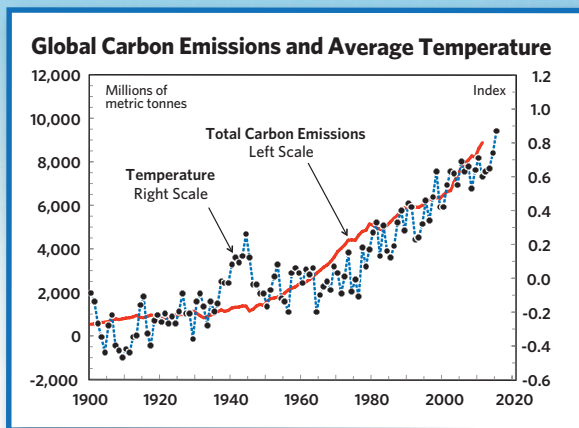


Understanding Climate Change

What is climate change?

Climate change or “global warming” refers to the increase in average temperature of the earth’s climate system since the mid-twentieth century. The rise in temperature results from the release of greenhouse gases (GHGs) into the atmosphere, including carbon dioxide, methane and nitrous oxide. At lower levels of emissions, the burning of fossil fuels would ordinarily be absorbed by vegetation and the oceans. The historically unprecedented concentration of GHG emissions since the mid-twentieth century has meant that more carbon is being stored in the earth’s atmosphere, which is thought to be the leading cause of the temperature increase.



What is causing climate change?

The Intergovernmental Panel on Climate Change (IPCC), which many consider the leading scientific authority on climate change, argues that it is “extremely likely” that human-generated GHG emissions—resulting from fossil fuel dependence and population and economic growth—has been the “dominant cause” of global warming since the mid-twentieth century.

The graph here outlines the dramatic growth in average temperatures in relation to the increase in carbon emissions.

The largest GHG emitters in the world include China (at 28%), the United States (16%), the European Union (10%), India (6%), Russia (6%) and Japan (4%). Canada is the 13th largest emitter, with 1.6% of the global total.

What are the consequences of climate change?

Warming of the earth’s oceans dominates the increase in the energy stored in the climate system, which has led to the increased acidification of the oceans. Ice sheets in the poles have been losing mass, which has contributed to rising sea levels. Over time, a rising sea level will cause mass human migration as coastal areas become uninhabitable, creating what some have called “climate refugees”. Other effects include extreme weather events such as heavy rainfall (and associated flooding), heavy snowfall, heat waves, droughts and the expansion of deserts. These weather shifts are expected to reduce crop yields and lead to more rapid species extinction.

The risks and effects of climate change are unevenly distributed, tending to fall more heavily on the backs of the poor nations. Continued increases in GHG emissions are expected to cause further warming and, beyond a certain point, irreversible effects for human society and ecosystems.

What is the role of energy production and usage?

Global GHG emissions have reached nearly 50 gigatonnes of carbon dioxide equivalent per year. Roughly one half of all the human-generated carbon emissions dumped into the atmosphere between 1750 and 2010 have been generated in the past 40 years, which implies that there are clear linkages between industrial development and climate change. In terms of various sources of emissions, electricity and heat production were the largest, accounting for 25% of total global emissions, followed by agriculture and forestry (at 24%), industry (21%), transportation (14%), other energy production (for example, fuel extraction and refining at 10%) and buildings (at 6%).

What should the public response be?

The IPCC recommends both adaptation (because global warming has already begun) and mitigation (see the Carbon Pricing Fact Sheet). In terms of mitigation, the IPCC recommends that warming be limited to two degrees Celsius relative to pre-industrial levels. This implies that if atmospheric concentrations of CO₂ remain below 450 parts per million by 2100, warming is likely to remain below two degrees Celsius, thus avoiding the worst consequences of planetary warming. The IPCC estimates that GHG emissions will need to fall 40-70% by 2050 (compared with 2010 levels) and to near-zero by 2100 for climate stability to be attained.

Sources: U.N. Intergovernmental Panel on Climate Change; U.S. Environmental Protection Agency; NASA; BP Statistical Review of World Energy; Unifor Research Department.



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