

History of Earth's Climate

- Life appeared ~3.8 billion years ago
- Photosynthesis began 3.5-2.5 billion years ago
 - Produced oxygen and removed carbon dioxide and methane (greenhouse gases released from the molten core of the Earth as it cooled)
 - Earth went through periods of cooling ("Snowball Earth") and warming caused by geological processes over eons of time
- Antarctic ice first appeared 34 million years ago (MYA)
- Primates walk upright and use tools 6 MYA
- Earth began cycles of glacial and interglacial periods ~3 MYA
- Homo sapiens sapiens appear 200,000 YA

Basic Photosynthesis

oxygen

carbon dioxide,

water

CO₂ and energy in the atmosphere

- The Earth's surface absorbs solar radiation, and reradiates it as heat.
- CO₂ and other greenhouse gases (GHG) reduce the rate at which this heat can escape into space.
- The more GHG, the more heat is trapped and the higher the global temperature.



• This role of CO_2 and other GHG has been understood for over a century. ⁴



If you want to save our planet





Source: NASA Goddard Institute for Space Studies • By Veronica Penney

Meet the GHGs



https://climatechange.lta.org/get-started/learn/co2-methane-greenhouse-effect/

Sources of GHGs



Drawdown (2020) The Drawdown Review 2020

Global fossil fuel consumption

Global primary energy consumption by fossil fuel source, measured in terawatt-hours (TWh).



Our World in Data

Source: Our World in Data based on Vaclav Smil (2017) and BP Statistical Review of World Energy OurWorldInData.org/fossil-fuels/ • CC BY

Warming lags behind emissions, but reversal in temperatures can happen quickly



skepticalscience.com IPCC (2019) IPCC Special Report on the Ocean and Cryosphere in a Changing Climate



Temperature Difference (Fahrenheit)



Global greenhouse gas emissions and warming scenarios Our World in Data

Each pathway comes with uncertainty, marked by the shading from low to high emissions under each scenario.
 Warming refers to the expected global temperature rise by 2100, relative to pre-industrial temperatures.



Data source: Climate Action Tracker (based on national policies and pledges as of May 2021). OurWorldinData.org – Research and data to make progress against the world's largest problems.

Emission implementation & ambition gaps











The maps displayed are for reference only.

LAST UPDATE: September 2022

CRITICALLY INSUFFICIENT	HIGHLY INSUFFICIENT	INSUFFICIENT	ALMOST SUFFICIENT	1.5°C PARIS AGREEMENT COMPATIBLE

The Exxon Climate Scandal: Nearly 40 Years in the Making

The real real of the meeting and the second and the real of the re

"Present thinking holds that man has a time window of five to ten years before the need for hard decisions regarding changes in energy strategies might ' **become critical**."

-Exxon scientific advisor, 1978

Newly released documents reveal that ExxonMobil has known since the late 1970s that its products cause global warming. A decade later, the company ignored its own scientists and financed a campaign to deceive the public about the realities of climate change.ExxonMobil now faces heightened scrutiny and growing calls to hold the company accountable for its deceptive actions.

Concerned Scientists

LEARN MORE: www.ucsusa.org/exxonclimatescandal

(c) 2015 Union of Concerned Scientists







Half a Degree Makes a Big Difference!



A. Risks to humans and ecosystems from changes in land-based processes as a result of climate change

Increases in global mean surface temperature (GMST), relative to pre-industrial levels, affect processes involved in **desertification** (water scarcity), **land degradation** (soil erosion, vegetation loss, wildfire, permafrost thaw) and **food security** (crop yield and food supply instabilities). Changes in these processes drive risks to food systems, livelihoods, infrastructure, the value of land, and human and ecosystem health. Changes in one process (e.g. wildfire or water scarcity) may result in compound risks. Risks are location-specific and differ by region.





Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards. combined with limited ability to adapt due to the nature of the hazard or impacts/risks. Red indicates severe and widespread impacts/risks. Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium

confidence.
White indicates that no impacts are detectable and attributable to climate change.

IPCC (2019) *Climate Change and Land* Summary for Policymakers IPCC (2018) *Global Warming of 1.5*° Summary for Policymakers

What Will It Take to Limit the Increase To 1.5F?

45% emissions reduction by 2030

Net Zero by 2050 (new data says sooner)

Reaching Net Zero

No home, business, or industry heated by gas or oil; replace with renewable energy



No vehicles powered by diesel or gasoline; all coal and gas power plants shuttered;



Conversion of the petrochemical industry to green chemistry;



No carbon energy sources for heavy industry unless CO2 is captured and permanently stored;



Industrial agriculture replaced by regenerative agriculture;

Large-scale restoration of ecosystems...





A. Amazon rainforest Frequent droughts

B. Arctic sea ice Reduction in area

C. Atlantic circulation In slowdown since 1950s **D. Boreal forest** Fires and pests changing

F. Coral reefs Large-scale die-offs

G. Greenland ice sheet Ice loss accelerating H. Permafrost Thawing

I. West Antarctic ice sheet Ice loss accelerating

J. Wilkes Basin, East Antarctica Ice loss accelerating

onature

Tipping

Points

Lenton (2019) "Climate tipping points – Too risky to bet against"

Energy and Environment

'We are in trouble.' Global carbon emissions reached a record high in 2018.

As nations assemble in Poland for climate talks, the figures suggest there is no clear end in sight to the growth of humanity's contribution to climate change.

"It is hard to overstate the urgency of our situation. Even as we witness devastating climate impacts causing havoc across the world, we are still not doing enough, nor moving fast enough, to prevent irreversible and catastrophic climate disruption."

- António Guterres, UN Sec Gen



Figures show emissions from fossil fuels and industry, which includes cement manufacturing but not deforestation.

Source: Global Carbon Project





Note: This figure includes a selection of 80 nations among the largest energy-consuming countries in the world. Source: Based on IEA data.



BIG OIL GETS AN 11,900% RETURN ON Every Dollar it spends on congress



HOW IS YOUR 401K DOING?

During the 113th Congress, Big Oil, Gas, and Coal spent \$350



United States



European Union

28 countries, including Britain



7 other developed countries







All other countries



Developed economies

Other countries

Progress toward Paris Agreement Commitments



The maps displayed are for reference only.

LAST UPDATE: November 2020

CRITICALLY INSUFFICIENT	HIGHLY INSUFFICIENT	INSUFFICIENT	2°C COMPATIBLE	1.5°C PARIS AGREEMENT COMPATIBLE	ROLE MODEL
4°C+	<4°C	< 3°C	< 2°C	< 1.5°C	<< 1.5°C
WORLD	WORLD	WORLD	WORLD	WORLD	WORLD

Fatal extraction

Forecast global CO₂ emissions from fossil fuels, gigatonnes per year



Source: "The Production Gap" by SEI, IISD, ODI, Climate Analytics, CICERO and UNEP, 2019

The breakdown of production by the type of fossil fuel paints a deeply worrying picture, with countries forecast to produce:







than is consistent with a 1.5°C trajectory by 2030.

* 2021 Production Gap Report

WORLD MAP


A 4C rise in global average temperatures would force humans away from equatorial regions



New Zealand, Tasmania, Western Antarctica and Patagonia

Some of the only habitable parts of the southern hemisphere – likely to be very densely populated

Equatorial belt

High humidity causing heat stress across tropical regions will render them uninhabitable for much of the year. To the north and south will lie belts of inhospitable desert Oceanic dead zones Coral reefs, shellfish and plankton will be wiped out by rising acidity and algae starving the oceans of oxygen. Without prey, larger sea life will decline rapidly

Agriculture and Food Security Impacts by 2050



5° Sustained food supply disruptions 4° globally Infrequent price spikes Periodic food 3° affect shocks across individual regions countries 2° 1° H Food supply instabilities

Indicative example of transitions

https://www.cgdev.org/page/mapping-impacts-climate-change

IPCC Climate Change and Land Chapter 5

Conflict, War & Fascism

- Climate change increases potential for conflict
 - Migration, drought, fire
- Increased risk of inter-group violence and civil war, by increasing economic shocks and poverty
- At 2°C warming, 2.7 billion people in 46 countries will be at heightened risk of conflict due to climate change



Irishenvironment.com

IPCC (2019) Climate Change and Land Chapter 5 Oxfam (2011) Suffering the Science IPCC (2014) Climate Change 2014: Impacts, Adaptation and Vulnerability

Economic Costs of Militarism

- Over \$21 Trillion spent on War on Terror
- US military funding-More than next 11 countries combined
- Neglect of domestic social spending and economic aid
- Funds could be redirected to achieve beneficial goals



SOURCE: Stockholm International Peace Research Institute, SIPRI Military Expenditure Database, April 2021.



Veterans For Peace Climate Crisis and Militarism Project

The U.S. Military Emits More CO₂ Than Many Nations

Estimated carbon dioxide emissions in 2017 (million tonnes)





WORLD MILITARY EXPENDITURE, BY REGION, 1988-2021







The US has spent \$21 trillion on war in the past few decades.

The cost of shifting our national power grid to 100% renewable energy over the next decade is estimated at \$4.5 trillion.

Instead of funding endless wars, we could have transformed our fossil-fuel energy system with money to spare.

Impacts of War in Ukraine on Climate Crisis

- Increased military spending = increased emissions
- Ukraine war causing return to increased extraction and production of fossil fuels
- Leads to increased militarization and military spending globally



It's not too late! The Global Carbon Budget for 1.5°C

- 45% reduction by 2030
- Net zero by 2050



100% Renewables by 2050 is Possible

- Costs less than current system
- Would reduce electricity sector to net zero emissions
- 9 million coal jobs lost, 15 million new jobs in renewable energy
- By comparison IPCC estimates 59-97% renewables by 2050 in 1.5°C scenario



Ram (2019) "Global energy system based on 100% renewable energy: Power, heat, transportation, and desalination sectors" IPCC (2018) Special Report on $1.5^{\circ}C$



Growth of Fossil-Fuel Divestment



Annual emissions grew 60% from 1990 to 2015. Cumulative emissions doubled. During this time period:

• The richest 10% of the world's population (c.630 million people) were responsible for 52% of the cumulative carbon emissions – depleting the global carbon budget by nearly a third (31%) in those 25 years alone.

• The poorest 50% (c.3.1 billion people) were responsible for just 7% of cumulative emissions and used just 4% of the available carbon budget.

• The richest 5% (c.315 million people) were responsible for over a third (37%) of the total growth in emissions and the total growth in emissions of the richest 1% was three times that of the poorest 50%.

Figure 3: Total and per capita consumption emissions of individuals in different global income groups in 2015



Nearly 60% of global CO₂ emissions come from the world's six largest economies the United States, China, Russia, India, the European Union, and Japan.

16% of the emissions are from the United States alone, while the U.S. population is only 5% of the global population.

Annual CO₂ emissions from fossil fuels, by world region



Add region □ Relative



Source: Global Carbon Project OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY Note: This measures CO₂ emissions from fossil fuels and cement production only – land use change is not included. 'Statistical differences' (included in the GCP dataset) are not included here.

CHART	TABLE	SOURCES	L DOWNLOAD	<
-------	-------	---------	------------	---

The breakdown of production by the type of fossil fuel paints a deeply worrying picture, with countries forecast to produce:





24

MORE COAL

* 2021 Production Gap Report



Evaluation for consistency



Fair Share Range	35.2 26.3	18.0 15.7	16.1 15.4	12.7 13.1	2.4 3.1	2.2 3.4	2.4 2.8	0.03 0.13	0.05 0.16	0.02 0.18	
(range, if applicable)	9.5 10.0	1.1	3.5	3.8	2.4 3.4	1.2 2.2	0.0	1.6	0.5	0.0	
Full Decarbonization (for Reference)	20.7	9.7	7.2	8.9	12.8	7.8	5.4	3.1	1.5	2.8	



Figure ES-3: Industry projections of increase in annual gas production 2030 compared to 2019. [Source: SEI, Trends in Fossil Fuel Extraction (2021)]



Foodprints by Diet Type: t CO2e/person



Note: All estimates based on average food production emissions for the US. Footprints include emissions from supply chain losses, consumer waste and consumption.. Each of the four example diets is based on 2,600 kcal of food consumed per day, which in the US equates to around 3,900 kcal of supplied food.

Sources: ERS/USDA, various LCA and EIO-LCA data







"Yes, the planet got destroyed. But for a beautiful moment in time we created a lot of value for shareholders."

Figure 1. Billion-dollar natural disasters are increasingly common in the United States

Number of disasters



Sources: NCEI (2021, 2022).

Note: Disaster costs are adjusted for inflation using the Consumer Price Index for All Urban Consumers.



This map denotes the approximate location for each of the 22 separate billion-dollar weather and climate disasters that impacted the United States during 2020.

\$2.5 Trillion a year until 2035—some possible sources

Military—cutting budgets of top ten by 25% = \$325 billion a year.

1% billionaires tax = \$45 billion a year globally (2095, net worth 8T)

Closing tax havens (\$70B a year, 20% of tax revenue collected)

Transaction tax on sales of stocks, bonds, derivatives (Sanders \$60B to \$220B in US)

Global minimum tax rate on multinational corporations = ???



Unified Goal on the Climate (part 1)

Humans are on an unsustainable path that puts at risk most of Earth's life forms, including ourselves. This path was created and is supported by destructive irrational policies carried out by the governments, institutions, and industries of our societies, for example, the fossil fuel industries. These policies must be completely transformed, beginning now.

To transform these policies, we must end the many forms of oppression our governments, institutions, and industries use to create and enforce the policies. We share a vision of a world free from oppression, in which people work cooperatively, in a respectful and harmonious relationship with the Earth, to ensure that everybody's real needs are met. To make this vision a reality, we must significantly reduce consumption—especially by the globally dominant and more industrialized nations—by ending the irrational patterns of consumption our societies promote.

We in the RC Community commit ourselves to encouraging and supporting every one of us to act against and discharge any distress that might keep us from playing an active role, as large and radical as necessary, to resolve the climate emergency. For most of us, this will involve uniting with others to publicly oppose irrational policies and visibly support rational solutions.

Unified Goal on the Climate (part 2)

The oppression of any group of people is unjust, inhumane, destructive, and against the interests of all people. Because our societies all use oppression to maintain themselves, we need to end all oppression to free humans from the grip of irrationality and end the threat to our climate.

To solve the climate crisis, we must transform the current economic system with its focus on profits for a small number of people, its endless pursuit of growth, and its exploitation of both nature and humans—into a system that respects and sustains all life and ecosystems. To end the climate emergency, we must simultaneously work to end all oppressions and all forms of exploitation. The societies that have exploited people and the Earth are the result of irrational behavior coming from humans' vulnerability to distress recordings.

The thoughtless, patterned desperation for more, without considering its damaging effects, has brought us to our current crisis. The distresses behind the irrational personal and institutional policies must be discharged for us to create policies that sustain our Earth's ecosystems.

They must eventually be discharged fully, but we cannot wait for that to happen before we take large actions. The climate is deteriorating too rapidly, and the changes needed to address the crisis must begin now.

Unified Goal on the Climate (part 3)

Working simultaneously on oppression and the climate emergency requires that we support and follow the leadership of Indigenous, Global Majority, and other oppressed groups—working together with individuals and organizations to build a united force that welcomes everyone to end the climate emergency. In particular, we must continue the work of ending all oppressions, and understanding the ways in which they intersect:

• Ending racism

We cannot end the climate crisis without ending racism. Racism and patterns of domination, colonization, exploitation, and extraction have created the conditions for the climate crisis. Also, Indigenous and Global Majority communities and nations have been, and are being, exposed to far greater climate and other environmental danger than are the vast majority of white-dominated communities and nations.

The RC Community commits to creating opportunities for everyone to do the following:

a. Implement the Strategies for Goal 1: Ending Racism (see <www. rc.org/publication/racism/implement_goal_one>)

b. More fully understand the connection between racism and the climate crisis

Unified Goal on the Climate (part 4)

c. Discharge on the patterns and practices of white domination that have enabled, and continue to enable, rich countries to get rich at the expense of Indigenous and Global Majority communities and our Earth

d. Discharge feelings of powerlessness and any other feelings that would stop us from acting to end institutional and systemic racism and white supremacy culture

• Ending genocide and honoring Indigenous sovereignty

Protecting the Earth is inherent to Indigenous and Tribal sovereignty and to sustaining all forms of life. The RC Community commits to reading, discharging, and instituting proactively the Goal on Ending Genocide and Honoring Indigenous Sovereignty.

• Ending classism

The RC Community commits to building connections with, learning from, and increasing the participation of the sector of the working class engaged in the direct production of goods and services.

These workers are currently underrepresented in our Community, yet they represent the majority of the world's population.

Unified Goal on the Climate (part 4)

Their leadership is key to making the changes and building the solidarity needed to end the climate crisis.

• Ending sexism and male domination

Women and girls are among the most powerful forces in ending climate devastation. They hold vital knowledge as caregivers, land and resource stewards, and leaders of communities. They offer their societies long- practiced, sustainable, community-based solutions.

The exploitation of women's reproductive work, caregiving, and agricultural and factory work (along with poverty) leaves women more exposed to climate change and other environmental shocks. Also, their lack of material resources with which to adapt to and mitigate climate impacts puts them at greater risk of sexual exploitation and male violence.

Females of all ages are significant members of the working class and of Indigenous and Global Majority peoples. We recognize the intersection of all their oppressions and the work needed to end their internalized oppression. The RC Community commits to ending the divisions among women and to building a united sisterhood—while also welcoming and working

Unified Goal on the Climate (part 5)

with women's brothers to end the exploitation of all women and girls and the environment.

• Ending the oppression of young people

Young people are at the forefront of facing the present and future effects of the climate crisis.

The RC Community commits to creating opportunities for young people to discharge the hurts of young people's oppression and for adults to discharge the oppressor distresses that keep them from fully backing young people.

We support the leadership of young people. We also support adults to stay close and connected as they face the climate crisis together with young people.

The RC Community commits to discharging the early hurts from young people's oppression that discourage us from taking action to transform society. People of all ages can unite and play large roles in ending the climate crisis.

Unified Goal on the Climate (part 5)

• Ending antisemitism

The RC Community commits to doing the work to understand antisemitism, its significant rise worldwide, and the divisive role it plays in weakening liberation work (particularly the fight against racism).

We commit to discharging and acting against all antisemitic patterns that have been installed on us.

We will take an active role to ensure that antisemitism is addressed in all liberation programs and to end the use of antisemitism to disrupt liberation movements, and the climate movement.

• Ending Gay oppression

Historically and in the present, the oppression of LGBTQ+ people has been, and is being, used to divide and derail liberation movements and the climate movement.

The RC Community commits to understanding and ending Gay oppression, discharging and acting against all oppressions that target LGBTQ+ communities, and taking an active role in ending the use of LGBTQ+ oppression to disrupt liberation movements and the climate movement.

Unified Goal on the Climate (part 7)

• Ending the oppression of disabled people

Disabled people are disproportionately impacted by the climate crisis. They are more likely to be displaced, injured, or killed. They are often the poorest of the poor.

Disabled people also model the cooperation and connection essential to addressing the climate crisis and assuring the future of humanity.

The RC Community commits to ending the oppression of disabled people by discharging the hurts that devalue disabled people's lives and limit our view of what it is to be human. We also commit to building connections with and learning from disabled people.

• Ending all other mistreatments

The RC Community commits to ending all other mistreatments of groups of people in our societies. We will work to become stronger allies to each other and to remove any distresses, including oppressor distresses, that get in the way of our working together in a unified way.

Go to <www.rc.org/publication/environment/coe_draft_policy> to see the Draft Program on Care of the Environment and articles that explain its relationship with all oppressions. We need to build sustainable, resilient movements to end the climate emergency. This requires us to act to end all forms of oppression—and this requires ongoing emotional healing. Healing work is social justice work. This is the work of Sustaining All Life and United to End Racism.



Sustaining All Life www.SustainingAllLife.org



United to End Racism www.UnitedToEndRacism.org

