

Lessening the effects of or adapting to climate change will require coordinated action by citizens, corporations, and governments all over the world.

- CO₂ remains in the atmosphere for a very long time. This has two impacts:
 - Regardless of source, CO₂ disperses throughout Earth's atmosphere, giving a relatively uniform concentration everywhere.
 - The atmosphere is a true "commons" in which all people share the impacts of CO₂ no matter how much or little they emit.
- CO₂ emissions = population × energy use.
 - Global population continues to grow.
 - People everywhere strive for better living standards, which means greater energy use.
 - To minimize the impacts, energy must be obtained with little or no CO₂ emissions.
- The amount of CO₂ being emitted globally is so large that no single country can solve the problem alone. All must work together.
 - Because the developed world has contributed more than half of the CO₂ currently in the atmosphere, it should lead the way to a lower CO₂ future.
 - Because the developing world has a large population deserving of higher living standards, its development must be fueled by new, greener, and more efficient energy technologies to avoid catastrophic warming.
- New and improved energy systems are required to reduce CO₂ emissions.
 - Improvements are needed in technologies that do not use fossil fuels, such as wind, solar, wave, geothermal, and nuclear power.
 - Power grids need modernization to take full advantage of wind and solar power. This is particularly important in the U.S., which does not have a national grid.
 - Energy storage systems must be improved.
 - Methods to capture and store CO₂ from fossil fuel power plants need further development to increase reliability and reduce costs.
- We must place a price on CO₂ emissions that reflects their impact on Earth. This will allow the marketplace to drive the development of new and improved energy systems.

Things You Can Do

- Educate yourself about climate change and energy systems.
- Talk about climate change and the energy transition to neighbors, friends, and family.
- Get involved!
 - Join an organization advocating for change in our energy policies.
 - Write letters to the editor.
 - Call or write your elected officials at all levels about the need for action to limit the emission of CO₂ from fossil fuels.
 - Vote for candidates who will act on climate.
 - Support efforts to put a price on carbon consistent with its global impacts.
- Drive less, but when you do drive, use a vehicle that has the best mileage possible.
- Use alternative transportation when possible.
- Reduce your use of energy at home.
 - Weatherize your home to minimize your heating and cooling energy needs.
 - Use Energy Star appliances.
 - Change to LED lights.
 - Adjust your thermostat.
 - Use less hot water.
- Eat less meat, especially beef, and cheese. Eat more plants. Reduce food waste.
- Install solar panels on your home.
- Plant trees.

<https://www.pwc.co.uk/services/sustainability-climate-change/insights/net-zero-economy-index.html>

<https://www.ipcc.ch/sr15/>

<https://www.ipcc.ch/working-group/wg1/>

<https://www.ipcc.ch/working-group/wg2/>

<https://www.ipcc.ch/working-group/wg3/>

Climate Action Alliance of the Valley

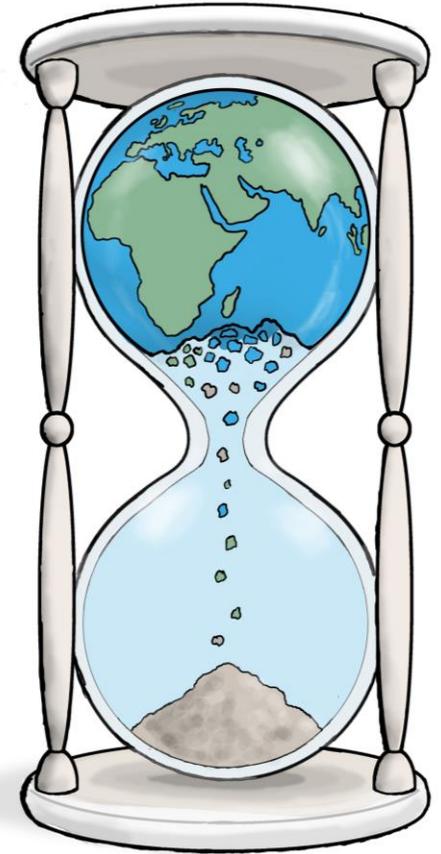
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The Need for Action on Climate Change Is Urgent!



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Driven mainly by fossil carbon dioxide (CO₂) emissions, Earth's climate is changing.

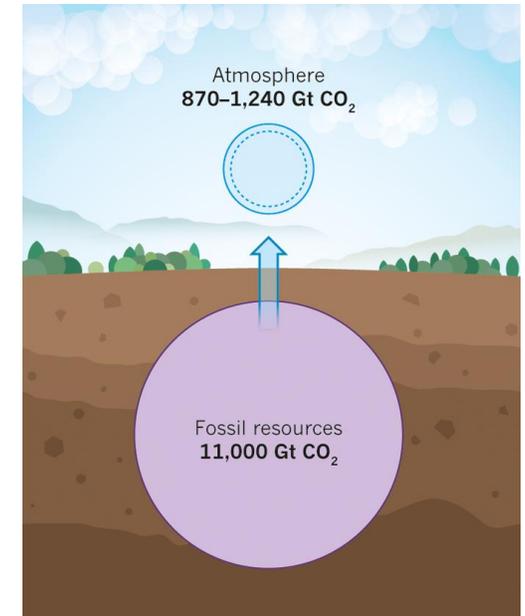
- Evidence from diverse sources confirms climate change.
 - The current warming is unprecedented within the span of human civilization.
 - Oceans are warming.
 - Glaciers are melting.
 - Sea level is rising.
 - The Arctic ice cap is shrinking, the ice is thinning, and its nature is changing.
 - Weather is getting more extreme.
 - Ecosystems are changing more rapidly.
- Evidence for the role of CO₂ as the main cause of climate change is unequivocal.
 - Earth's temperature is stabilized and regulated by the greenhouse effect.
 - The major greenhouse gases (GHGs) are CO₂ and water vapor.
 - Water vapor is responsible for 50% of the greenhouse effect, but its life in the atmosphere is short because it condenses as rain and snow. CO₂ is directly responsible for 20% of the greenhouse effect, but its indirect effect is much larger. Because it does not condense, it stays in the atmosphere for a very long time, thereby regulating Earth's temperature. It is Earth's thermostat.
 - The level of CO₂ in the atmosphere is increasing because of the burning of fossil fuels (coal, oil, and natural gas).
 - Earth's temperature is directly proportional to the amount of CO₂ in the atmosphere.
 - Satellites show a reduction in outgoing (i.e., cooling) radiation leaving Earth at the wavelengths associated with CO₂ and other GHGs.
 - Land-based sensors show an increase in incoming (i.e., warming) radiation from CO₂ and other GHGs consistent with their increased concentration in the atmosphere.
 - Satellite measurements of top of atmosphere radiation confirm that GHGs are responsible for Earth's observed warming.

We must stop releasing CO₂ to stabilize Earth's climate.

- Although not without consequences, international agreements have set 2.7°F and 3.6°F as tolerable global average temperature rises above preindustrial (1750) levels. Greater increases will have greater consequences.
 - To have a 67% chance of keeping the temperature increase below 3.6°F, we can only release 1150 gigatonnes (Gt) of CO₂ to the atmosphere after 1 January 2020.
 - The global CO₂ release rate is currently 40 Gt/yr and increasing.
 - At the current discharge rate, we'll reach our 3.6°F CO₂ limit by 2049!
 - To have a 67% chance of keeping warming below 2.7°F, we can only release 400 Gt of CO₂, meaning we will reach our limit by 2030.
 - The impacts at 3.6°F of warming will be substantially worse than those at 2.7°F, but the likelihood of meeting the lower limit is slim.
- Because of natural variability it will take ten or more years after CO₂ concentrations in the atmosphere start declining for a drop in temperature to be apparent. The effects on regional precipitation trends will only become apparent after several decades.
- The longer we wait to lower CO₂ emission rates, the longer it will take for Earth's climate to stabilize.
- Achieving net zero CO₂ emissions globally requires deep emissions cuts across all sectors and regions, along with active removal of CO₂ from the atmosphere to balance remaining emissions that may be too difficult, too costly, or impossible to abate at that time.
- Pledges under the Paris Climate Agreement are insufficient to limit warming to 3.6°F.
- The global CO₂ emission rate must be halved by 2030 to keep alive the possibility of limiting the increase in global average temperature to 2.7°F. NDC pledges from Paris and Glasgow are well below that requirement and suggest an end-of-century temperature increase of 4.3°F.

Continuing to burn fossil fuels could be catastrophic for humanity, both financially and in suffering.

- The greater the amount of CO₂ emitted by burning fossil fuels, the higher Earth's temperature will rise and the worse the impacts will be.
- The amount of CO₂ that would be released by burning all fossil fuel reserves far exceeds the safe limits on emissions. The results of burning all fossil fuels would be disastrous.



M. Jakob and J. Hilaire, *Nature*, 517, 150, 2015

- About 89% of coal, 59% of natural gas, and 58% of oil reserves must be left in the ground to limit the temperature increase to 2.7°F.
- Fossil fuel reserves are currently worth around \$27 trillion.
 - The reserves would have no economic value if left in the ground and studies indicate that would cause large financial losses.
 - Fossil fuel companies and their investors are understandably reluctant to embrace the move to carbon-free energy sources.
- How to move away from fossil fuels without damaging the global economy is a difficult challenge that is undergoing extensive study.