CARBON INITIATIVE FORUM

C.I.F CLIMATE CLUB

C1: BASICS OF CLIMATE CHANGE

Carbon Initiative Forum is non-profit that aims to empower the youth through the mainstreaming of climate policy in education. *We see a void in the public space on policy discussions about the climate. There hasn't been enough awareness, conversation and therefore expectation from the public towards policy makers and corporations is lacking. We want to make climate a voting issue in India and create a space, through CIF, for dialogue, discussion and chiefly an impetus from youth and other individuals to drive actions at various governance levels.*

We are a comprehensive platform to ask the right questions to the right people and gain clarity and our target audience includes youth of age group 14-28 years.

OUR MISSION IS TO EDUCATE & ENGAGE ON CLIMATE POLICY

> "Our planet needs each one of us right now. We need you to inspire change to control climate change."

> "On our platform, understand what the policy makers are doing to limit global warming, engage with us and enhance awareness on it."

> "We enable the youth to become better future climate decision makers by educating them on climate change and climate policy."

OUR OBJECTIVES

Create city level chapters that work on city level issues
Our vision is to become a national platform, growing and collated by the people
Enable a larger movement and consequently a larger impact towards climate action

VOLUNTEER LIKE A PLANETEER!

Whether you're a lifelong environmentalist, a new activist just starting out, or someone totally new to the concept of climate change, join our **#CIFClimateClub** or **#LocalCityChapter** and be the planeteers our planet needs.

LEAD THE WAY. INSPIRE THE YOUTH. CLIMATE POLICY NEEDS YOU.

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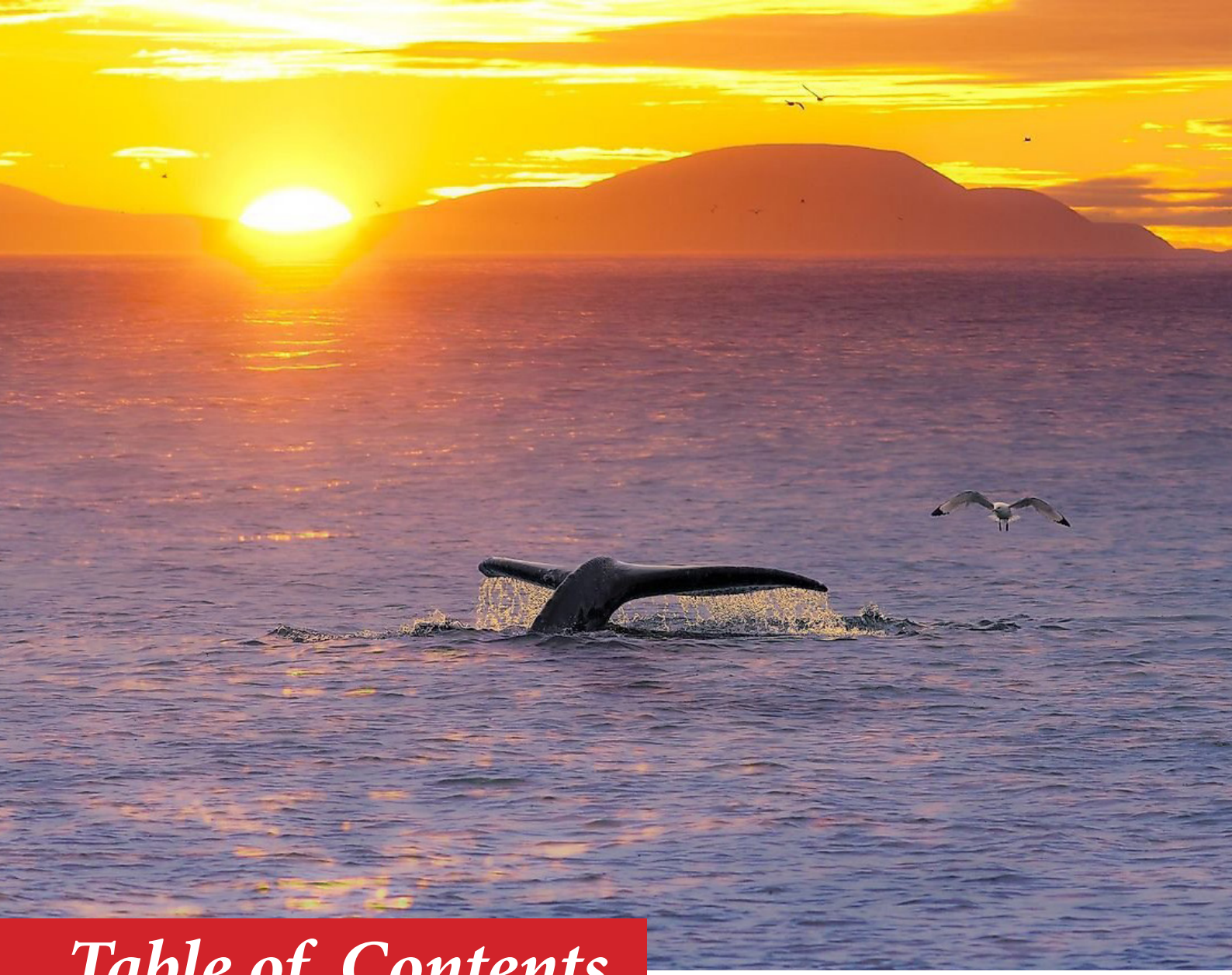

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Difference between Weather and Climate

Though they are closely related, weather and climate aren't the same thing. Climate is what you expect. Weather is what actually happens. While descriptions of an area's climate provide a sense of what to expect, they don't provide any specific details about what the weather will be on any given day. Global climate is a description of the climate of a planet as a whole, with all the regional differences averaged. While the weather can change in just a few minutes or hours, climate changes over longer time frames.[1]

Weather describes the short term state of the atmosphere. This includes such conditions as wind, air pressure, precipitation, humidity and temperature. Climate describes the typical, or average, atmospheric conditions. Weather and climate are different as the short term state is always changing but the long-term average changes quite slowly. Measurements of climate include the averages of the daily, monthly, and yearly weather patterns, the seasons, and even a description of how often extraordinary events, such as hurricanes, occur.[2]

How CO2 emissions have increased with the Industrial Revolution

Human activities are driving the global warming trend observed since the mid-20th century.

The greenhouse effect is essential to life on Earth, but human-made emissions in the atmosphere are trapping and slowing heat loss to space. While the sun has played a role in past climate changes, the evidence shows the current warming cannot be explained by the sun.

Over the last century the burning of fossil fuels like coal and oil has increased the concentration of atmospheric carbon dioxide (CO2). This happens because the coal or oil burning process combines carbon with oxygen in the air to make CO2. To a lesser extent, the clearing of land for agriculture, industry, and other human activities has increased concentrations of greenhouse gasses (GHGs).[3]

The industrial activities that our modern civilization depends upon have raised atmospheric carbon dioxide levels by nearly 50% since 1750. This increase is due to human activities, because scientists can see a distinctive isotopic fingerprint in the atmosphere.

In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC), a group of 1,300 independent scientific experts from countries all over the world under the auspices of the United Nations, concluded there's a more than 95% probability that human activities over the past 50 years have warmed our planet. The industrial activities that our modern civilization depends upon have raised atmospheric carbon dioxide levels from 280 parts per million to about 417 parts per million in the last 151 years. *The panel also concluded there's a better than 95% probability that human-produced greenhouse gasses such as carbon dioxide, methane and nitrous oxide have caused much of the observed increase in Earth's temperatures over the past 50 plus years.*

An increase in the atmospheric concentrations of greenhouse gasses produces a positive climate forcing, or warming effect. From 1990 to 2019, the total warming effect from greenhouse gasses added by humans to the Earth's atmosphere increased by 45%. The warming effect associated with carbon dioxide alone increased by 36%.[4]

Who is responsible?

Top 100 oil companies

Only 100 investor and state-owned fossil fuel companies are responsible for around 70% of the world's historical GHG emissions. This contradicts the narrative pushed by fossil fuel interests that individuals' actions alone can combat climate change, as individual actions have minute effects relative to these emissions - average American households produce only 8.1 metric tons of carbon dioxide out of a total of over 33 billion tons globally. Fossil fuel interests spend billions on climate science denial to mislead the public about the truth behind the crisis and push the misperception that through individual actions alone climate change can be stopped. They simultaneously lobby for trillions of dollars in subsidies that cheapen fossil fuels and make it more difficult for alternative renewable energy sources to compete fairly in the marketplace. Given this reality, combating climate change requires holding fossil fuel producers accountable for their outsized contribution to the climate crisis and active efforts to thwart meaningful climate action by implementing carbon pricing that will reflect the true cost of fossil fuels, reducing emissions, and advancing a clean energy economy.[5]

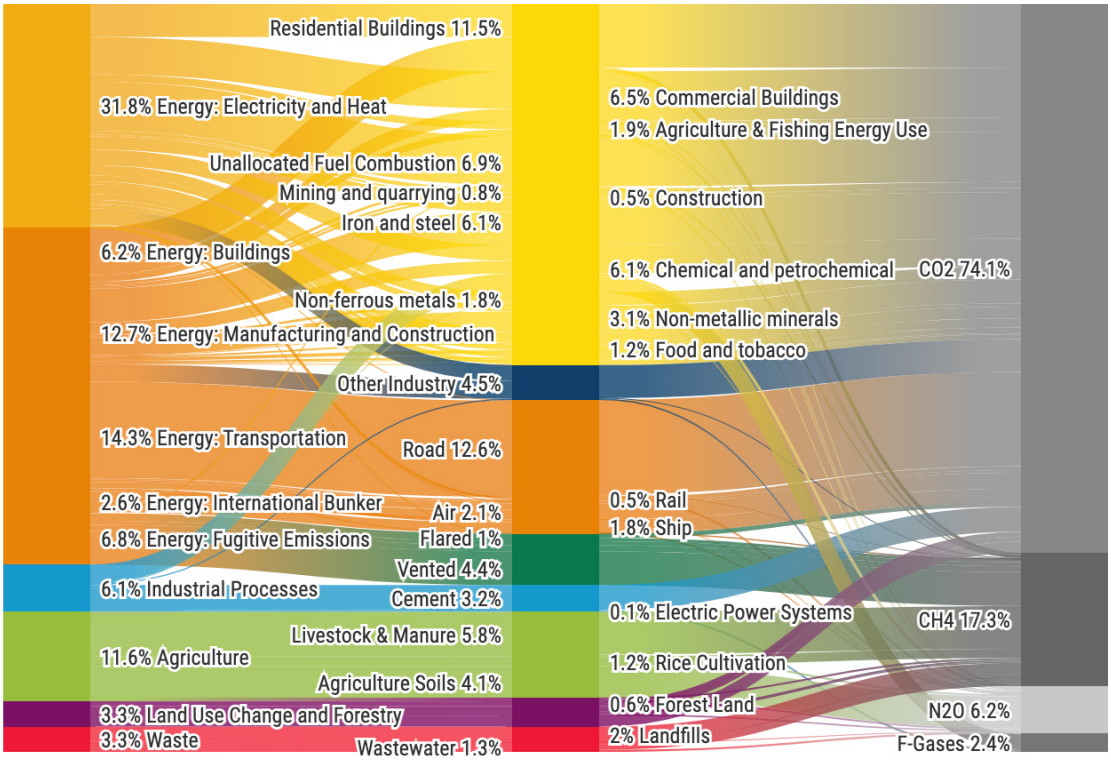
Major emitting sectors

As countries implement their targets and policies and develop more detailed pathways to reduce their greenhouse gas (GHG) emissions, it's important to fully understand the global emissions picture and how it changes over time.

The top three greenhouse gas emitters - China, the United States and India, contribute 41.5% of total global emissions, while the bottom 100 countries account for only 3.6%. Collectively, the top 10 emitters account for over two-thirds of global GHG emissions.

World Greenhouse Gas Emissions in 2019 (Sector | End Use | Gas)[6]

Total: 49.8 GtCO2e

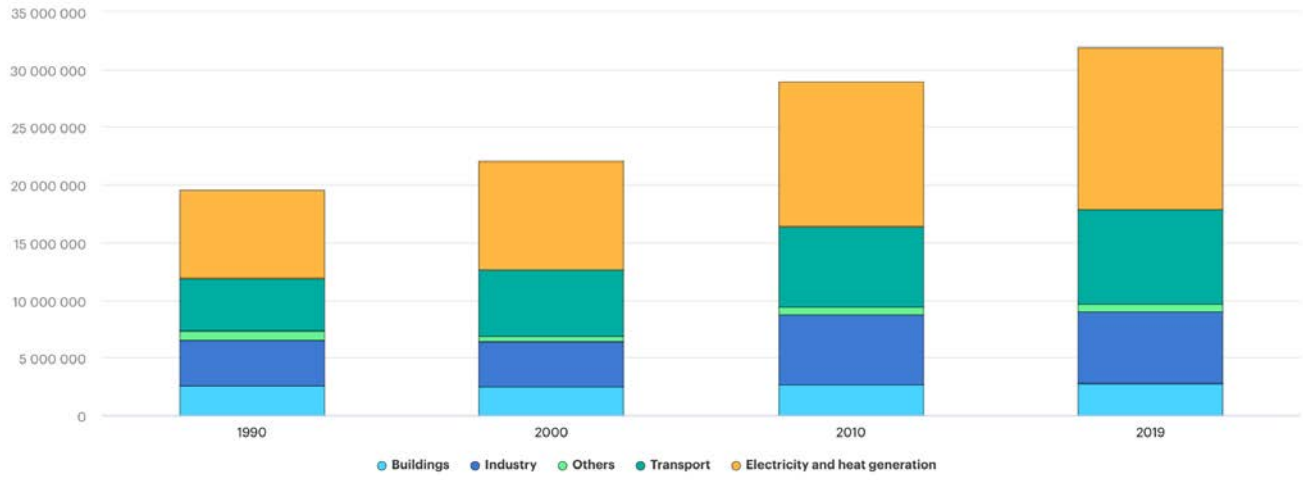


Source: Climate Watch, based on raw data from IEA (2021), GHG Emissions from Fuel Combustion, www.iea.org/statistics; modified by WRI.

WORLD RESOURCES INSTITUTE

Since reporting began in 1990, the energy sector - including electricity, transport, manufacturing, buildings, fugitive and other fossil fuels, remained the largest contributor to GHG emissions over any other sector, representing 73% of global emissions in 2017.

Global CO2 emissions from fuel combustion by sector with electricity and heat separated, World[7]



Power generation and transport together account for over two-thirds of total CO2 emissions from fuel combustion in 2019 and have been responsible for almost all global growth since 2010. The remaining third was

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mainly associated with the industry and buildings sectors.

Despite global efforts in decarbonizing the power sector, electricity and heat generation correspond to over 40% of global CO2 emissions from fuel combustion, with coal plants emitting over 70% of the associated emissions.[8]

The six-sector solution to the climate crisis

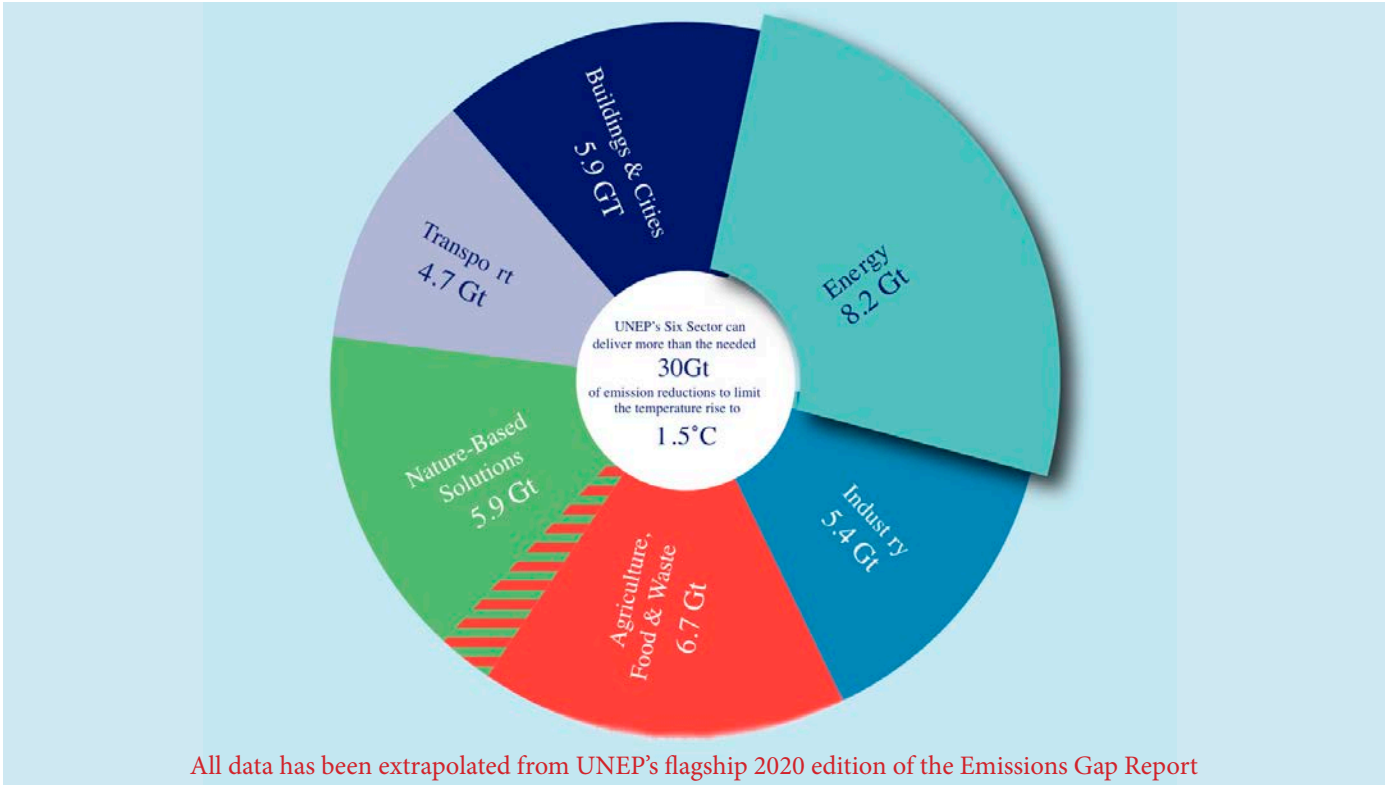
Ensuring a safe future below the 1.5°C mark requires the world to cut 30 gigatonnes greenhouse gas emissions annually by 2030. Transport and industry are not enough. We need to cut carbon emissions by managing our land and resources more efficiently, including building smart cities and curbing deforestation and food waste.

So how can humankind get there?

To ensure a stable climate and make real on the commitment of the Paris Agreement UNEP has identified six sectors with the potential to reduce emissions enough to keep the world below the 1.5°C mark.

It is possible to cut 30 gigatonnes greenhouse gas emissions annually by 2030. There is a lot that can be done. We already have the solutions we need in the six sectors.

UNEP's six-sector solution can reduce 29-32 GTCO2e and limit temperature rise to 1.5˚C[8]



All data has been extrapolated from UNEP's flagship 2020 edition of the Emissions Gap Report

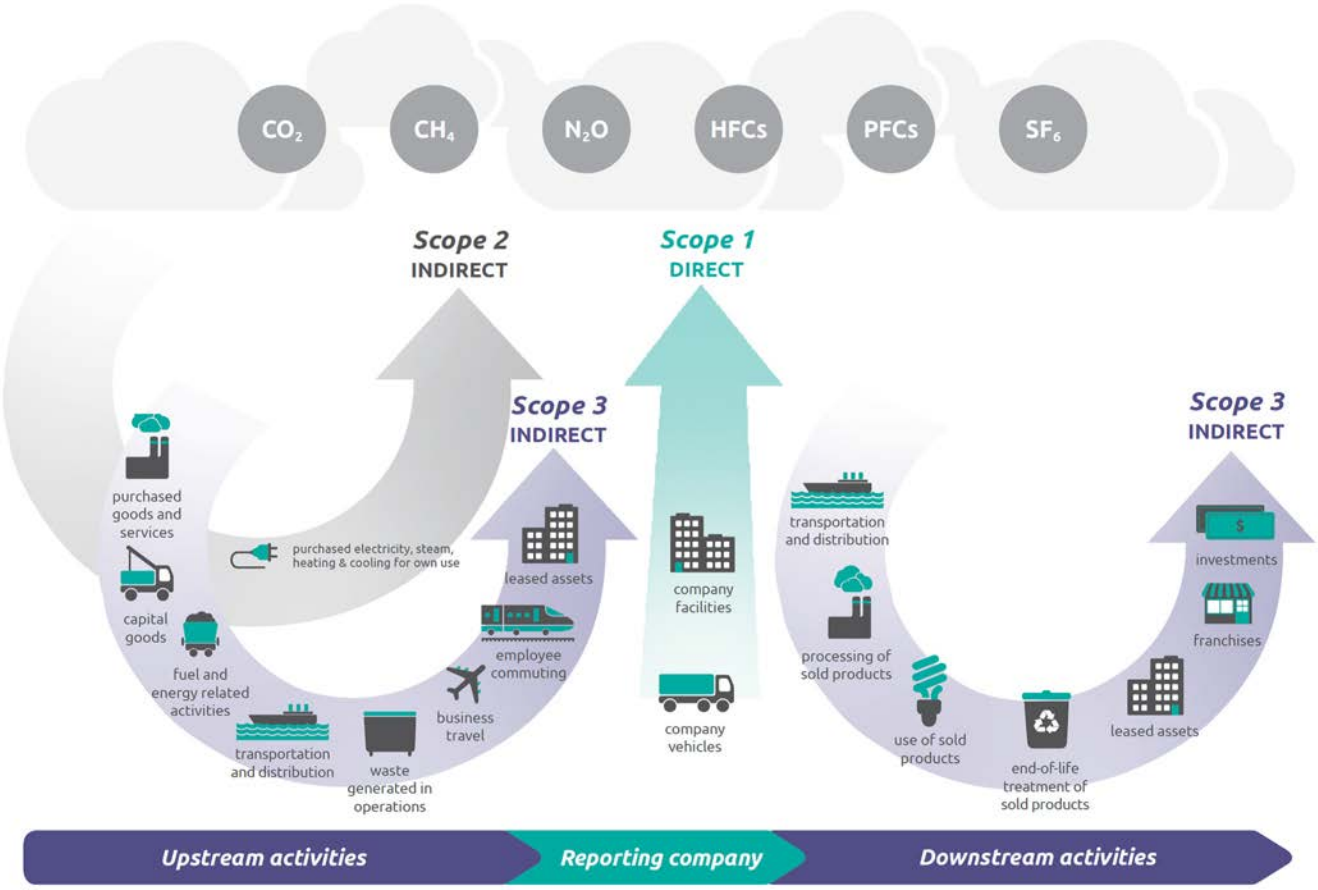
Types of emissions

8 major greenhouse gases are:

Carbon Dioxide (CO2)	**Sulfurhexafluoride (SF6)**	**Water Vapour (H2O)**	**Nitrogentrifluoride (NF3)**
Perfluorocarbons (PFCs)	**Methane (CH4)**	**Hydrofluorocarbons (HFCs)**	**Nitrous Oxide (N2O)**

If you're hearing about Scope 1, 2 and 3 for the first time, it's unlikely to be the last. Think of it in terms of three categories of emissions;

- **Scope 1 —** This one covers the Greenhouse Gas (GHG) emissions that a company makes directly — for example while running its boilers and vehicles.
- **Scope 2 —** These are the emissions it makes indirectly – like when the electricity or energy it buys for heating and cooling buildings, is being produced on its behalf.
- **Scope 3 —** Now here's where it gets tricky. Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of products and services.[9]



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Understanding the interlinkages between climate change and biodiversity

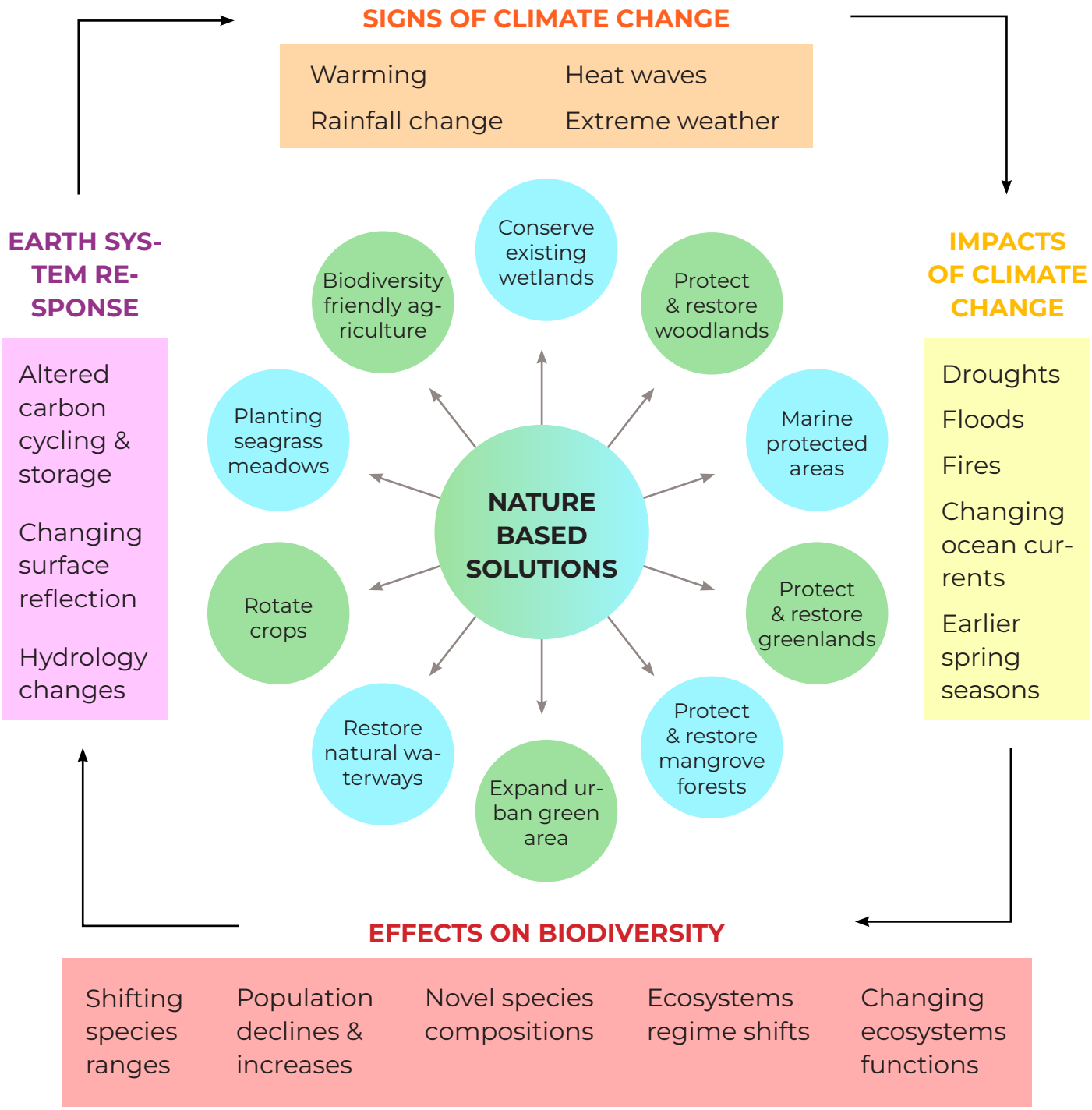
Biodiversity is the biological wealth of the Earth and it makes ecosystems more resilient to varying and shifting climates and other disturbances. Currently, the world is on track for a temperature rise in excess of 3°C this century – could mean that many species fail to adapt or migrate at sufficient speed, particularly in more fragmented landscapes. Some plant and animal populations will decline whilst others will increase, changing species interactions such as predation, competition and the spread of disease.[10]

Around one million animal and plant species are now estimated to be threatened with extinction as a result of human activity. While climate change has yet to cause major species decline in some ecosystems, in others it has already resulted in severe falls in population size and changes in composition.

For example, warming-induced coral bleaching has caused declines of up to 90% in coral populations in some regions, leading to shifts to alternative types of organisms such as macroalgae, or broad-scale transformations in coral species composition. A 2°C warming is expected to cause a decline of greater than 99% of coral reefs. On land, the impacts of climate change on the diversity of plants and vertebrates are predicted to exceed those of land-use by 2050.[11]

Biodiversity can support climate action in many ways, particularly through well-designed 'Nature-based solutions' (NbS). These actions are intended to protect, sustainably manage, and restore ecosystems that address societal challenges such as climate change, while providing human well-being and biodiversity benefits. These are reasonably well understood and available for deployment in terrestrial systems, but less so in marine systems.[11]

Climate change impacts biodiversity through interactions with the Earth System. Examples of NbS are outlined in the center of the figure.[13]



By better integrating climate and biodiversity policies at national and international levels, the full potential of biodiversity to support climate action could be leveraged, while at the same time helping to reverse the ongoing decline in biodiversity.

What are Carbon sinks?

Carbon is essential to all life on Earth – it's in our DNA, in the food we eat and the air we breathe. The amount of carbon on Earth has never changed but where carbon is located is constantly changing – it flows between the atmosphere and organisms on Earth as it's released or absorbed. This is known as the carbon cycle – a process that has been perfectly balanced for thousands of years. For example, carbon continually flows in and out of the atmosphere and also living things. As plants photosynthesize, they absorb carbon dioxide from the atmosphere. When plants die, the carbon goes into the soil, and microbes can release the carbon back into the atmosphere through decomposition.

A carbon sink is anything, natural or otherwise, that accumulates and stores some carbon-containing chemical compound for an indefinite period and thereby removes carbon dioxide (CO2) from the atmosphere. Forests are typically carbon sinks, places that absorb more carbon than they release. They continually take carbon out of the atmosphere through the process of photosynthesis. The ocean and soil are other examples of a carbon sink, absorbing a large amount of carbon dioxide (CO2) from the atmosphere.

Today we are releasing CO2 beyond the cleansing capability of the planet. The proportion of CO_2 emissions taken up by land and ocean carbon sinks is smaller in scenarios with higher cumulative CO_2 emissions.[14]

What is Carbon Footprint

According to Mike Berners-Lee, a professor at Lancaster University in the UK and author of The Carbon Footprint of Everything, a carbon footprint is "the sum total of all the greenhouse gas emissions that had to take place in order for a product to be produced or for an activity to take place (the activities include of a particular person, organization, or community)". Determining a carbon footprint is easier said than done, and it's not clear how much weight we should put on it.

For most consumers in developed countries, these products and activities tend to fall into four principal categories:

- **Household energy use**
- **Transport**
- **Food**
- **Everything else, which is mostly the products we buy, from utensils to clothes to cars to television sets.**

Each of these activities and products has its own footprint; a person's carbon footprint is the combined total of the products they buy and use, the activities they undertake, and so on. A person who regularly consumes beef will have a larger food footprint than his vegan neighbor, but that neighbor's overall footprint may be larger if she drives an hour to work and back in an SUV each day while our meat-eater bicycles to his office nearby. Both their footprints may pale in comparison to the businesswoman across the street, who flies first-class cross-country twice a month. The carbon footprint for first-and-business class passengers is larger because they take up more space on the plane and because their higher cost creates an extra incentive for the flights to actually take place.

Let us take another example where switching to an electric car is far more impactful in Vermont than in West Virginia, where half the state's electricity is generated by hydropower, than in West Virginia, where it is almost entirely generated by coal.[15]

The carbon footprint is also an important component of the Ecological Footprint, since it is one competing demand for biologically productive space. Carbon emissions from burning fossil fuel accumulate in

the atmosphere if there is not enough biocapacity dedicated to absorb these emissions. Therefore, when the carbon footprint is reported within the context of the total Ecological Footprint, the tonnes of carbon dioxide emissions are expressed as the amount of productive land area required to sequester those carbon dioxide emissions. This tells us how much biocapacity is necessary to neutralize the emissions from burning fossil fuels.[16]

IUCN Red List of Ecosystems and its successful use and policy impact

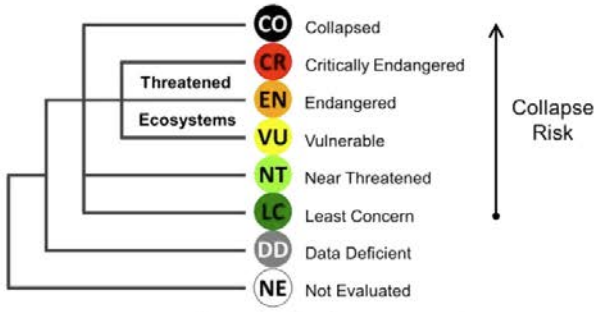
Nature is under threat around the world. Members of IUCN (International Union for Conservation of Nature) recognise the vital importance of conservation. Governments, civil society organizations, NGOs and 18,000 scientists and researchers provide the knowledge and tools that can enable human progress, economic development and nature conservation.

Scientific excellence is critical to IUCN's role. IUCN sets global standards for biodiversity assessment, including the

- Red List of Threatened Species
- Red List of Ecosystems
- Key Biodiversity Areas (sites that contribute significantly to the global persistence of biodiversity).

Understanding where ecosystems are at greatest risk allows us to act to sustain species and ecosystems. The IUCN Red List of Ecosystems measures the relative risks of ecosystem collapse for terrestrial, freshwater and marine ecosystems at subnational, national, regional and global scales. The Red List of Ecosystems (RLE) approach evaluates the risk of ecosystem collapse by measuring ecosystem loss and degradation.

The IUCN risk categories[17]



Structure of the IUCN Red List of Ecosystems categories.

In descending order of threat, the eight IUCN Red List of Ecosystems risk categories are: *Collapse (CO),Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NE), Least Concern (LC), Data Deficient (DD) and Not Evaluated (NE):*

Definitions

- *(CO):* ecosystems collapsed throughout the assessed distribution
- *(CR),* (EN), *(VU):* ecosystems facing collapse
- *(NE):* ecosystems close to the threatened threshold or threatened without ongoing conservation measures in the future
- *(LC)*: ecosystems evaluated as at low risk of collapse
- *(DD)*: ecosystems for which too few data exist
- *(NE)*: ecosystems that have not yet been assessed

Ecosystem risk assessments give us information that helps us conserve, manage and sustain our environment. They are based on scientific data and made within a scientific framework. A rigorous standardized assessment method supports decision-making, influences government policy and informs strategies for management at the same time.[17]

Users and benefits

Main users

Assessments are usually carried out by:

- Local and national governments
- Conservation practitioners
- Academic institutions

Assessments can be useful for a variety of other stakeholders too, such as land-use planners and advocates, policymakers, general public, donor agencies and programme developers as well as businesses, companies and investors.[17]

Main applications

The Red List of Ecosystems has many applications, including to assess and highlight risks to ecosystems, guide national and international conservation strategies, prioritize and monitor restoration action, inform land-use planning, inform laws and regulations, provide recommendations on how to manage industries, raise public awareness or report on multilateral agreements.

Information from the RLE assessments is also valuable for guiding local actions for conservation and sustainable development. This includes restoration, invasive species control, environmental impact assessments, monitoring, threatened ecosystem action plans, and local incentive schemes.[17]

It is also used for making decisions about investment. For example, at a global level, the International Finance Corporation recommends the use of the Red List of Ecosystems to address private sector performance standards to conserve biodiversity, maintain ecosystem services and sustainably manage living natural resources.[18]

Some of the policy and management contexts are shown in the figure below, and operate at very diverse scales.[18]

Policy and management contexts (Nicholson, 2020)

Red List of Ecosystems assessments have already influenced national policy in Finland and Norway and protected area planning in Colombia.

Case study: National assessments of South Africa and Colombia[18]

Colombia and South Africa are extraordinarily varied countries with many rich and beautiful ecosystems. Their national Red List of Ecosystems assessments determined not only which ecosystems were threatened but suggested what can be done to reduce risks.

South Africa

South Africa has exceptional biodiversity, characterized by a wide variety of ecosystem types, high species richness and high levels of endemism. South Africa was also a pioneer in ecosystem risk assessment, as part of its National Biodiversity Assessment (NBA), covering all realms (terrestrial, freshwater and marine). The first national assessment was done in 2004, using locally developed criteria, and repeated in NBA 2011 and NBA 2018, when the IUCN Red List of Ecosystems criteria were used. The RLE has been mainstreamed into policy and legislation to inform conservation action and decision-making in several sectors – providing an excellent example for the rest of the world in the application of the Red List of Ecosystems.

Colombia

Colombia is one of the world's most megadiverse countries, with close to 10% of the planet's biodiversity. Its ecosystems range from Andean mountain peaks to lowland rainforest to coral reefs. Conservation here is a global imperative. The Red List of Ecosystems assessments are being used to identify priority areas for protection and restoration. The RLE assessment outcomes have been included in Tremarctos. This online tool allows development projects (e.g., for road infrastructure and the energy and mining sectors) to take into account threatened ecosystems, when analyzing environmental, socioeconomic, and geophysical risks. The tool also allows for the calculation of offsets and compensations for impacts.

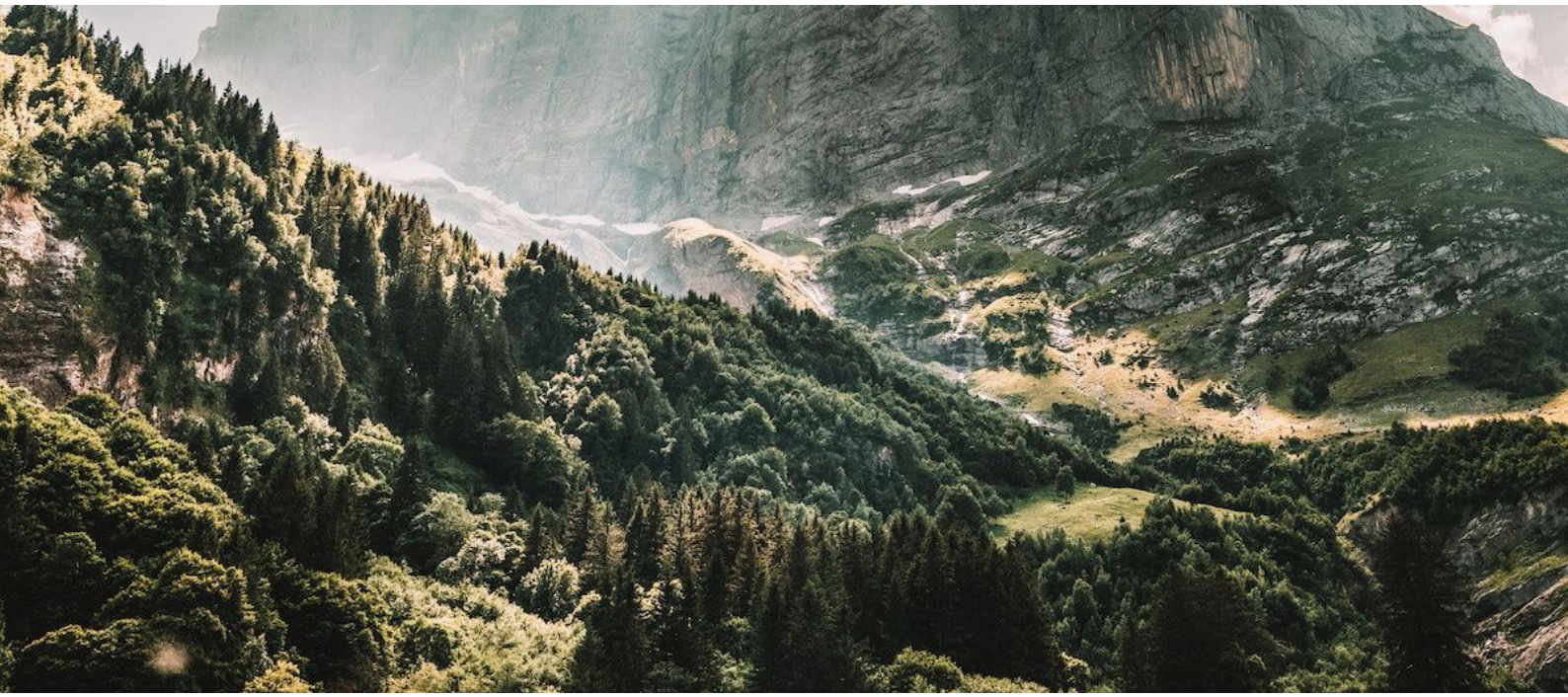
Why is 1.5 degrees the danger line for Global Warming?

To start with, Global Warming is about average temperatures - Continued global warming is projected to further intensify the global water cycle, including its variability, global monsoon precipitation and the severity of wet and dry events.

Many changes due to past and future greenhouse gas (GHGs) emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level. For example, over the next 2000 years, global mean sea level will rise by about 2 to 3m if warming is limited to 1.5°C, 2 to 6m if limited to 2°C and 19 to 22m with 5°C of warming, and it will continue to rise over subsequent millennia.

In the scenarios assessed, limiting warming to around 1.5°C requires GHG emissions to peak before 2025 at the latest, and be reduced by 43% by 2030; at the same time, methane would also need to be reduced by about a third. Even if we do this, it is almost inevitable that we will temporarily exceed this temperature threshold but could return to below it by the end of the century.

It's now or never, if we want to limit global warming to 1.5°C. Without immediate and deep emissions reductions across all sectors, it will be impossible. The global temperature will stabilize when carbon dioxide emissions reach net zero. For 1.5°C, this means achieving net-zero carbon dioxide emissions globally in the early 2050s; for 2°C, it is in the early 2070s.[19]



Business and climate change

5 WAYS CLIMATE CHANGE IS AFFECTING BUSINESS

Climate-related events are already affecting more than 1 in 4 organizations worldwide, according to Deloitte Global's report. Public sector, consumer and life sciences/healthcare industries are the most worried about the business impacts of climate change, with over 80% of executives in these sectors expressing apprehension about the planet's future.

According to the survey, here are the top five ways that climate change is already impacting (or threatening to impact) companies across the globe:

REPUTATIONAL DAMAGE

Environmental sustainability efforts are becoming core tenets of organizations' culture and brand identity.

SCARCITY/COST OF RESOURCES

Resources like food, water and energy are at risk due to both environmental and human causes, with the energy and consumer industries reporting the greatest impacts.

INCREASED INSURANCE COSTS OR LACK OF INSURANCE AVAILABILITY

Executives are very aware of how climate-related events have, in some cases, led to dramatic increases in insurance costs.

REGULATORY/POLITICAL UNCERTAINTY

Rounding out the top three concerns, over a quarter of executives say they are wary about shifting regulatory and political environments. The banking and life sciences/healthcare industries overwhelmingly cited this as the issue impacting their sustainability efforts the most.

OPERATIONAL IMPACT

Nearly 3 in 10 organizations are noticing the operational impacts of climate-related disasters, such as facilities damage and workforce disruption.[20]

CLIMATE CHANGE IS A THREAT AND AN OPPORTUNITY FOR THE PRIVATE SECTOR

THREATS

A growing number of studies are showing that it could be disastrous for the bottom lines of companies around the world. If global temperatures jump 4°C by 2100 – the path we're on now – they could spark droughts, flooding and ferocious storms, sowing financial chaos and upending small shops and international conglomerates alike.

A study by CitiGroup found that rampant warming could shave up to $72 trillion off the world's gross domestic product, while another report in the journal Nature found it could reduce average global incomes by nearly a quarter. A 4°C jump would also batter sectors like agriculture, real estate, timber, and emerging market equities. All told, that would make for a toxic environment for businesses large and small.

Investors wouldn't be immune either. A report by Cambridge University suggests equity portfolios could tumble by up to 45% as climate-related fears ripple across global markets.

OPPORTUNITIES

Like any disruptive force, climate change is creating opportunities for companies willing to innovate. Globally, one area especially ripe for growth is renewable energy. Countries from Honduras to India have set ambitious targets for wind, solar, and hydro-power and they'll need private sector investment to get there. Even Saudi Arabia, home to one of the world's biggest oil reserves, is looking to generate the bulk of its electricity from renewables and nuclear power by 2040.

Renewable energy isn't the only climate-related sector primed for growth. Companies can find opportunities in eco-friendly construction and in helping cities prepare for changes in climate. By 2050, more than 6 billion people will live in urban areas, creating a pressing need for a host of infrastructure services, like water and sanitation.

There are great opportunities in climate-smart financial solutions as well. These run the gamut from green bonds issued by governments and international institutions to micro-loans for entrepreneurs.[21]

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Calculate your carbon footprint to make more informed decisions on how you can cut your share of emissions!

https://www.carboninitiativeforum.org/measure

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