rank Trend:** ↔

What do the data show? The United States is the second-highest annual emitter of greenhouse gases after China. Our trends are mixed because our emissions were rising into the mid-2000s and that trend has subsequently reversed, so that our emissions are still almost identical to 1990. We are still easily the highest cumulative emitter since the Industrial Revolution.

What might explain these patterns? Greenhouse gas emissions are driven heavily by economic activity, which is currently dependent on energy consumption and the burning of fossil fuels. It is no coincidence that China and the US are the top two countries ranked by economy size and emissions. We are generating economic output more efficiently than in the past—with lower greenhouse gas emissions per unit of output—but the overall problem is getting worse because these gases accumulate in the atmosphere.



The primary greenhouse gas is carbon dioxide, which is responsible for 80% of gross US greenhouse gas emissions. The main sources are transportation, electricity generation, and industry. We have improved in these areas in recent years by switching from coal to natural gas, expanding the use of renewable energy, and improving efficiency in all of the major sources, especially vehicles. Methane represents only 12% of US greenhouse gas emissions but has particularly large warming effects. Methane comes mainly from animal agriculture, oil and gas industry operations, and landfills.

Air Quality

Specific measure: Annual mean concentration of particulate matter with diameter of 2.5 micrometers or less (roughly 3% of the width of a human hair). (Source: Authors' analysis of Environmental Protection Agency data).

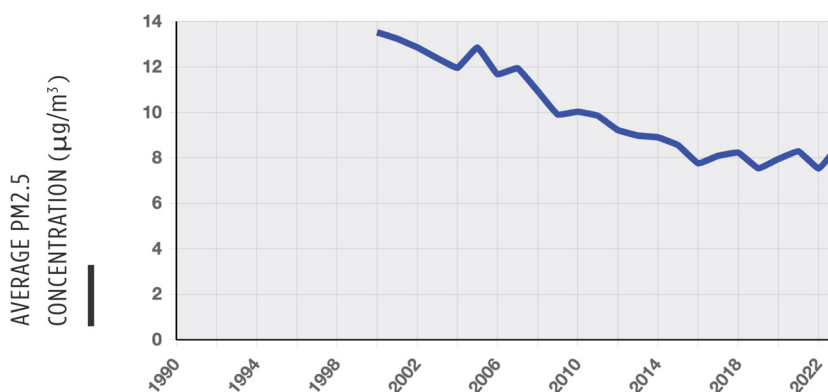
National
Trend
↑

% of
countries
the US
outperforms
73%

Intl.
Rank
Trend
↓

Why did we include this measure? Our lungs are designed to provide oxygen to the body and to remove pollution that interferes with basic bodily functions. However, this only works for larger particles that our bodies can filter out—not tiny particles. The main source of these tiny particles is combustion of fossil fuels—the same source as greenhouse gas emissions (transportation, electricity generation, etc.). This particulate matter directly enters our respiratory systems and bloodstreams and can bypass the usual defenses. This appears to create harmful breathing problems (asthma and bronchitis) and an increased risk of heart attacks, strokes, and hypertension.

Figure 15: Air Quality (National Trend)



How does the US rank globally?

- **Specific Measure:** (Same as above.) (Source: Authors' analysis of World Health Organization data).
- **Percentage of countries the US outperforms:** 73% (out of 30 countries)
- **International Rank Trend:** ↓

What do the data show? Particulate matter has declined by almost 50% since the year 2000, and we rank ahead of almost three-quarters of higher-income countries, just behind Denmark, Sweden, and Portugal. However, other countries are improving faster than we are, so our relative position is declining.

What might explain these patterns? Given that greenhouse gas emissions and particulate matter have the same sources, the decline in the burning of fossil fuels partly explains the decline in particulate matter. But particulate matter has declined much more quickly than carbon dioxide emissions because it has been subject to government regulations.

Related Topics: Greenhouse gas emissions arise mainly because of economic activity—energy fuels the economy (see the Economy section). Sea level rise and extreme weather events caused by climate change are expected to create considerable migration and food insecurity, which may destabilize countries and create more international conflict (see the National Security section). Particulate matter is linked to lower birthweight and reduced cognitive function in children (see the Children and Families section) and other health effects (see Physical Health).

For more information about data sources and treatments, see the Data Notes section.

Board and Public Support for this Topic and Measures

	Support from Board	Support from Public
Environment (as topic)	77%	66%
Greenhouse Gas Emissions	62%	55%
Air Particulate Matter (PM2.5)	62%	61%

Other Measures Considered: The board also considered, but did not include, other measures, including the number of extreme heat days. The public did not support this additional measure either.

