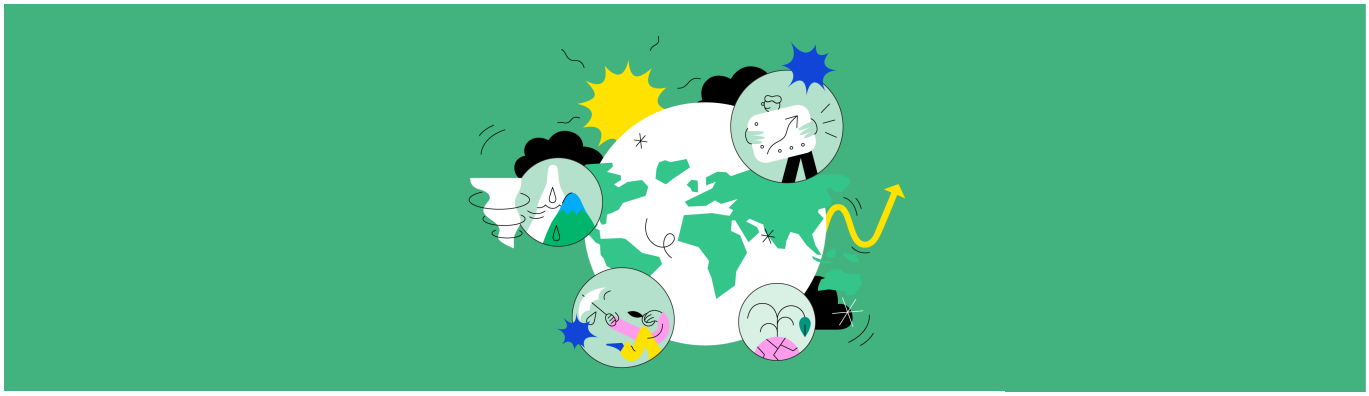
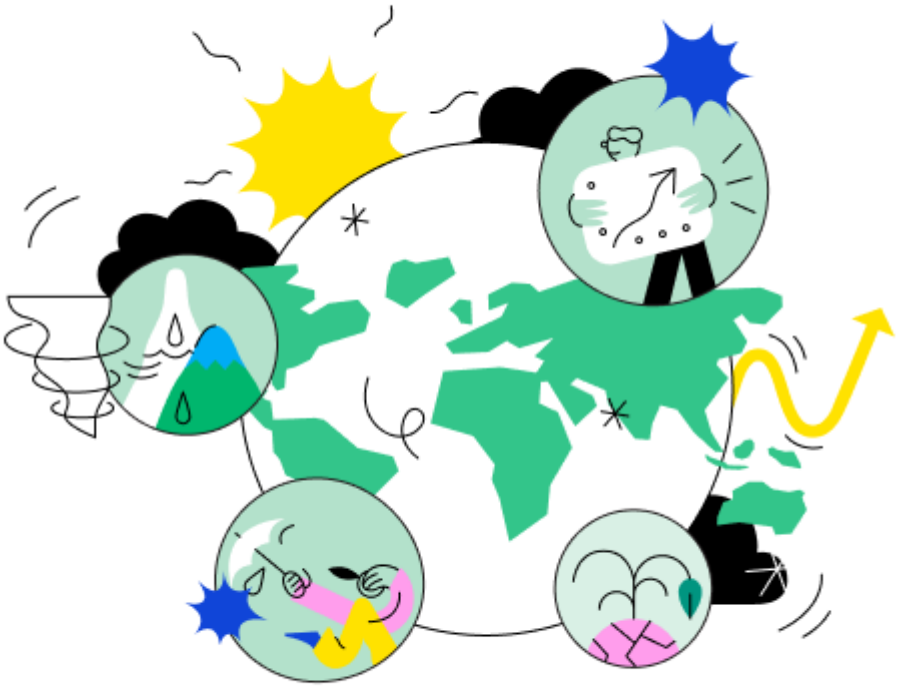
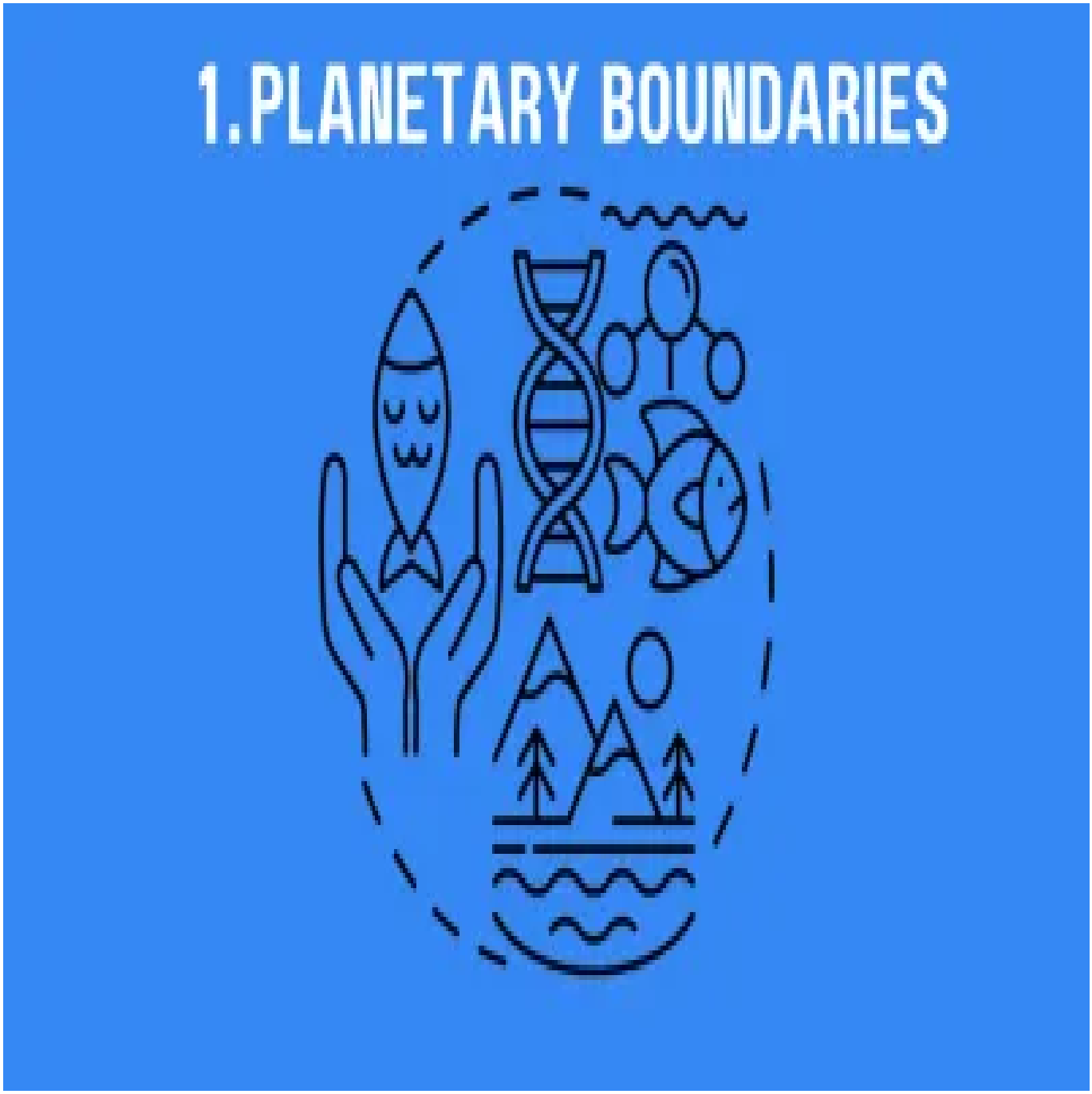


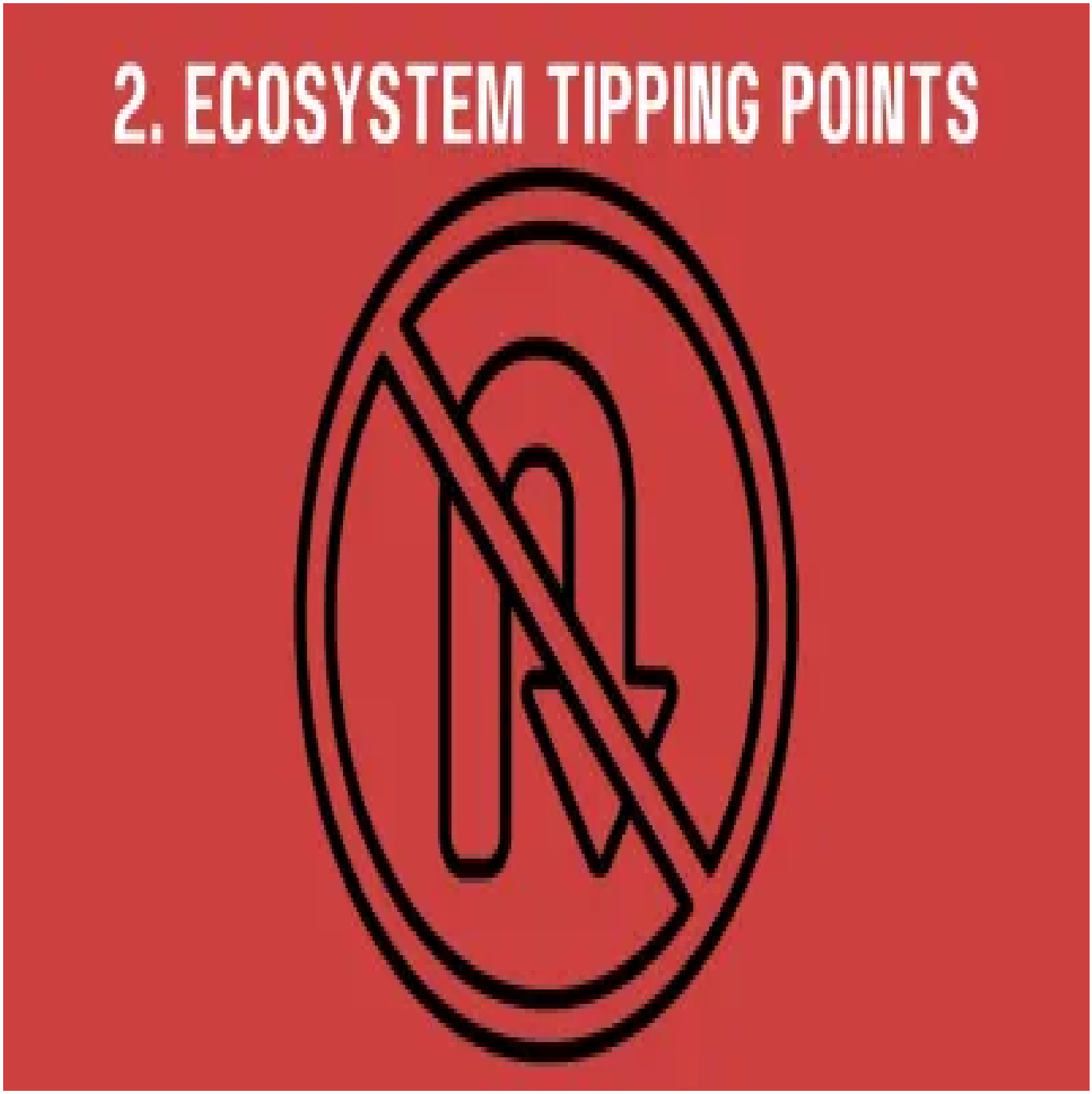


23 Facts You Need To Know About The Planetary Crisis

A Comprehensive Guide to the Crisis Threatening Our Planet's Future

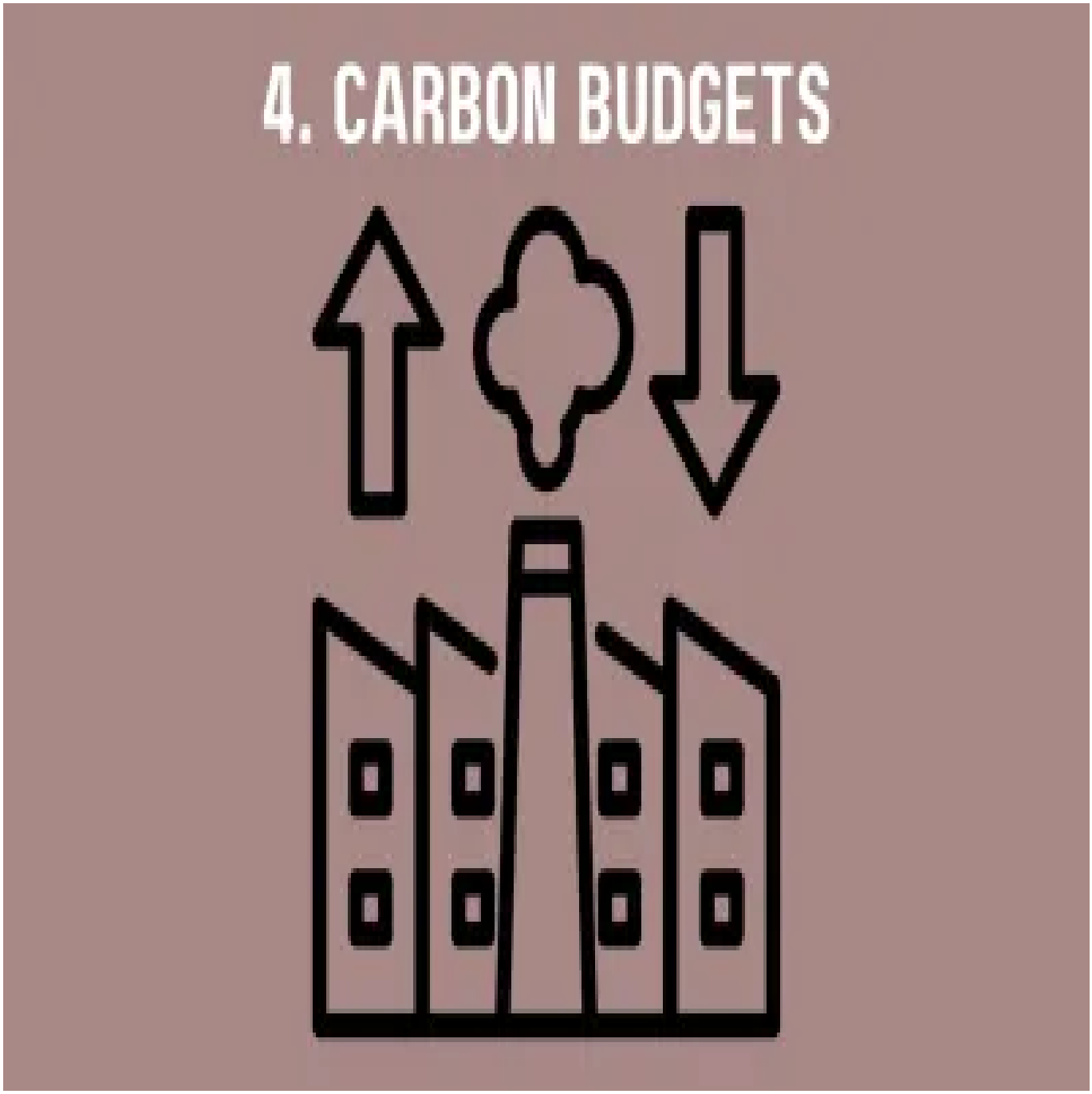


Earth is finite and its limits can't be pushed



There are tipping points for various environmental systems

The world has a "NET ZERO" objective: what does that mean?



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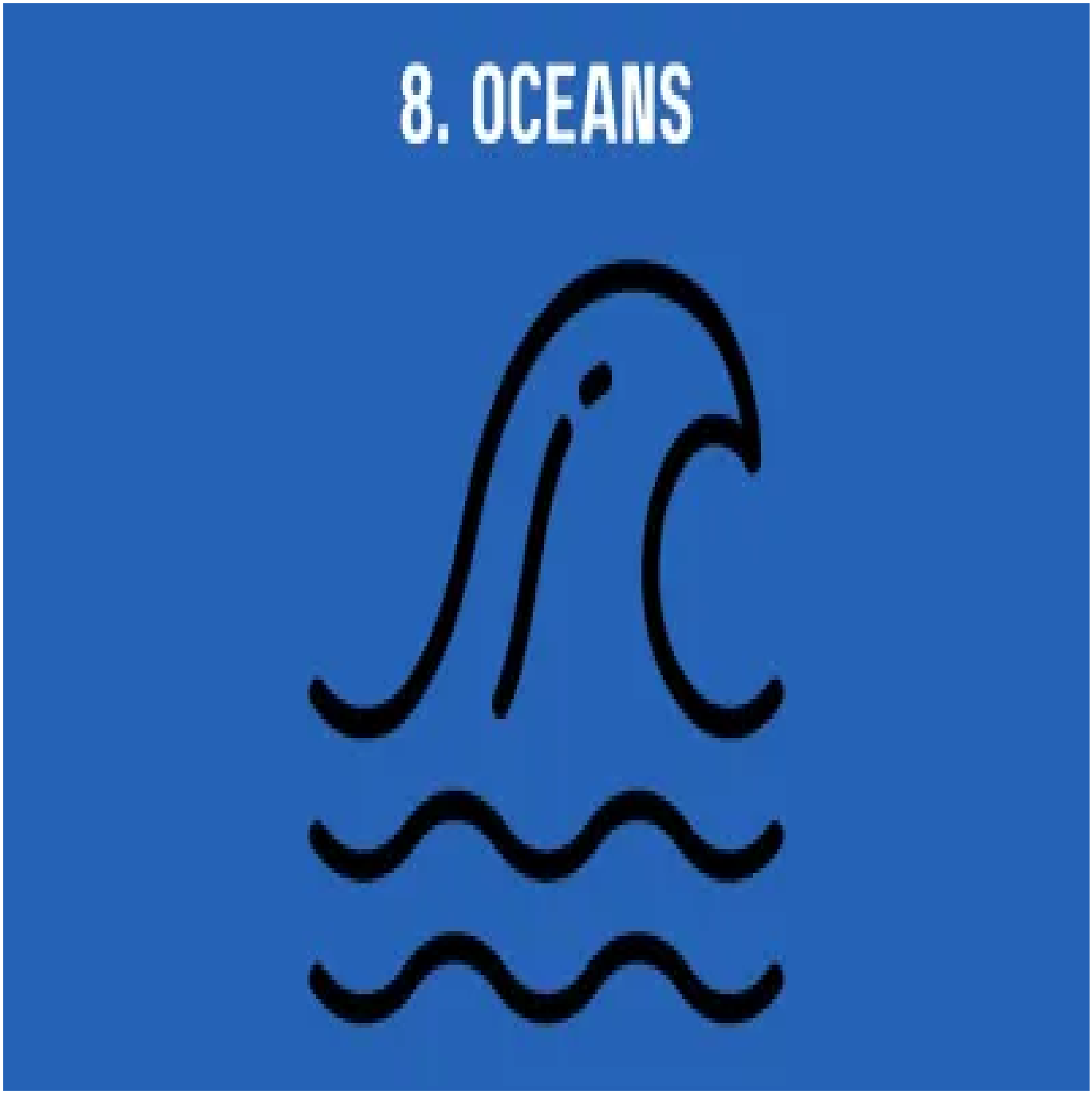


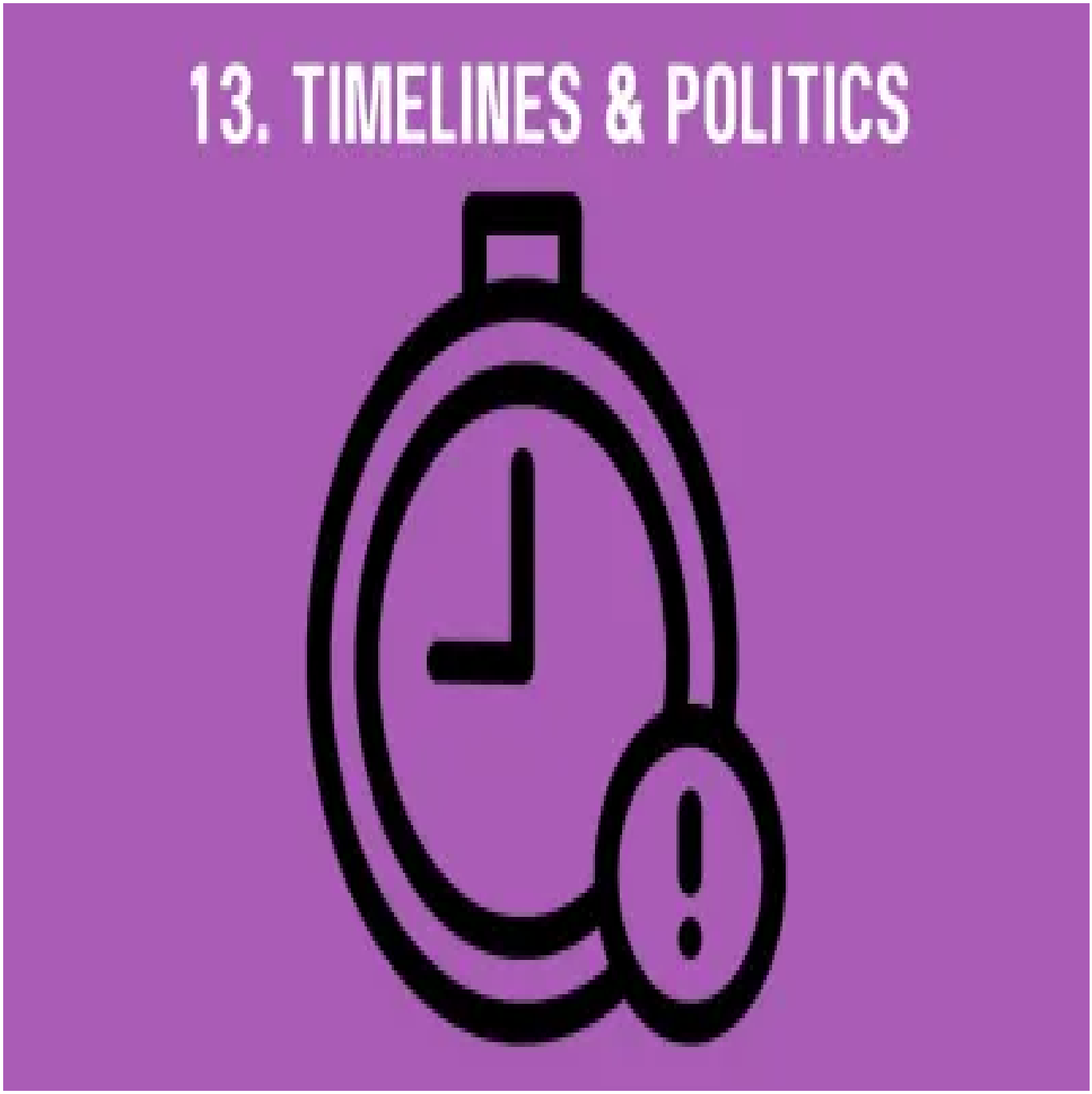
The ocean is largely overlooked

Climate change is exacerbating water insecurity endangering the lives and livelihoods of billions of people

The global food system might be the most important level to act upon to reduce the crisis

Our agricultural system damages our soil, crops and animals, putting us at risk of food system collapse

Air pollution is a leading cause of death globally, especially for children



Climate change is occuring along a non-linear timeline which doesn't match political cycles

Climate is the ultimate interdependency between countries and a geopolitical struggle

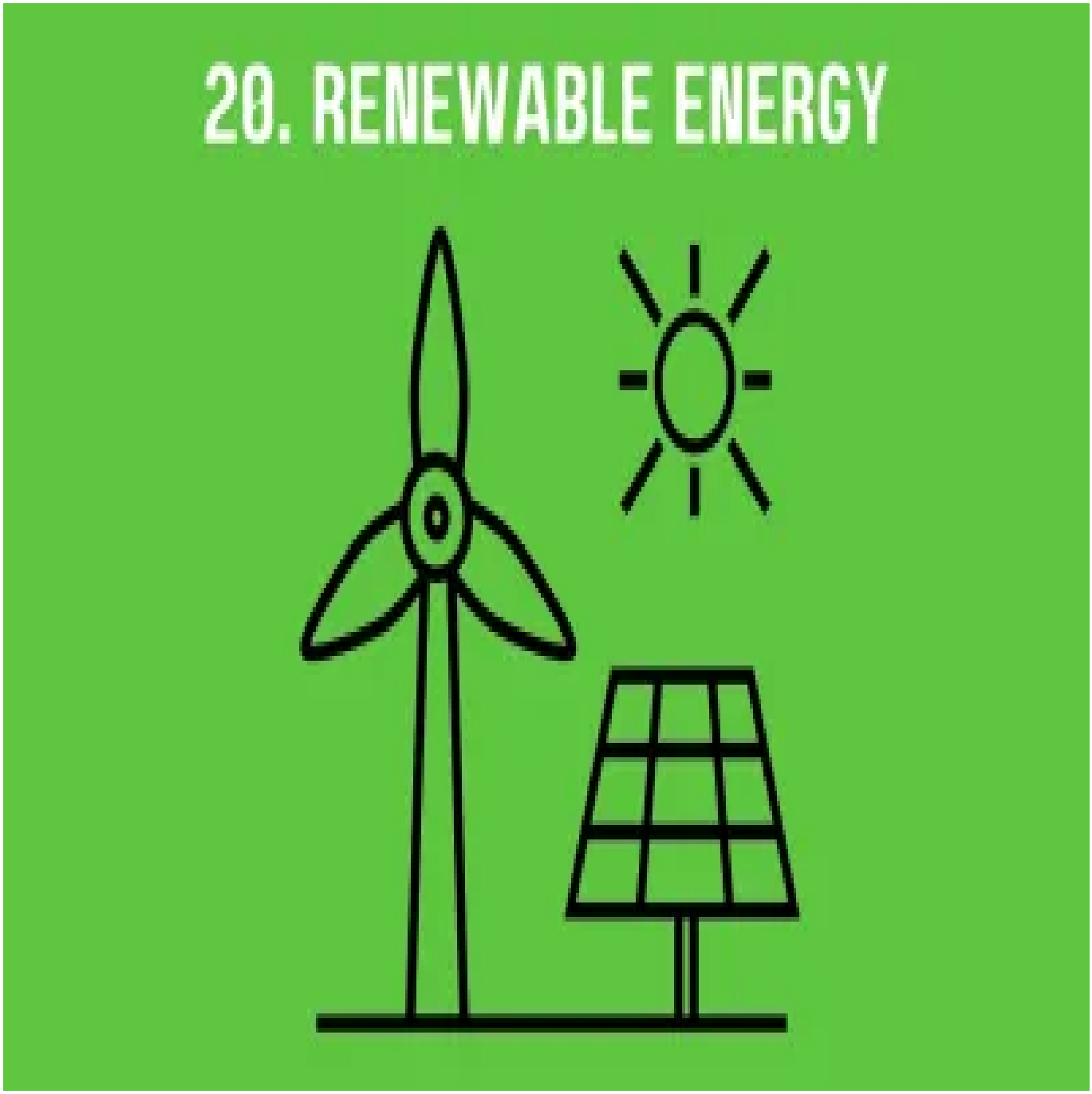
There are critical question related to justice and colonialism at the heart of the problem

Climate change is deeply intertwined with global patterns of inequality and is making poverty worse

Climate Financing

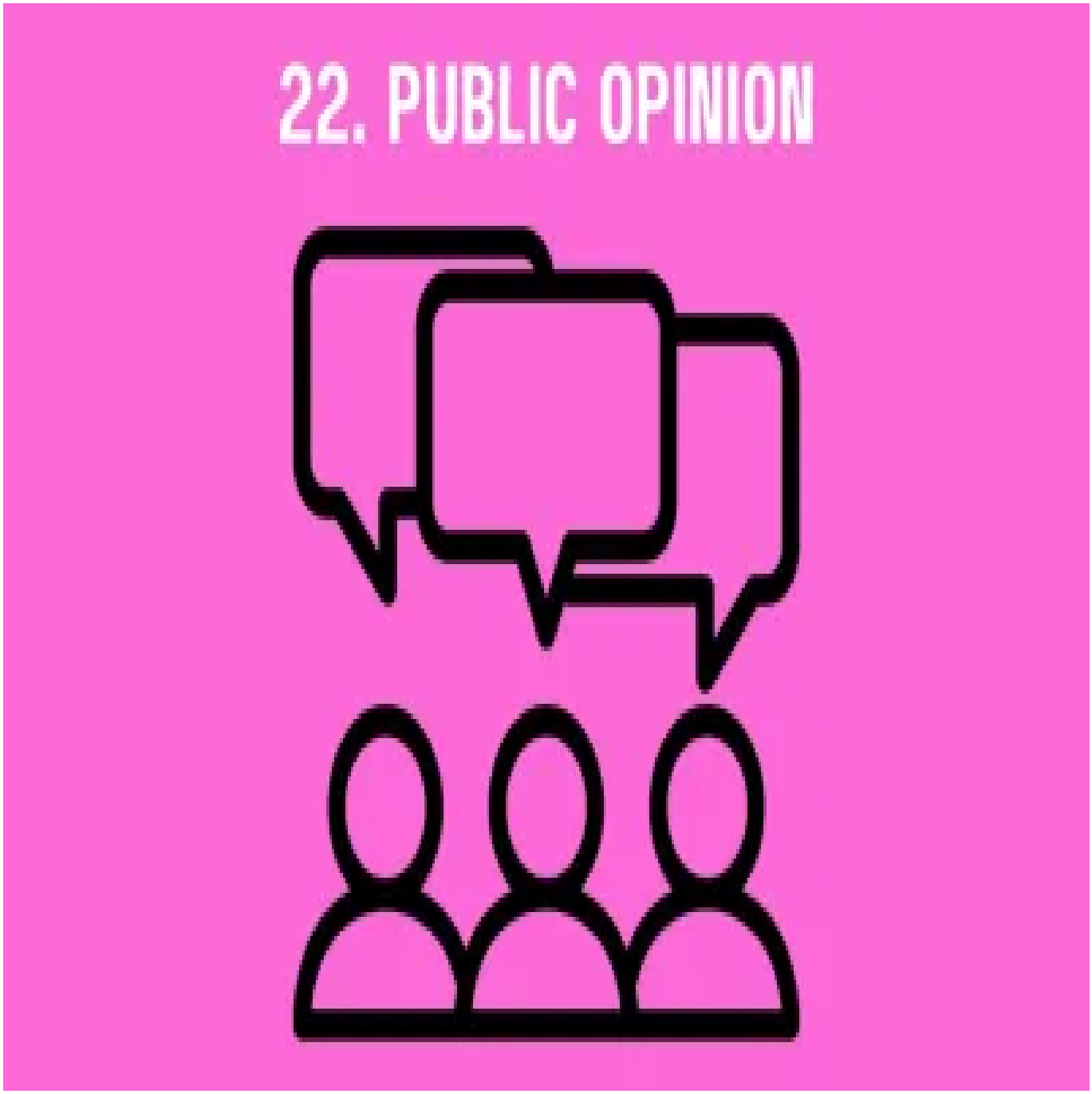
The planetary crisis agenda is plagued by fake solutions promoted to continue business as usual

Recycling is not the cure all it was promised to be

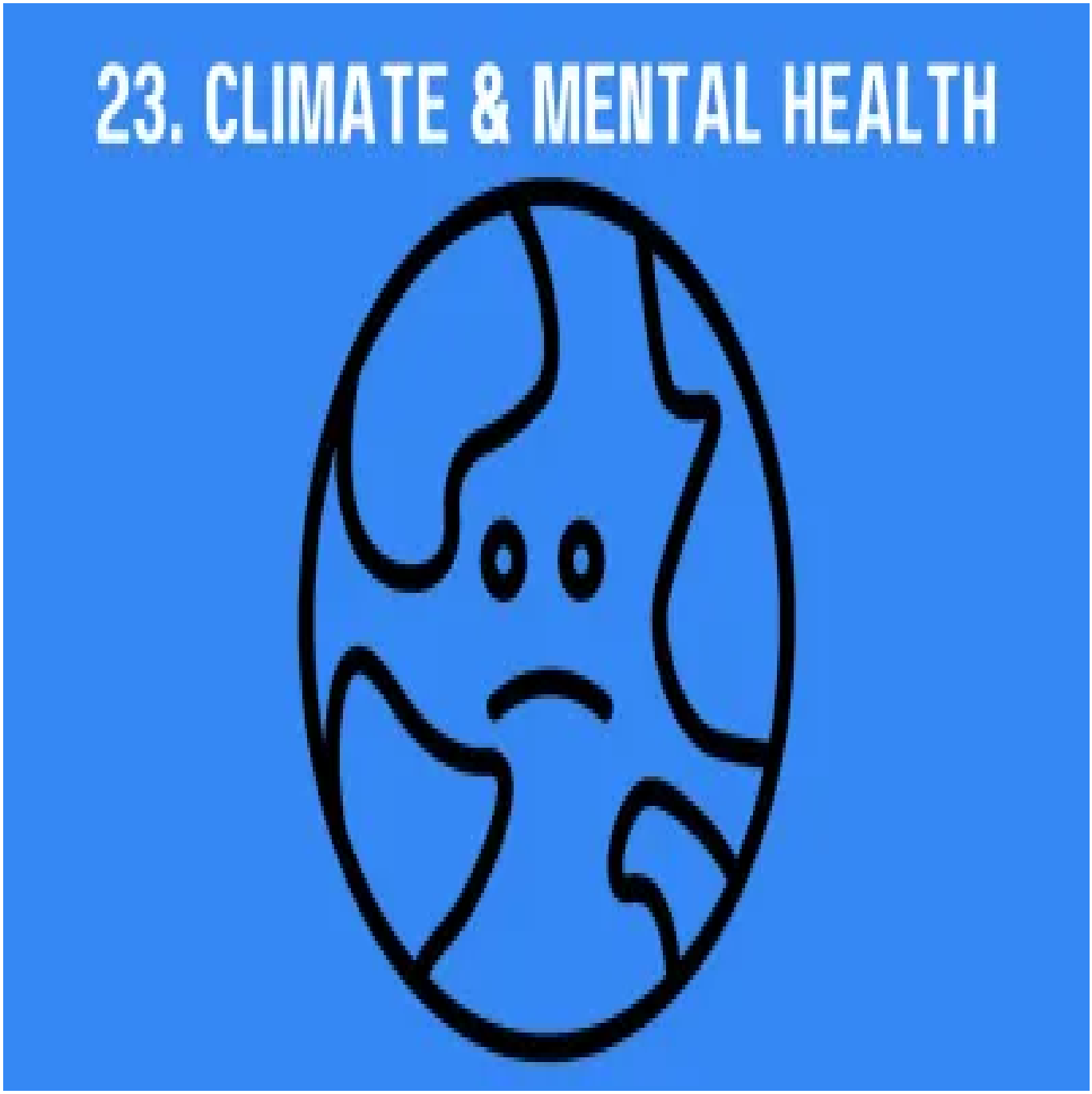


Renewable energy alone will not meet current energy demands

Digitalisation and the ICT sector's environmental impact is rapidly growing and must be addressed



Despite declining trust in institutions public support for climate action is growing



Young people's anxieties about the climate are intersecting with other mental health challenges.

1. Planetary Boundaries

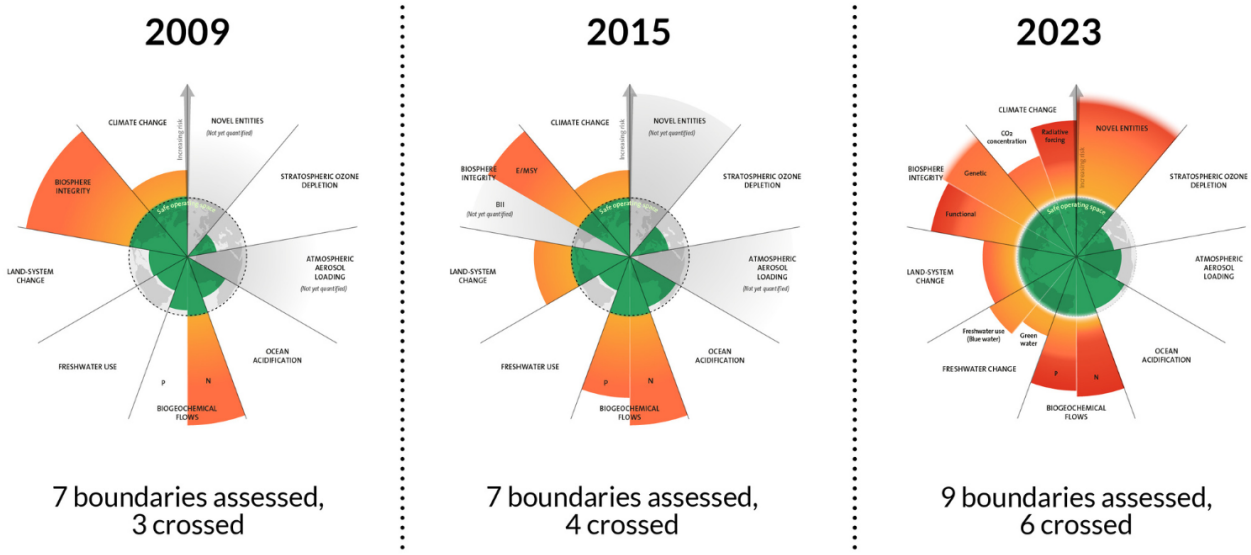
Earth is finite and its limits can't be pushed

Scientists define 'planetary boundaries' across 9 interdependent systems[1] and processes that regulate the stability and resilience of the Earth. When these boundaries are crossed, we jeopardise the interactions of land, ocean, atmosphere and life that together provide conditions for the survival

of humans.

Today, 6 out of these 9 limits have already been crossed.[2]

â□□We are crossing key boundaries in the Earthâ□□s natural system, including climate change, biodiversity loss, and increasing levels of pollution in the air, soil, water and oceans. Climate and environmental hazards, shocks and stresses are already having devastating impacts on the well-being of children globally. **As these boundaries are breached, so too is the delicate natural balance that human civilization has depended upon to grow and thrive."**[3]



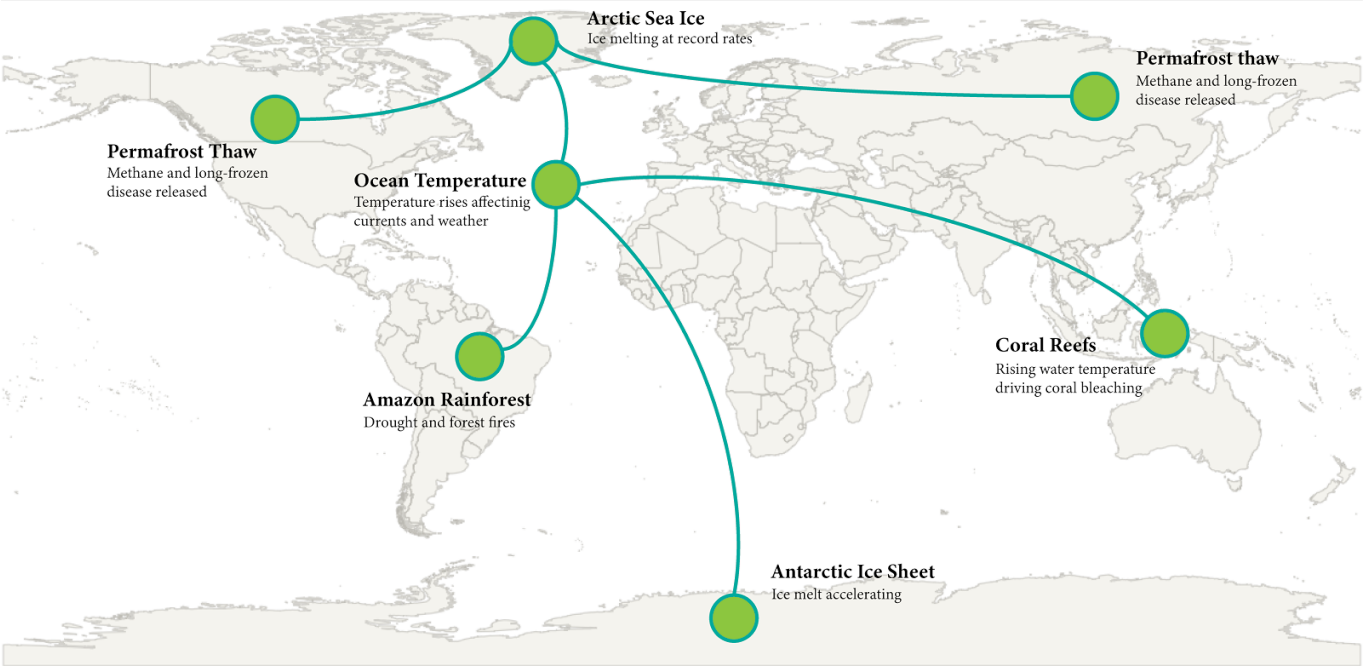
2. Ecosystem Tipping Points

"There are tipping points"[1] for various environmental systems.

These are critical thresholds that, when crossed, lead to large and often irreversible changes in the system towards a new state. In other words, **once these thresholds have been reached, there is no turning back**. Examples include the proper circulation of the atmosphere, the size of the ice sheet and glaciers,[2] the existence of ocean currents like the Gulf Stream, or the size and integrity of the rainforest.[3]Crossing tipping points can precipitate world-scale and abrupt changes to the environment: instead of evolving in a linear and progressive way, systems collapse, â□□unexpectedlyâ□□.[4] This leads into the unknown.

For example, it is now too late to prevent the disappearance of the Arcticâ□□s summer sea ice which will precipitate a now unavoidable increase in extreme weather. Diminishing snow and ice levels, especially in the summer and autumn months has reduced the Arcticâ□□s â□□Albedo effectâ□□- its ability to reflect sunrays back into the atmosphere. This in turn increases the amount of solar

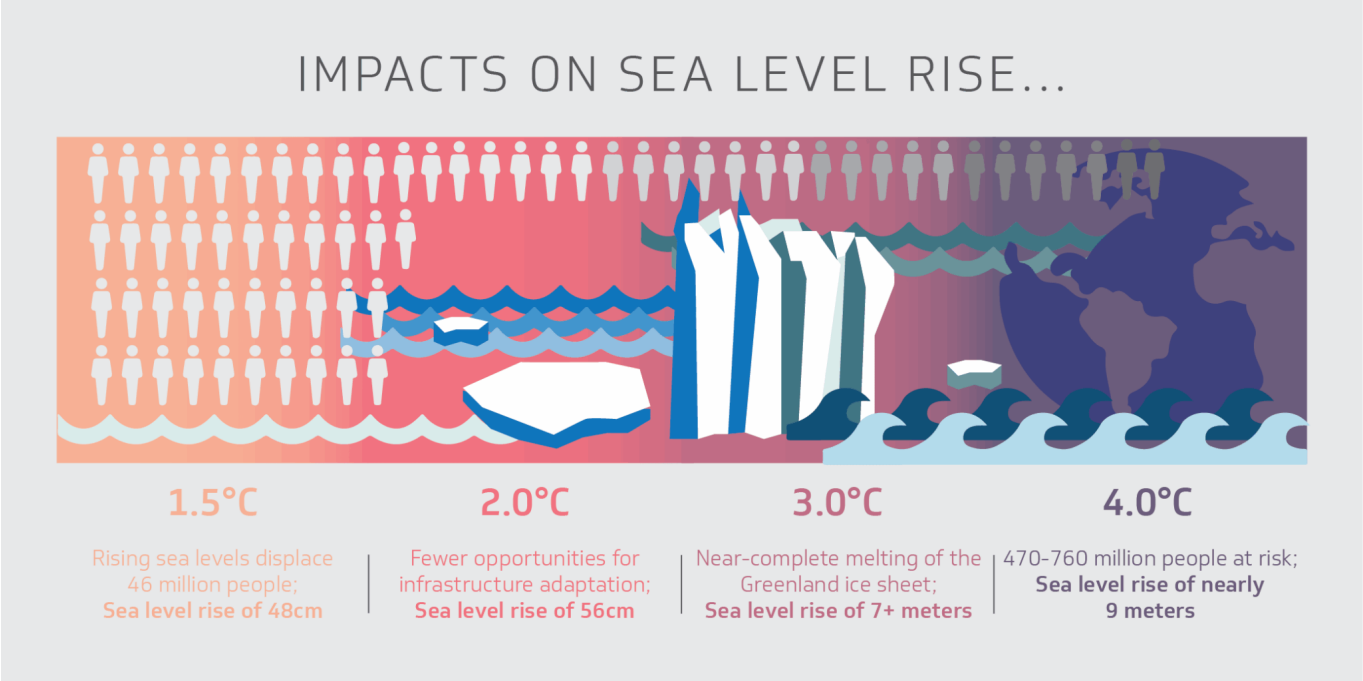
radiation absorbed by the oceans and causes the earthâ□□s surface to heat up.[5] We have already reached this â□□tipping pointâ□□ meaning that an ice-free summer in the Arctic is now inevitable by the 2030s. **No reduction in emissions will prevent this from happening so we must prepare to adapt to the inevitable consequences** which include profound and now irreversible changes for the climate.[6] [7]



3. Net Zero

The world has a "NET ZERO" objective: what does it mean?

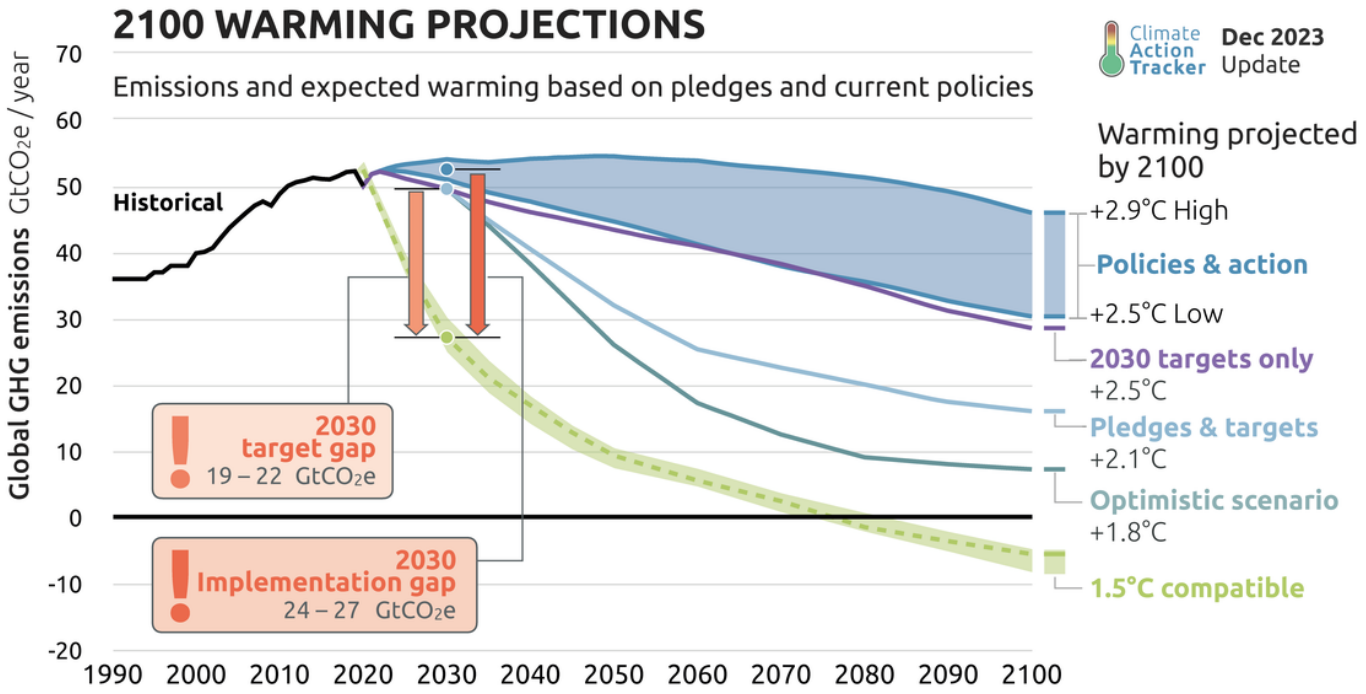
The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in 2015 and entered into force in November 2016. Its goal is to keep the increase in the global average temperature to below 1.5Â°C above preindustrial levels (the initial goal was 2Â°C).[1] **If warming remains below this â□□defense lineâ□□, most regions could potentially avoid the most extreme and irreversible climate effects that would occur with a 2á□¤C increase**.[2] To meet this goal, greenhouse gasses emissions need to be reduced by 45% by 2030 and reach "net zero" by 2050.[3] Net zero is not no emissions, it is when we stop digging a deeper hole: all greenhouse gasses are emitted and absorbed in similar proportions.[4] This means building an economy and societies that emit no more greenhouse gasses into the atmosphere than are permanently removed and stored each year. Although the rate of CO2 emissions has slowed in recent decades, these gradual changes are nowhere close to the reductions needed to limit warming to 1.5Â°C as set out in the Paris Agreement.[5] To reach net zero as rapidly as possible, we need to start decarbonising the economy and our lives, especially the lives of the richest (i.e., highest polluters) on the planet.



4. Carbon Budgets

To reach net zero, we must balance the global â□□carbon budgetâ□□

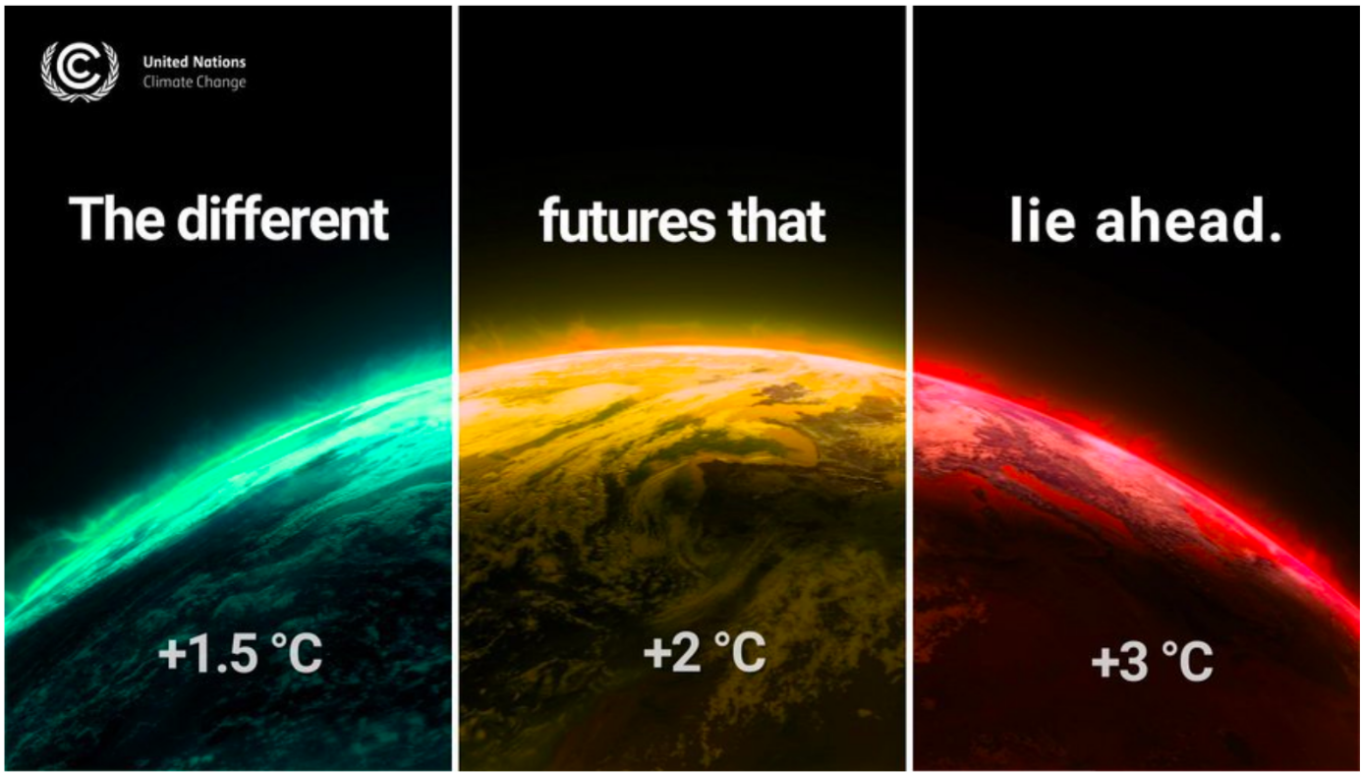
For millennia, humansâ□□ impact on CO2 levels remained relatively stable and sustainable at around 280ppm as our emissions were balanced out by the earthâ□□s CO2 absorption systems. However, **the rapid surge in CO2 emissions caused by humans since the Industrial Revolution has thrown the Earthâ□□s previously sustainable CO2 emission and absorption cycle out of joint**. Fossil fuel burning since 1850 has generated nearly 1.5 trillion metric tons of CO2 pollution which cannot be absorbed by the Earthâ□□s CO2 reservoirs, resulting in rapid global warming and a rise in climate-related extreme weather events.[1] While North America and Europe contributed the bulk of these historical emissions, China and India have also become critical contributors in recent years and are now both among the top three carbon emitters - along with the USA - despite both facing significant climate-related risks and extreme weather events.[2][3][4]
Moreover, the levels of CO2 the Earth is capable of absorbing have shrunk because humans are also irreparably damaging many of the carbon sinks and absorption systems that are vital for keeping even pre-industrial CO2 levels steady. Global land-use changes have affected almost a third (32%) of land in just six decades (1960-2019).[5] These changes include the destruction of vital carbon sinks such as tropical forests[6] and peatlands which cover just 3% of the Earthâ□□s surface but store 30% of all land-based carbon.[7]
Humans are blowing past the Earthâ□□s carbon budget. In other words, we emit a CO2 â□□surplusâ□□ into the atmosphere that the Earth is incapable of absorbing which is exacerbating the greenhouse effect and warming global temperatures towards uninhabitable levels. **To return to a balanced carbon budget, we need to drastically reduce our CO2 output and protect and restore our forests, wetlands, oceans and other carbon reservoirs**.



5. Warming Effects

Targets are to be taken seriously because climate is not weather forecast.

Maintaining warming below 2Â°C is a critical target. A change by 3 or 4Â°C might not sound like much if only assessed against the feeling of the heat, especially during colder months. But for the earth systems, it has catastrophic consequences. In this sense, the earth is analogous to the human body: if your body temperature increases by 4Â°C, you are likely to die. Likewise, the IPCC found that **if global average temperatures warm to 1.5Â°C, there will be â□□catastrophicâ□□ impacts**.[1] The window of time we have to reach this goal is running out. The World Meteorological Organization predicts that we have a 50% chance of reaching the 1.5á□¤C threshold in five years.[2] However, 1.5á□¤C of warming is not a magic number under which all of our environmental problems go away. ***â□□For every 0.1 degrees Celsius of warming above present levels, about 140 million more people will be exposed to dangerous heat.â□□***[3] This is especially concerning for children as early exposure to extreme heat can have lifetime consequences on childrenâ□□s mental and physical health and development:[4] Every additional day with average temperatures above 32Â°C in utero and in the first year after birth is associated with a 0.1 per cent reduction in adult annual earnings at age 30.[5] One study using data from 170 countries found that a 1Â°C increase in temperature in lowincome countries leads to an additional 16.6 children per 1,000 live births dying before 1 year of age.[6] For vulnerable populations and whole ecosystems in the most at-risk regions, staying below the 1.5á□¤C target is a choice between life and death.[7] With the current increase at 1.2Â°C, we are already witnessing unprecedented events: heat waves, wildfires, droughts, and flooding. ''Every tenth of a degree of warming matters in terms of the impacts and damages and suffering that can be avoided in the future.''[8] **If left unchecked, by 2100 high temperatures could cause more deaths than all infectious diseases combined**[9].



6. Biosphere Crisis

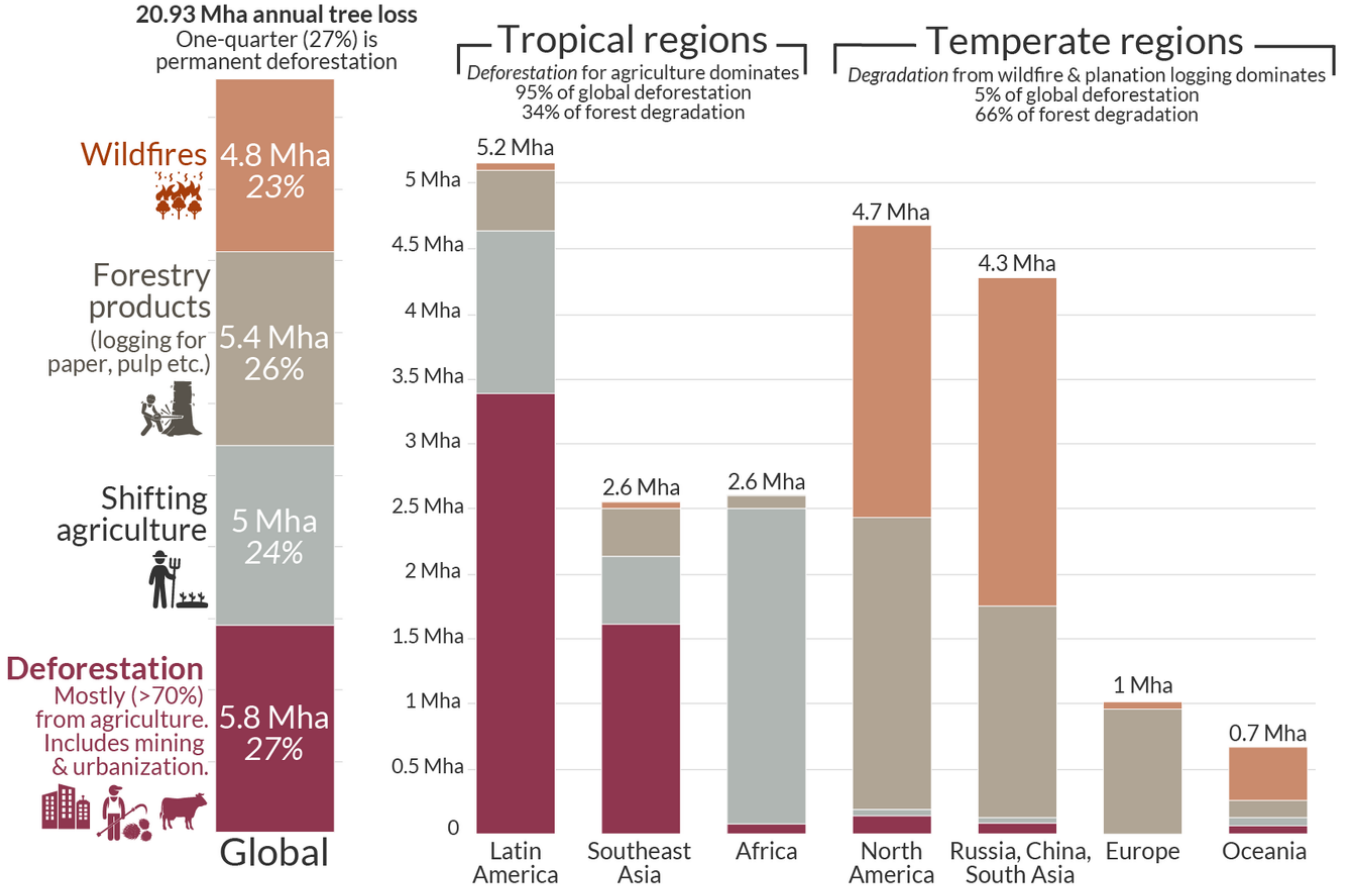
The complete biosphere crisis is overshadowed by the term "Climate"

The world has already lost 80% of its forests and weâ□□re continually losing them at a rate of 375 km2 per day.[1] Global wetlands have declined by at least 35% since 1970[2] and every hour, 1,692 acres of productive dry land become desert (12 million hectares per year).[3] We have a garbage island floating in our ocean - mostly comprised of plastics - the size of India, Europe and Mexico combined.[4] Close to 90% of the worldâ□□s marine fish stocks are fully exploited, overexploited or depleted.[5] The homes of 200 million people will be below sea level in 70 years.[6] **The planetary crisis goes far beyond just â□□climateâ□□ - plants, animals and entire ecosystems are at risk of disappearing from the biosphere crisis we face** while the towns, villages and entire ways of life that rely on these ecosystems risk being lost along with them.[7]

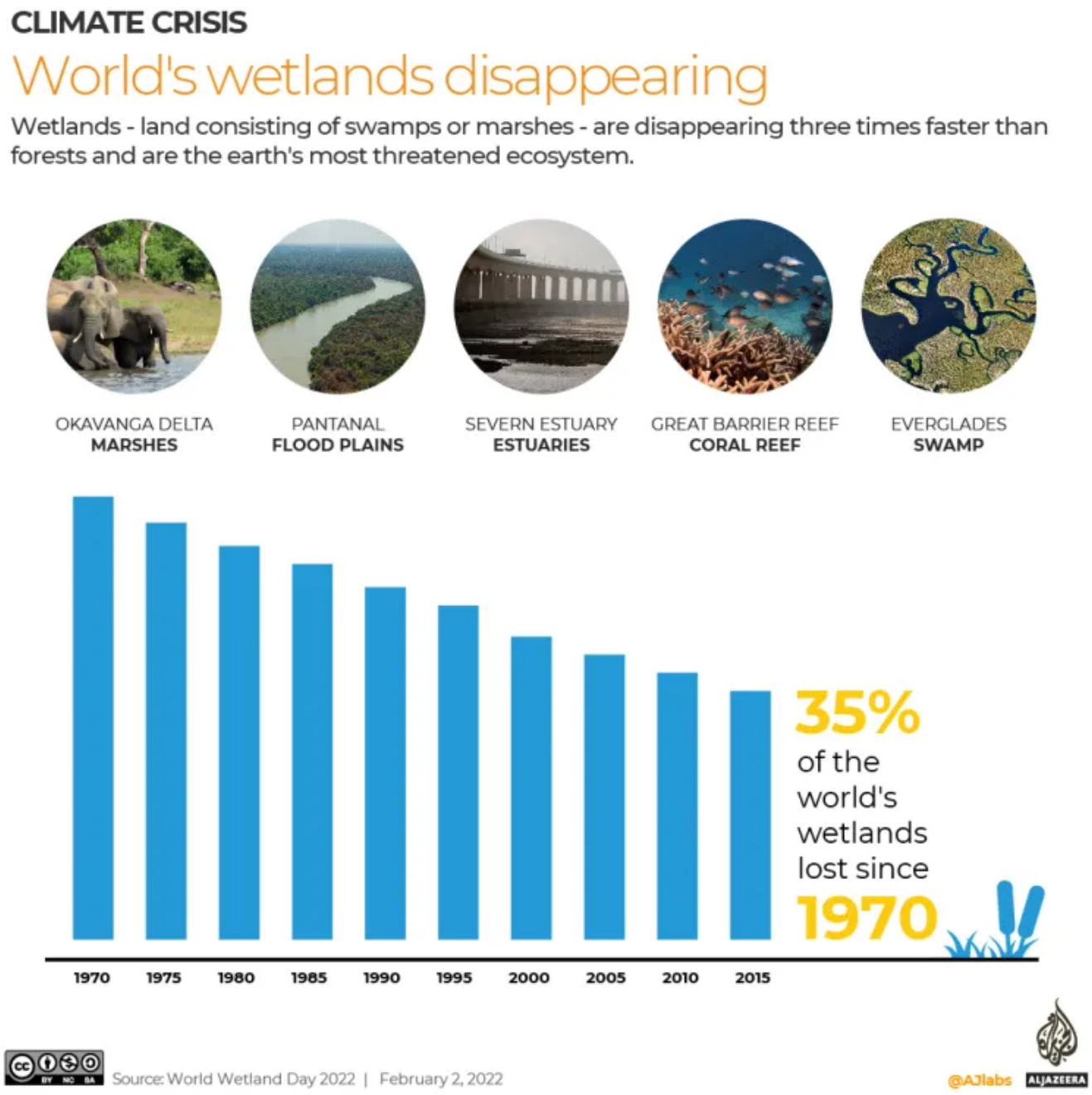
Global forest loss: deforestation vs. forest degradation

Our World in Data

Forest loss is defined as the combination of deforestation and forest degradation.
Deforestation involves the abrupt transition from land with trees to land without trees with no subsequent regrowth.
Forest *degradation* refers to thinning of the canopy and loss of carbon without a change in land use. Forest is expected to regrow.



Data source: Philip Curtis et al. (2018). Classifying drivers of global forest loss. *Science*.
OurWorldinData.org – Research and data to make progress against the world's largest problems.



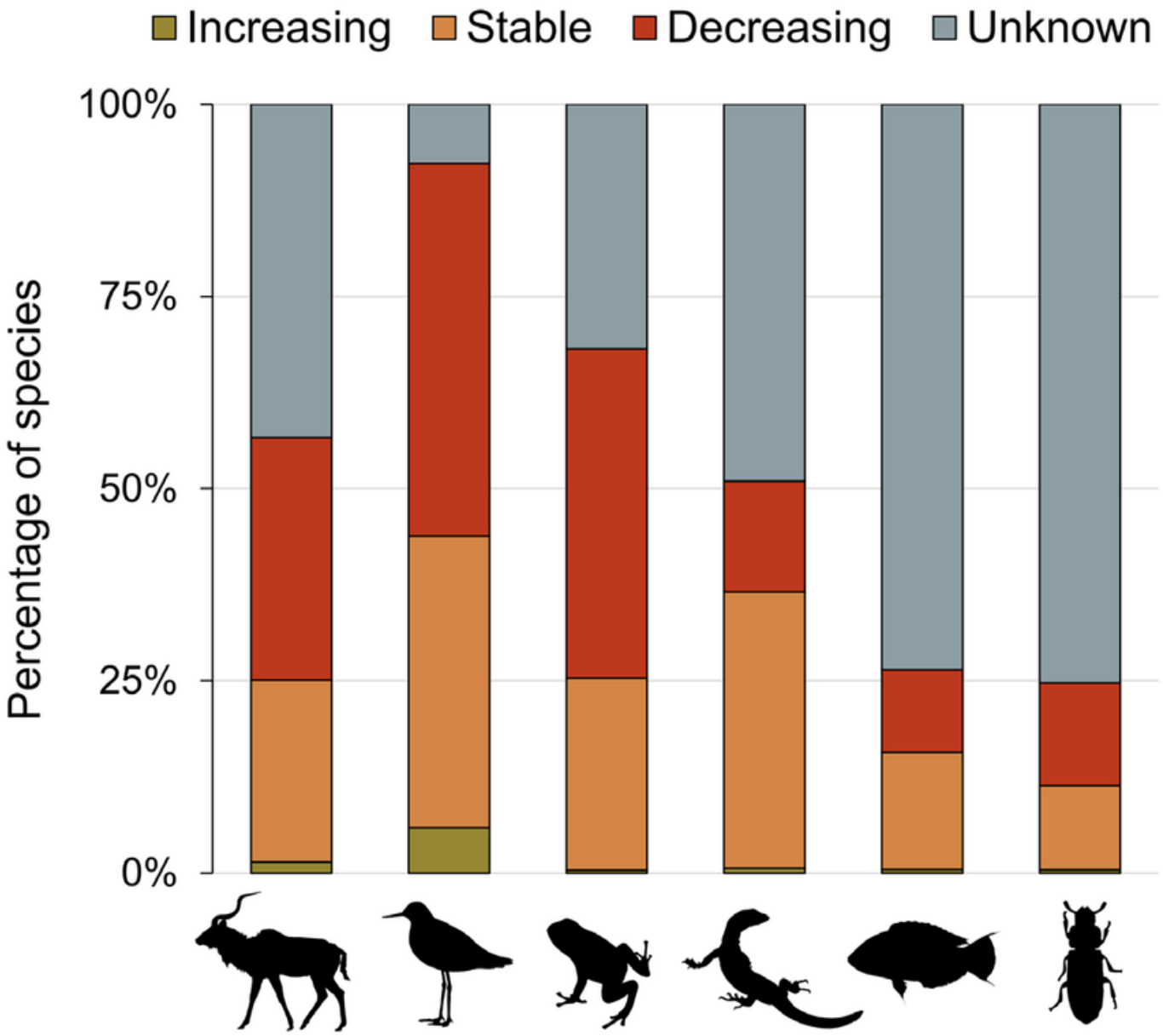
7. Mass Extinction

There is a mass extinction going on.

The 6th mass extinction (also referred to as the Anthropocene extinction or sometimes the Capitalocene extinction to locate it within the context of capitalism and colonialism)[1] is an ongoing event where **a large number of living species are threatened with extinction or are going**

extinct because of the environmentally destructive activities of humans, particularly the habitat destruction and overexploitation of land, water and energy.[2] This is the first time one species alone (humans) has caused an extinction event.

Currently, 40% of all land has been converted for food production. **Agriculture is also responsible for 90% of global deforestation and accounts for 70% of the planetâ□□s freshwater use**, devastating the species that inhabit those places by significantly altering their habitats.[3] The use of chemicals in largescale agriculture also renders soils, water and habitats unlivable for animals.[4] **Where and how food is produced is one of the biggest human-caused threats to species extinction and our ecosystems**.[5] The interdependency of species creates a domino effect and acceleration of the disappearance. These, in retroaction, will severely impact our ability to produce food (especially the loss of insects). Extinction rates are very difficult to state, but predictions are getting worse every year. Research has established that the current rates of extinction are between 1,000 to 10,000 times higher than â□□backgroundâ□□ extinction rates.[6] **Some estimate a 69% decline of global animal populations already**.[7] The last extinction of this magnitude was 65.5 million years ago.[8]



Percentage of species per taxonomic group which have decreasing, stable, increasing or unknown/unassessed (NA) population trends. Each group is represented by a silhouette from left to right; mammals (N = 5969), birds (N = 11,162), amphibians (N = 7316), reptiles (N = 10,150), fishes (N = 24,356) and insects (N = 12,161). Data were sourced from the IUCN Red List (www.iucnredlist.org).

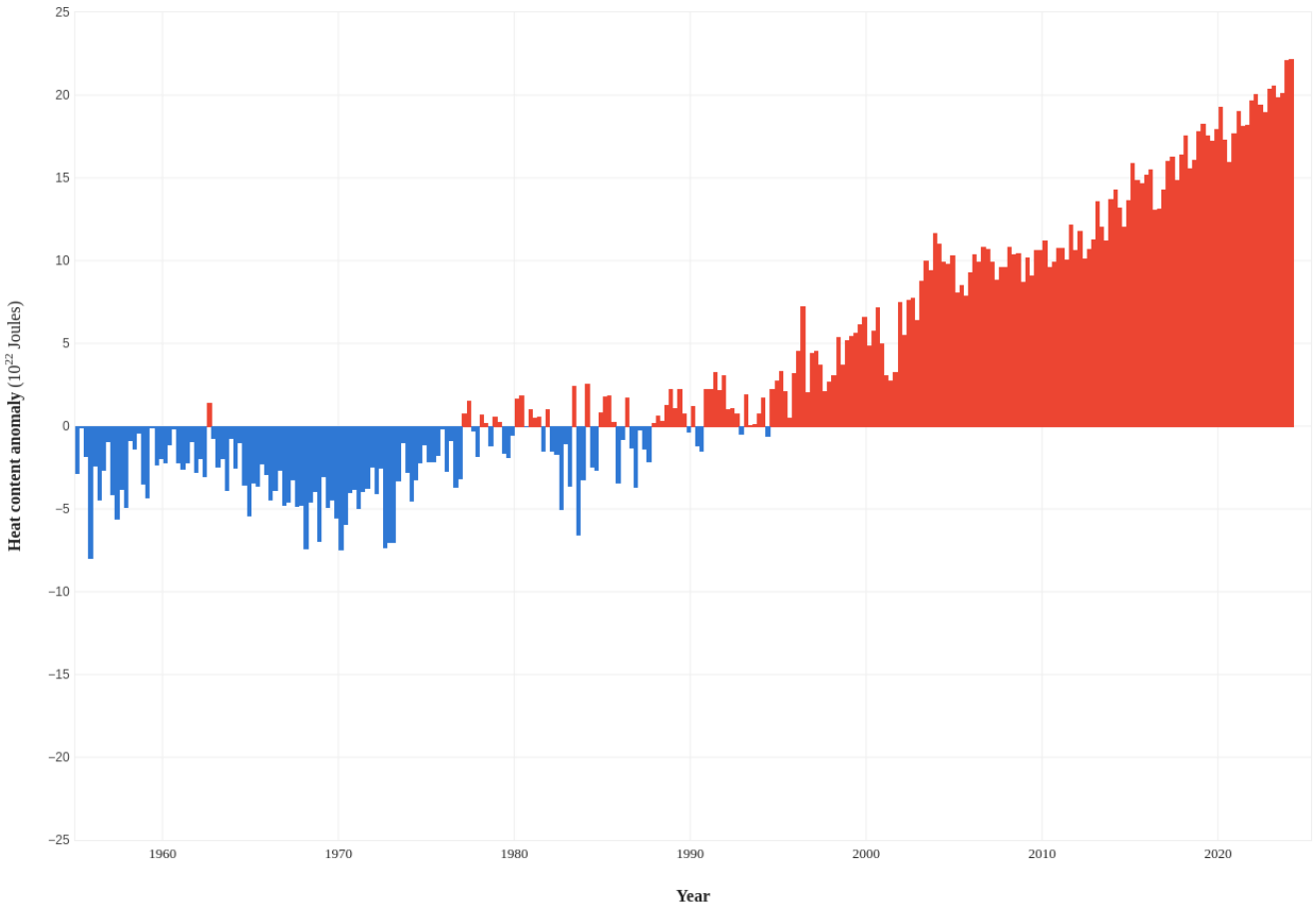
8. Oceans

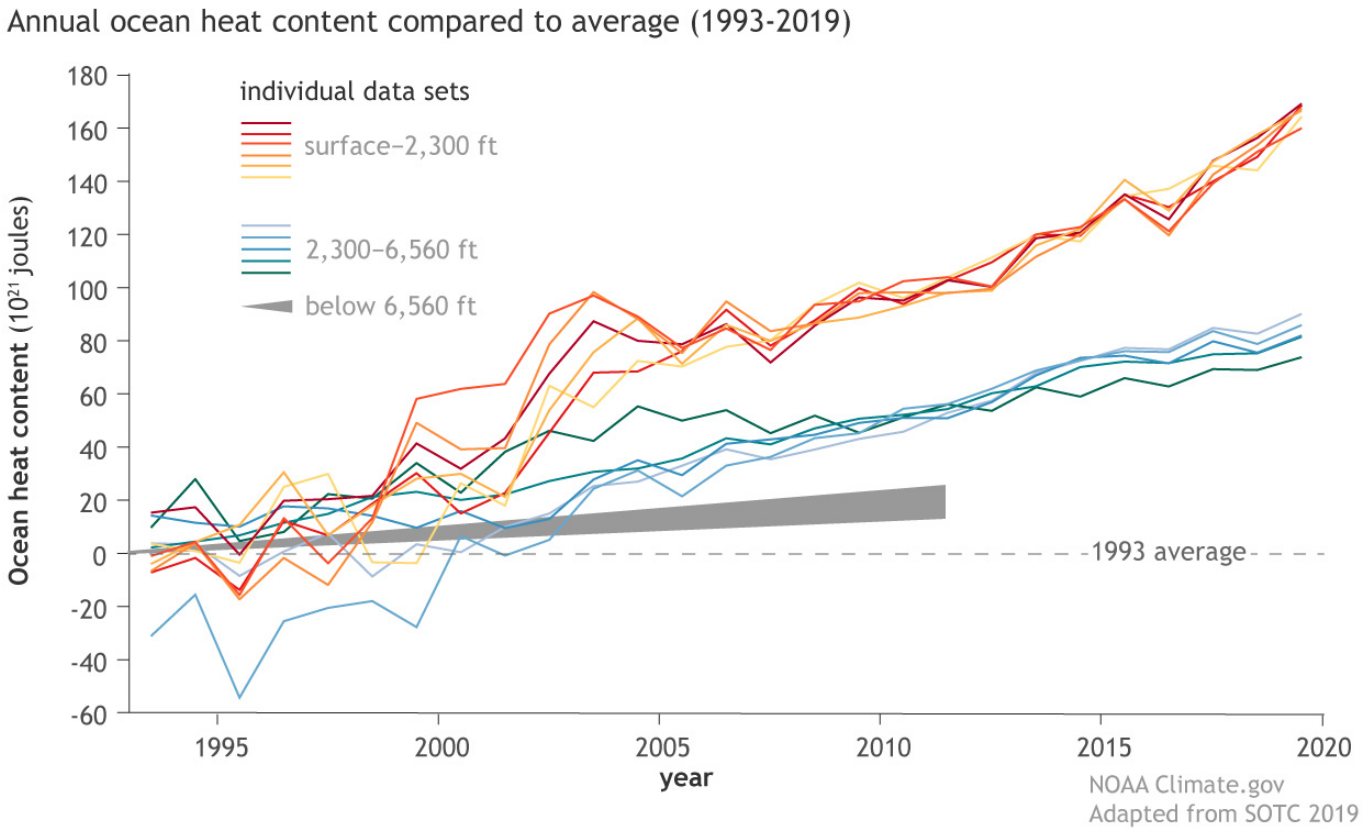
The ocean is largely overlooked.

The ocean, covering 70 percent of the Earthâ□□s surface,[1] is **the planet's largest ecosystem, and is home to up to 80 percent of all life in the world**. It generates 50 percent of the oxygen we need, absorbs 25 percent of all carbon dioxide emissions[2] and captures 90 percent of the additional

heat generated from those emissions.[3] **It is not just our greatest climate regulator and â□□the lungs of the planetâ□□ but also its largest carbon sink - a vital buffer against the impacts of climate change**. In the words of Captain Watson, ''If the ocean dies, we die. It is the life support of the planetâ□□.[4] Yet, most of the ocean is experiencing significantly increasing cumulative impact, in particular, due to climate change but also from fishing, land-based pollution and shipping. These translate into the destruction of habitats and wildlife, collapsing ecosystems and loss of the ability to trap carbon. **Increasing ocean heat is contributing to sea level rise, ocean heat waves, coral bleaching,[5] and melting of ocean-terminating glaciers and ice sheets** around Greenland and Antarctica. Increasing frequent and severe marine heatwaves result in â□□underwater infernosâ□□ in which marine flora and fauna are â□□burned to death.â□□[6] Heat already stored in the deeper layers of the ocean will eventually be released, committing Earth to at least some additional surface warming in the future. [7] This **excess heat will affect ocean currents, having a knock on effect on global temperatures, rain patterns, agricultural production and subsequent food supplies for billions of people.[8] Moreover, 95% of our oceans remain unexplored by humans so the true scale of the impact of human activities on our oceans is unknown**.[9] There are entire marine ecosystems which may provide as-yet-unidentified vital services for the planet that human activities may be harming.

OCEAN HEAT COMPARED TO AVERAGE





9. Water Security

Climate change is exacerbating water insecurity, endangering the lives and livelihoods of billions of people.

Water security is the capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socioeconomic development, for ensuring protection against waterborne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability. This security is becoming increasingly threatened around the world as a result of climate change, population growth and harmful human actions.[1] 436 million children live in areas with high or extremely high water vulnerability- the combination of physical water scarcity and inadequate infrastructure for drinking water services â endangering their lives and futures.[2] **Societies around the world face growing water insecurity as they struggle to balance rising demand with a steady, reliable supply in a changing climate**. As riverbeds run dry, frequent droughts and desertification decimate agricultural land and severe floods contaminate fresh water supplies, increased demand for clean water, notably from urbanising areas, puts pressure on local water sources. Poor and marginalised communities, especially those struggling to access even basic drinking water services in normal times, are often the hardest hit, underscoring the need to safeguard access to drinking water for these communities in the face of increased competition for drinking water resources.[3]

Most of the water we use every day is not consumed through our daily drinking, cooking or showering, it is instead âhiddenâ in the food, goods and services we buy, or more specifically in their production and supply chains. [4] Producing one pair of jeans requires 3,781 liters of water,[5] a

kilo of chocolate needs 17,000 liters of water[6] and 1,924 liters of water is needed to produce 1 kilo of pasta.[7] While a cup of coffee may appear to use up only a few hundred milliliters of water, 140 additional â□□hiddenâ□□ liters were used up in the production of the coffee needed for just one cup.[8] Because these water needs are hidden in the production processes or along the supply chain which usually involves multiple countries and stakeholders, it is often excluded from national water use measurements.[9] For example, only 5% of The Netherlandâ□□s water footprint was â□□Dutch water,â□□ the rest came from the production of food, goods and services imported from other countries which are not included in national statistics.[10] By importing these products we participate in the virtual water trade in which we reap the benefits of the vast amounts of water used to produce goods in other countries.[11]

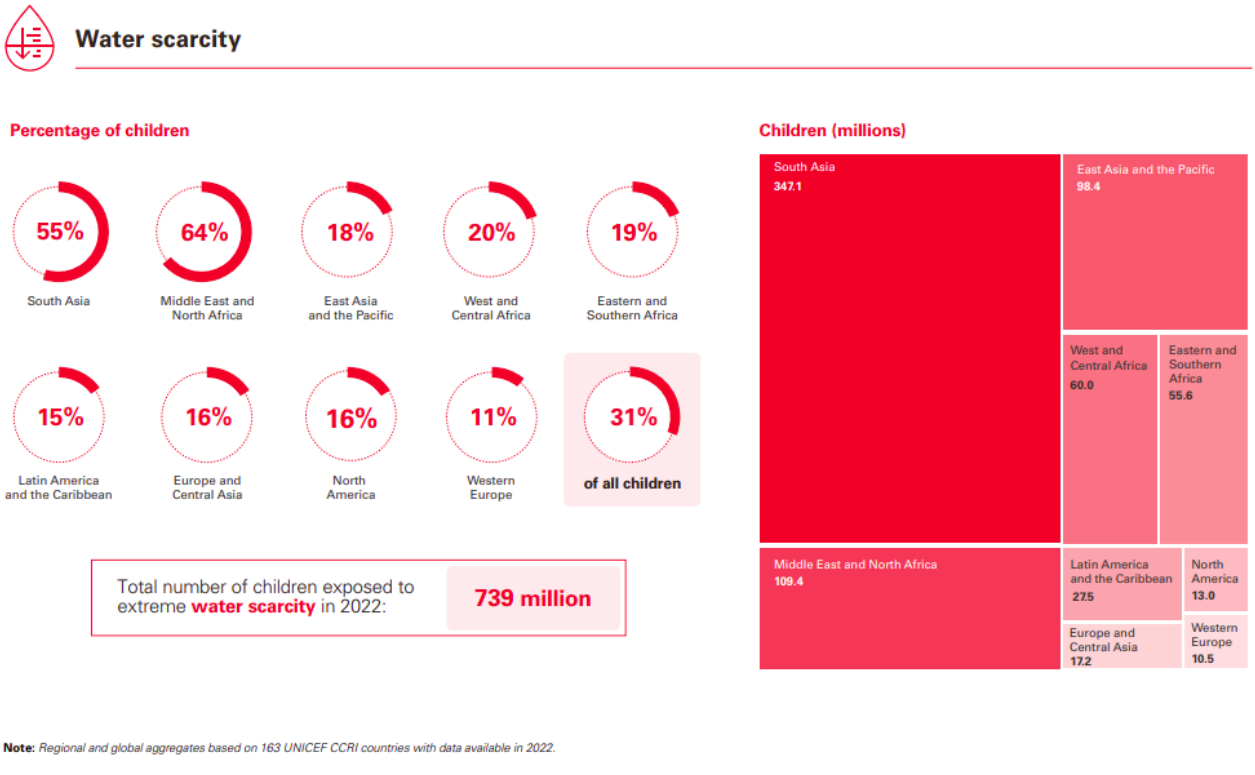
Roughly 70% of the worldâ□□s freshwater is used for agriculture. However, agricultural water use can vary hugely depending on where, when and how crops are grown; purchasing out-of-season fruits and vegetables can require significantly more water than buying them in-season due to the artificial irrigation involved.[12] A suitable climate reduces a cropâ□□s blue water footprint (the fresh surface and ground water used in production); for example, cotton grown in the southern parts of the USA will have a lower water footprint than cotton grown in Uzbekistan due to the USAâ□□s more suitable climate and reliance on rain-fed (green water) irrigation in comparison to Uzbekistanâ□□s more arid climate and greater reliance on blue water irrigation.[13]

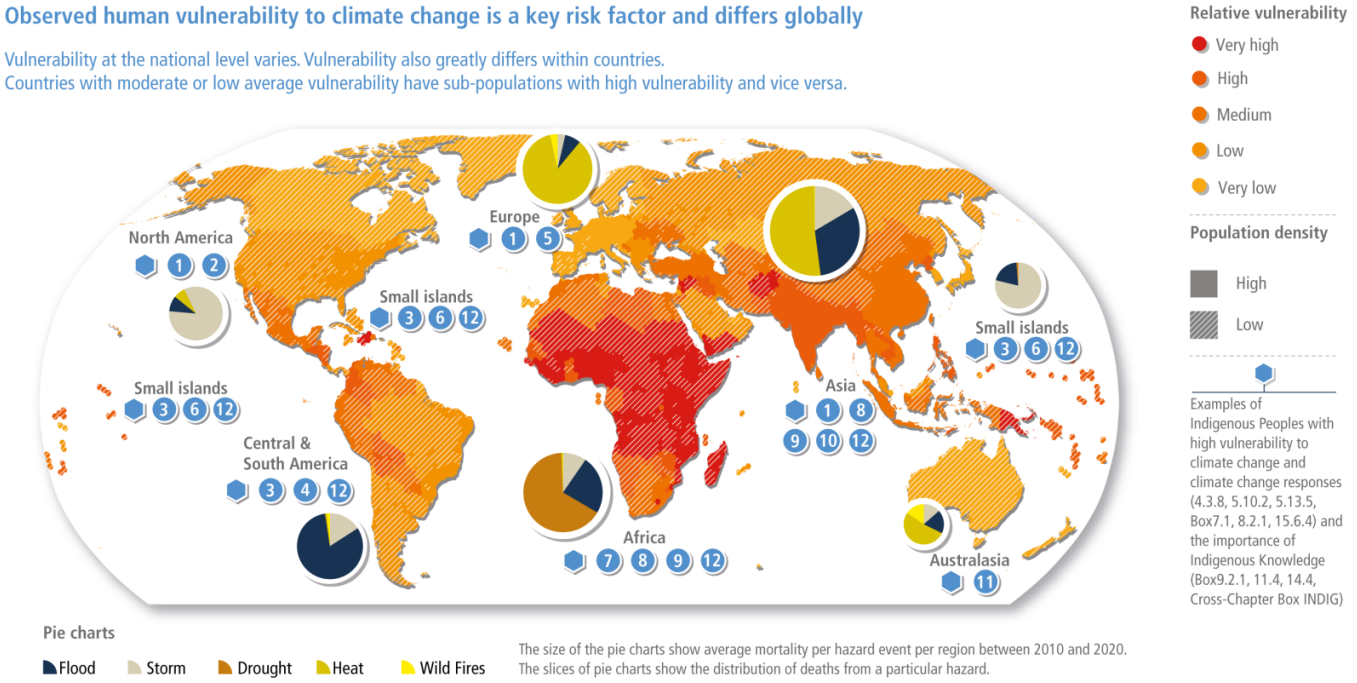
Unfortunately many water intensive cash crops such as almonds, avocados and cotton, are grown in arid regions that are already waterstressed. In importing these crops, we are exporting the environmental consequences of their production and more specifically the high water uses and subsequent risk of water scarcity and drought posed by their production.[14]

Although UNICEF and other organisations have made significant progress in expanding and improving WASH facilities around the world,[15] **water insecurity is projected to get worse in the coming years due to population growth, a subsequent rise in demand, and the climate crisis**. For example, the risk of an event similar to the unprecedented 2022 drought in the Horn of Africa, which affected more than 20 million children[16] and led to at least 15,800 excess deaths of children under 5 years old,[17] has been estimated to have become 100 times more probable due to human-made climate change.[18] Drought events and subsequent water scarcity that would previously have been considered exceptional are becoming the new normal.[19]

Women and children are particularly vulnerable to water insecurity as they are often the ones responsible for collecting it and thus must travel further to find reliable water sources, which often means less time at school, impacting student enrolment, attendance and performance, particularly for girls.[20] Water scarcity- the physical availability of water- endangers food stocks and increases the risk of food insecurity including for children. Drought conditions affect childrenâ□□s nutrition and health, exacerbating the impact of water scarcity.[21] Lax industrial regulations, waste mismanagement and weak environmental regulations also pose a risk as pollutants from agricultural (herbicides, insecticides and fertilisers) and industrial processes (heavy metals), as well as poorly managed human and animal waste disposal seep into freshwater supplies contaminating vital sources for decades and even centuries, decimating local wildlife and leaving both human and animal populations reliant on fewer and fewer clean water sources. Furthermore, as glaciers continue to disappear due to global warming, two thirds of our freshwater supply disappear with them, either evaporating into our atmosphere or melting into our oceans.[22]

As water scarcity and subsequent insecurity become more widespread, the number of children exposed will rise from 953 million in 2022 to 988 million in 2050.[23] Intense water scarcity could displace 700 million people by 2030, causing high water stress in regions elsewhere due to an influx of water refugees which puts pressure on existing local water systems, further exacerbating and expanding the crisis and increasing the risk of tensions with host communities.[24] **Rising demand for fresh water coupled with diminishing and at-risk supplies is also increasing the threat of water-related conflict around the world, posing even greater risks to children.**[25] Water security requires safe, affordable, sustainable drinking water for all that is resilient to threats such as extreme weather events and climate shocks. As a shared resource, **sustainable and equitable management of freshwater resources requires cooperation and trust** within and between national, regional and local authorities, communities, businesses and households.[26] [27]





10. Global Food Systems

The global food system might be the most important lever to act upon to reduce the crisis, and eating animals has the greatest impact.

Itâ□□s recently been estimated that **the global food system altogether is responsible for between one quarter**[1] **and one third of greenhouse gas emissions**,[2] [3] second only to the energy sector,[4] and is the underlying reason that beyond 24,000 of the 28,000 plant and animal species are at risk of extinction.[5] Specifically, our appetite for meat is destroying the planet. 80 billion land animals are raised and killed for meat every year - a number that doesn't even account for all the sea animals.[6] **Raising livestock for human consumption is the leading cause of biodiversity loss; uses 70% of agricultural land; is the leading cause of deforestation; generates 15% of all GHG emissions; is the number one source of methane** (methane alone is the cause of over 25% of global warming[7]), **and contributes significantly to water pollution**. [8]

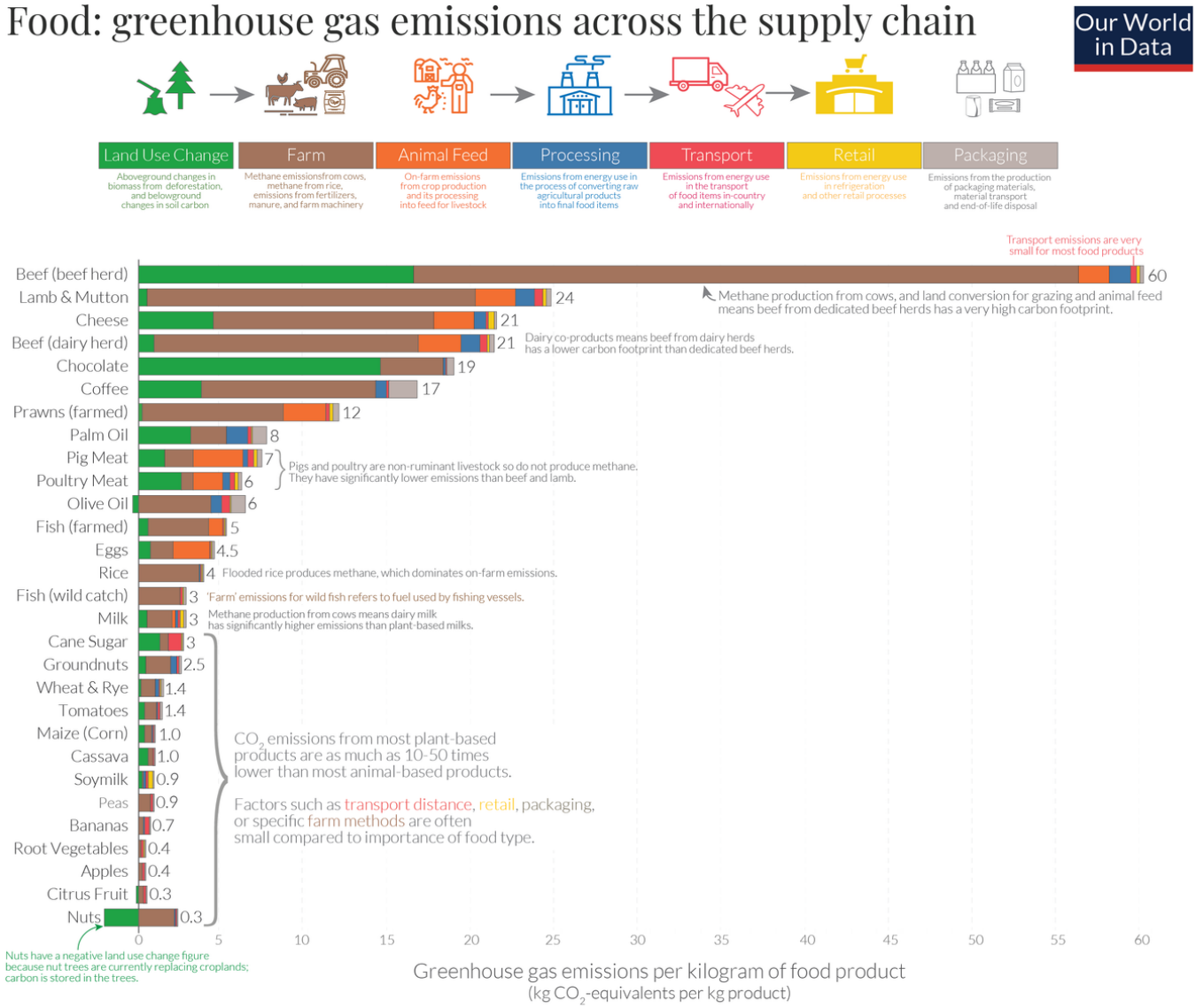
Other negative externalities include a significant health cost[9] - especially chronic diseases which increase when eating meat -, as well as farmersâ□□ debts,[10] loss of identity,[11] and high suicide rates in the animal factory farming sector.[12] This sector is also a significant contributor to antimicrobial

resistance (e.g., 80% of antibiotics imported by the US are used for industrial animals[13]) because animalsâ living conditions don't allow animals to survive without it. **Antimicrobial resistance in animals creates drug-resistant pathogens which pose a risk to human health by making infections harder to treat and surgery much riskier**.[14] It also increases the risk of the next pandemic: most viruses monitored as dangerous today are related to animals, with particular concern over fears of zoonotic diseases[15] (e.g., new versions of avian and swine flus). This risk is further compounded by human-induced ecosystem changes and the warming climate which have increased the geographical spread of vector-borne diseases such as malaria, Zika virus, dengue fever and Lyme disease.[16] One study estimated that over half of the worldâs population are now at risk for dengue fever with this figure expected to grow as a result of climate change and land-use change.[17]

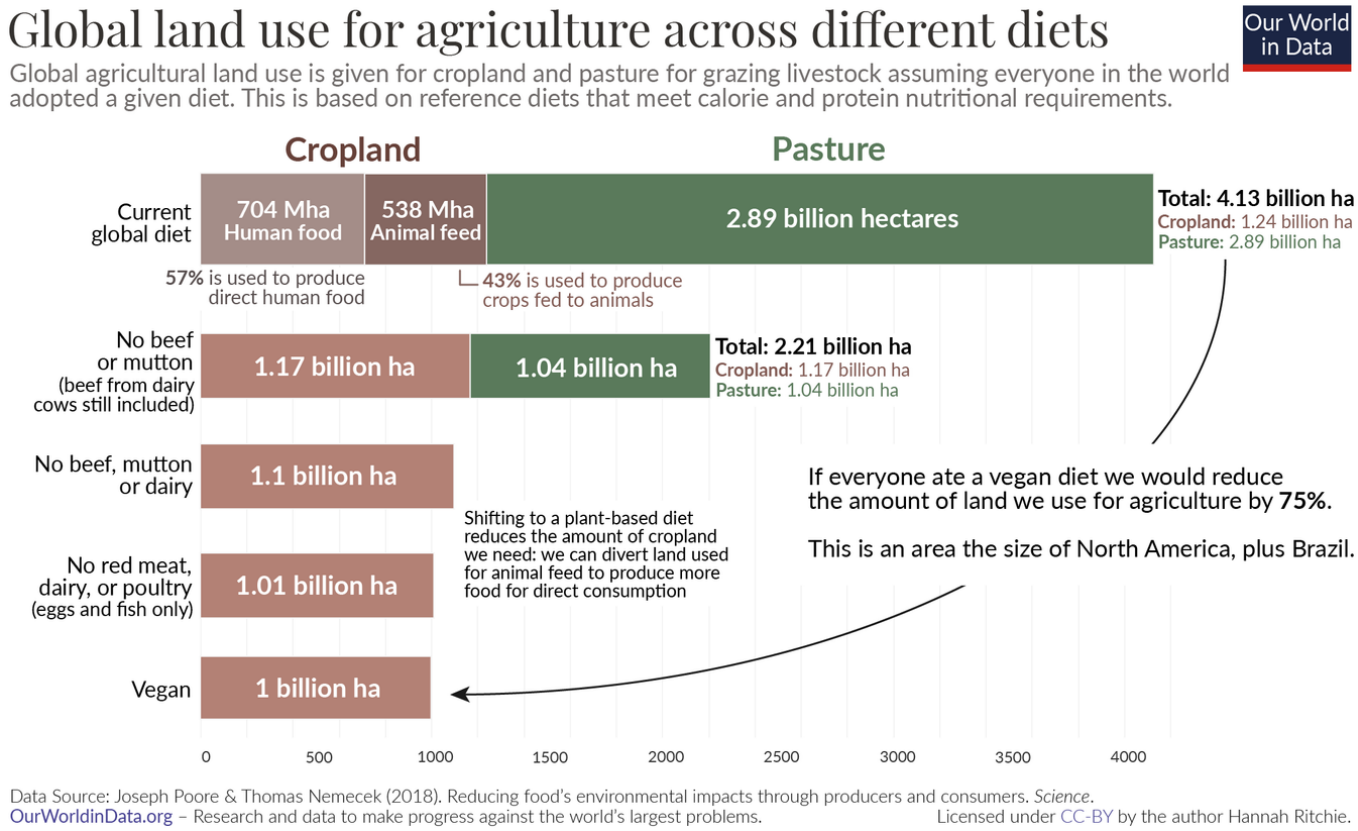
Most of the 80 billion animals slaughtered for consumption per year are chickens.[19] Yet, the environmental impact of cows is far greater due to the amount of land cattle and dairy farming requires. In fact, the protein and energy efficiency of all animals, especially cows, is extremely low in comparison to plants. The land used to grow crops to feed animals is not available to feed humans directly. **On average, it takes 100 times more land to produce an animal calorie than a plant calorie, and 40 times more land to produce an animal protein than a plant protein**.[20] To produce a calorie of beef, 98% of the calories sent as input to raise the animal are lost.[21] This is not an affordable cost when the risk of hunger is on the rise and the availability of energy is threatened. **Using this land to grow energy and calory-efficient crops for direct human consumption rather than animal feed will significantly improve global food security and markedly lower GHG emissions from food production.**[22]

Eating plants is by far better for the planet than eating local food. For most foods, transport is not a significant share of the carbon emissions.[23] Instead, **what type of food you eat determines your ecological burden**, and animal products top the list along with chocolate and coffee. Unfortunately, the global trend of meat consumption and production is skyrocketing. China is by far the biggest producer, followed by the US.[24] In Asia, meat production has increased 15-fold since 1961.[25] FAO predicts that to meet future demands based on the current trend, the world will need to double the number of animals by 2050.[26] This would lead to an absolute ecological disaster and the disappearance of most wildlife on Earth.

Phasing out animal agriculture represents â our best and most immediate chance to reverse the trajectory of climate changeâ.[27] As of now, High Income Countries would need to reduce their consumption of meat by at least 75% to meet the Paris Agreement.[28] Evidence consistently suggests that plant-based diets promote human and planetary health[29] and would free up 75% of worldâs arable land.[27] According to one study, the worldwide phase-out of animal agriculture, combined with a global switch to a plant-based diet, would effectively halt the increase of atmospheric greenhouse gasses for 30 years[30] and give humanity more time to end its reliance on fossil fuels.[31] However, **the massive environmental burden of animal agriculture is largely absent from political discussions and COP, and a taboo topic in many parts**.[32] This has led to a disconnect between meat eaters, many of whom are in favor of climate action, and the environmental impact of their diet. Consumers are either unaware of this impact, or dismiss or downplay it as they are unwilling to adapt their diets accordingly.[33] Meat and dairy industries also craft public perceptions of what a healthy diet requires, with meat and dairy products as an essential part. [34]



Note: Greenhouse gas emissions are given as global average values based on data across 38,700 commercially viable farms in 119 countries.
Data source: Poore and Nemecek (2018). Reducing food's environmental impacts through producers and consumers. *Science*. Images sourced from the Noun Project.
OurWorldinData.org – Research and data to make progress against the world's largest problems.



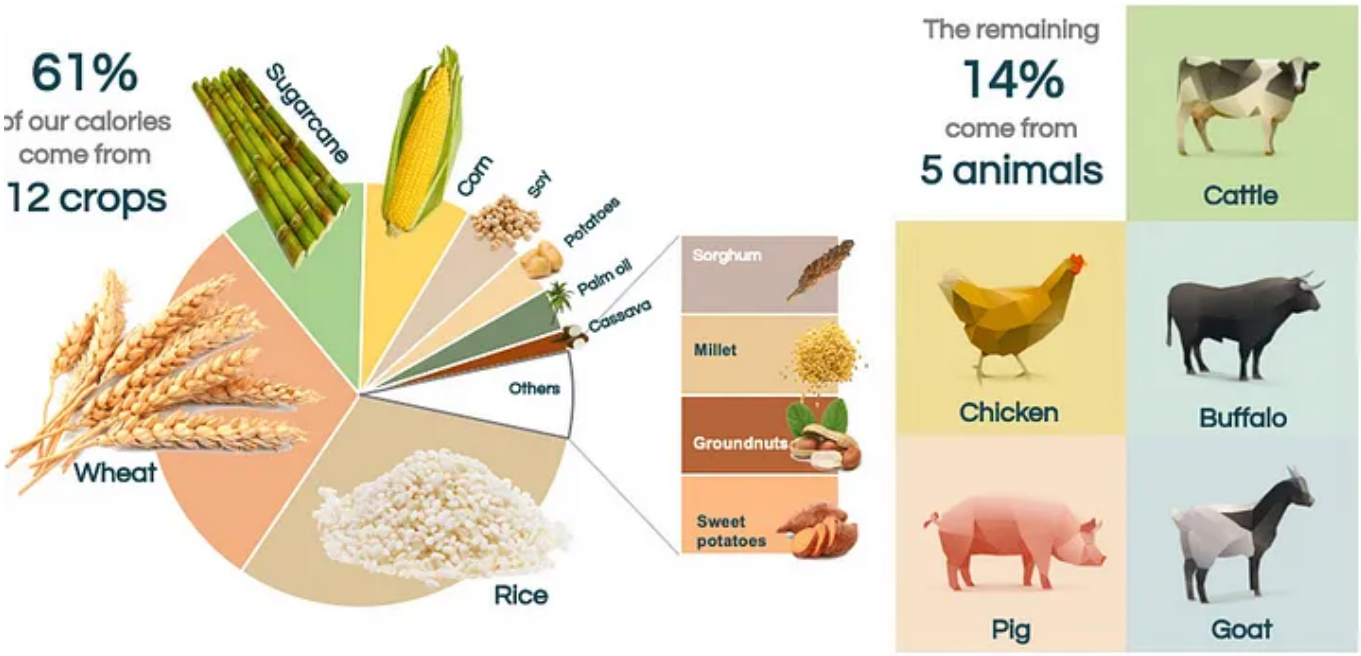
11. Industrial Agriculture

Our agricultural system damages our soils, crops and animals, putting us at risk of food system collapse.

Common industrial agricultural practices such as monocropping and using synthetic fertilisers, pesticides and mechanical tillage degrade soil over time causing a cascade of problems that affect ecosystems and global food production.[1] At the current rate, the UN warns that **90 per cent of soils could be degraded by 2050, which could be catastrophic not only for curbing climate change and rising temperatures, but for the productivity of crops and plants too.**[2] Moreover, efforts to improve crop yields, the quality of meat and nutrient values of staple crops and animals have resulted in decreasing genetic diversity, putting them at great risk of being eradicated by new diseases and pests.[3] **Three-quarters of our global food supply relies on just 12 crops and 5 livestock species, leaving our food system at greater risk from climate change and related extreme weather events** that may wipe out yields of staple crops such as maize, rice or wheat.[4]

Shifting farming practices away from industrial agriculture towards **agroecological approaches that promote plant diversity, dietary diversity and soil and ecosystem restoration will help mitigate these risks and reduce the ecological impact of our global food system**.[5] It will also shift agriculture back to family farming models and systems, providing jobs and food security to millions of families, including amongst the poorest.

As soil and plant health are inseparable from planetary and human health,[6] regenerative agricultural techniques that sustain and increase the fertility of soils and expand agricultural plant diversity are sorely needed to protect our food systems, ecosystems and health, but also rural societies and economies. Agronomists and farmers can look to and learn from ancient western and non-western forms of agriculture including native and indigenous agricultural systems around the world that prioritize soil health, plant health, human health and variety.[7]



12. Air Pollution

Air pollution is a leading cause of death globally, especially for children and is deeply intertwined with climate change and global warming

According to The State of Global Air 2024 report, produced in partnership with UNICEF, **air pollution is the second largest risk factor of death globally, contributing to more than one in eight deaths in 2021**.[1] The combination of indoor (household) and outdoor air pollution is responsible for 30% of deaths from lower respiratory infections; 28% of death from ischemic heart disease and 48% of deaths from COPD[2] as well as being a significant risk factor for stroke, lung cancer, diabetes[3] and mental health conditions such as depression and stress.[4] Moreover, it is also one of the main contributors to the global disease burden, not only taking years from peopleâ□□s lives but having a significant impact on the quality of their lives.[5] Children under 5 are uniquely vulnerable to air pollution because their lungs are in the process of growing and developing and they breathe twice as quickly as adults, taking in more air - and more pollutants - relative to their body weight.[6] **Almost 2000 children under 5 die every day because of health impacts linked to air pollution with the majority of these deaths occurring within the first month of a babyâ□□s life**.[7] In fact, damage from air pollution can start in the womb, leading to a higher risk of giving birth prematurely with health effects that can last a lifetime including asthma, cancer or impacts on

neurodevelopment and cognitive abilities.[8] **One quarter of all preterm births, one quarter of all newborn deaths and 15% of all under 5 deaths are linked to Air Pollution**.[9] Air pollution is of concern in both rich and poor regions - air quality does not respect international borders. **Only seven countries had air that met the WHOâ□□s guidelines for air quality in 2023.**[10] **However, populations in SubSaharan Africa and South Asia suffer the worst air pollution** and its subsequent health effects.[11]

Despite being deeply intertwined, climate change and air pollution are usually addressed separately. **Air pollutants and greenhouse gases often come from the same source such as coal fired power plants, residential solid fuel burning**[12] **and diesel-fueled vehicles**[13] **and therefore in many, though not all instances**[14] **can be tackled jointly**. Air pollutants can also directly contribute to global warming. For example, particulate matter such as black carbon[15] is circulated around the globe including to polar regions where it reduces the level of sunlight these regions reflect back into space, thereby contributing to global warming.[16] Pollutants also contribute to the biodiversity crisis as local pollutants especially sulphur and nitrogen emissions and ground-level ozone inhibit ecosystemsâ□□ abilities to grown and function and damage flora and fauna, affecting an ecosystemâ□□s ability to provide services such as nutrient cycling, carbon cycling and water provision upon which plant, animal and human life is dependent.[17]

Moreover, climate change increases the risk of wildfires and wildfire smoke, a more hazardous and localised form of air pollution. The United Nations Environment Programme projects that there will be a global increase in extreme fires of up to 14 per cent by 2030, and over 50 per cent by the end of the century.[18] A 2017 study predicts that the current rate of population exposure to wildfire smoke will cause a 138% increase in deaths due to all related causes by 2100,[19] and children are especially vulnerable.[20]

Tackling air pollution and its root causes can not only have clear nearimmediate positive effects locally - improving air quality and health outcomes in a targeted region - but also reduces the harmful effects of these pollutants on the earthâ□□s atmosphere and ecosystems over the longer term.[21] Although the relationship between air pollution and climate change is complex and not every intervention on one issue will benefit the other,[22] shifting to cleaner renewable energy sources including for cooking and heating,[23] eliminating diesel emissions, preventing crop burning and replacing diesel and petrol powered vehicles with electric vehicles can effectively improve air quality levels and reduce CO2 emissions.[24] **Public support for stricter air quality regulations and enforcement is substantial across the world**. One recent survey across five countries found that at least two thirds of citizens support stricter laws and policies to tackle air pollution including substantial majorities in favor of â□□clean air zonesâ□□ around cities; restrictions on the use of polluting fuels for domestic cooking and heating and redistributing spending on new roads to spending on public transport.[25] Every child has the right to a clean, healthy and sustainable environment and **the â□□right to clean airâ□□ has been or is in the process of being enshrined in human rights legislation at the international,**[26] **regional**[27] **and national level around the world**.[28] Ensuring a legal right to clean air will provide the public with a tool with which they can hold their governments accountable for their (in)action in tackling air pollution.[29]

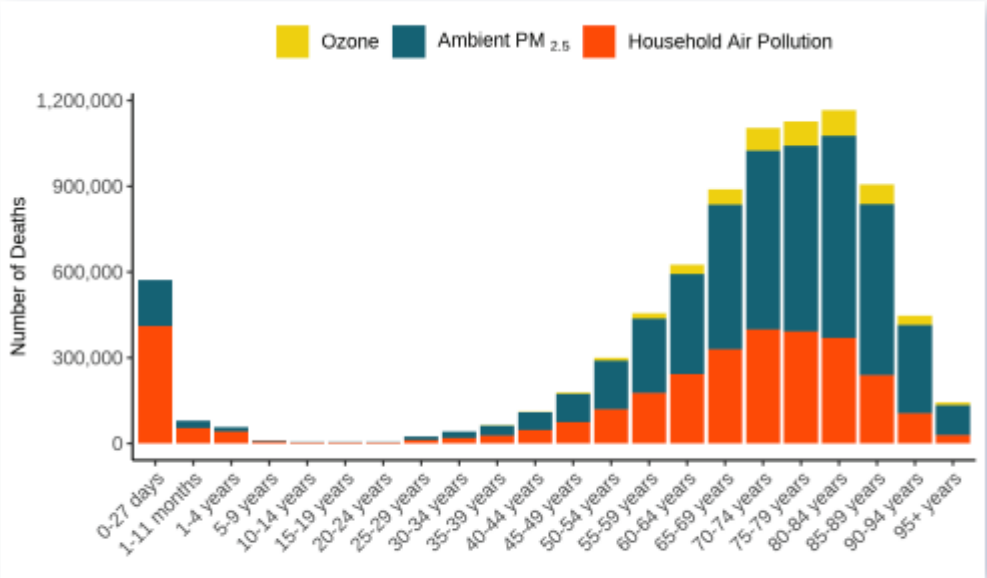
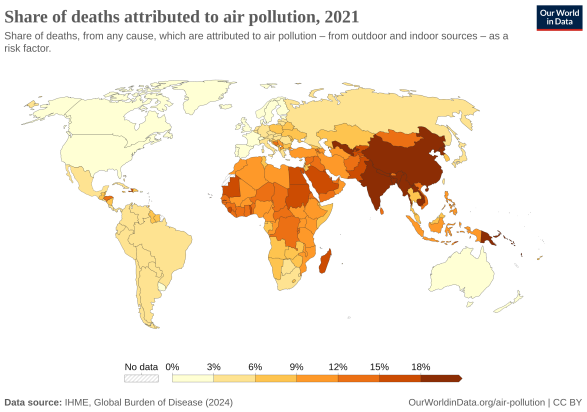


FIGURE 11. Distribution of global deaths in 2021 attributable to ambient $PM_{2.5}$, ozone, and household air pollution, by age. *Much of the disease burden of air pollution falls on older populations because aging is a risk factor for noncommunicable diseases.*



13. Timelines and Politics

Climate change is occurring along a different, non-linear, longer timeline, partly predetermined, which doesnâ□□t match current political cycles and dynamics.

When it comes to the planetary crises, the normal ways of thinking don't work anymore. The past won't guide the future because climate change is different: it is systemic, non-linear, and it has already partly been determined in the past. While some consequences of our GHG emissions may be felt instantaneously, most others will take decades or more to emerge.[1] Because of this **non-linear time lag between our actions and the bulk of their effects** on the climate and environment, it is hard for humans to fully comprehend the consequences of our actions and the timeline over which these consequences will play out.[2] The future consequences of our past actions are â□□locked inâ□□ and will materialise over decades.[3] **Predictions for the next 10 years are not guesses, they will mostly happen; they are largely the result of emissions from previous years which have not yet shown their effects**. Regardless of what we do from now on, weâ□□ve already accumulated enough GHGs in the atmosphere to keep trapping heat and warming the earth for at least a few decades.[4] Preventative actions today will only see results in a more distant future and with a similar

time lag to harmful activity.[5] **We cannot Â« stop Â» the crisis, but with radical systemic changes in the way we think, act and make decisions, we can slow it down**.

Our current political, social and economic systems strugglle to tackle such a longterm, non-linear crisis. Effective policies that cut emissions now to prevent damaging consequences decades into the future are difficult to implement given that the positive results of such policies are far removed from our current political timeframes while the high up-front cost of such actions will impact the population today.[6] In liberal democracies, **short-term election cycles mean that elected officials are often â□□single-minded seekers of re-electionâ□□ who â□□pay attention to the near future rather than the longer-term time horizon of issues such as climate change whose full effects may not be felt for decades.â□□**[7] Yet authoritarianism has proven no better than democratic environmentalism at producing good outcomes, as these governments are also focused on short-term goals.[8]

The projected CO2 emissions from all the fossil fuel-producing infrastructure that already and currently exists is more than we are allowed to burn if we want to meet the 1.5Â°C target.[9] Yet, companies and governments continue to grant permits for new large prospecting and extraction projects in pursuit of short-term profit and growth. The scale and pace of change needed is unprecedented, and the crisis is threatening our very existence as a species, but for many politicians and businesses, choosing harmful short-termist policies is a matter of (politically or financially) surviving the next few months or years, without much thought for what their decisions will mean in a few decades or centuries.[10] Adopting â□□long termismâ□□ beliefs within our political systems will increase consideration and support for pro-climate policies and underline our responsibilities to future generations in decision-making.[11]

14. Global Interdependencies

Climate is the ultimate interdependency between countries and a geopolitical struggle.

All populations of the world are in the same boat because the environmental systems affected by the crisis are global. **It doesnâ□□t matter where greenhouse gasses are emitted, they affect everyone**. More than ever, decisions made by each single government (especially of the largest economies) will impact everybody else. Which means that the current decline of multilateralism is bad news. Most environmental issues, such as access to and sourcing of minerals needed for building new technologies, or the enforcement of international regulations, are highly geopolitical. But more than anything, climate change is about energy, and energy is political power. It is a guarantee of consumption and standards of living for populations, and of domination over other countries for governments. Unfortunately, countries historically and increasingly deploy non-cooperative strategies (e.g., economic war, proxy wars across the world, conflicts over controls of resources, etc.), when **the world needs solidarity and cooperation**.

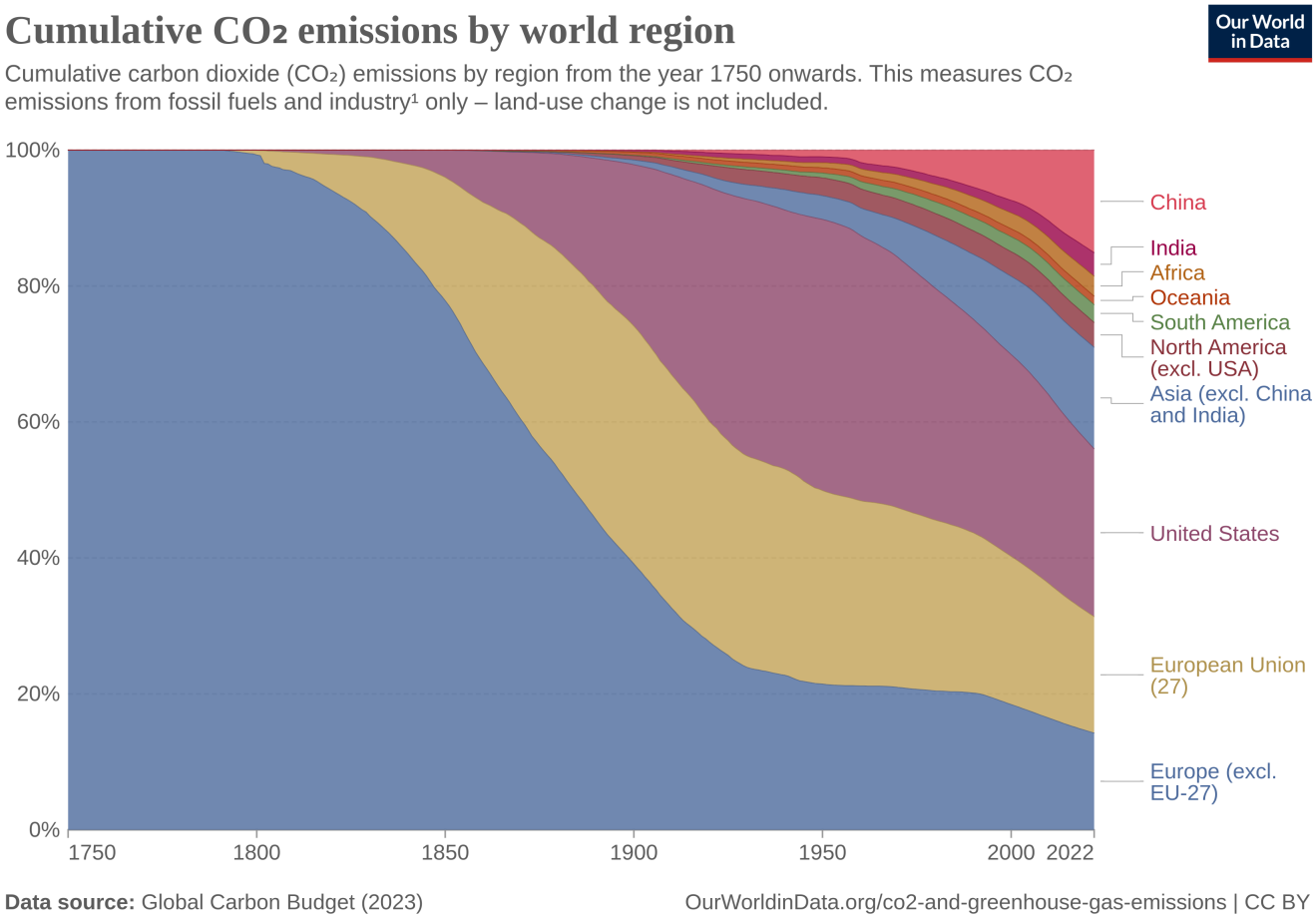
15. Climate Change and Colonialism

There are critical questions related to justice and colonialism at the heart of the problem.

The IPPC recognises that ''historical and ongoing patterns of inequity such as colonialism'' are amongst the factors that drive the significantly varying vulnerability of ecosystems and people to climate.[1] Along these lines, many scientists recognise **the colonial roots of issues such as deforestation, desertification, or the development of single-crop agricultural models over diversified and local production systems, which create or worsen climate related emergencies such as wildfires, food crises and forced displacements.**[2]

In the current context, various forms of neocolonialism are at the core of the path forward suggested by the global community. The Global North is responsible for almost the entirety of cumulative carbon emissions (92% of emissions up to 2015).[3] **Global North countries have exploited the most energy and resources (including extracting them from the South) and in doing so are the most at fault for the current problems.**[4] Many also depict the exporting of different types of waste to developing countries for storage and treatment as a colonial form of pollution.[5] Having built their wealth on fossil fuels, countries of the Global North, through climate action plans that fail to consider the unequal historical responsibility for both the environmental and uneven economic impact of colonialism, are striving for â□□sustainabilityâ□□ and green policies within their borders by outsourcing the ecological impact of this transition to countries of the Global South.[6][7] Policies like carbon border taxes punish developing countries for following the western model of using fossil fuels to develop themselves despite being pushed into this growth model by western development organizations and aid policies until just a few years ago.[8][9]

Under new green development frameworks promoted by Global North organisations such as The World Bank[10] and the OECDâ□□s DAC group,[11] **countries of the Global South must find a way to â□□leapfrog a long fossil-powered development pathâ□□**[12] **in the face of high vulnerability to climate change, despite the fact that their systems make them radically less likely to respond to, and cope with the climate crisis and related vulnerabilities**.[13] Finally, Global North nations are now using their power and influence to strike deals and secure sourcing and exploitation of Global South nations' resources for their green agendas, in particular, to manufacture advanced technologies (e.g., lithium for batteries) which they will later sell back to less advanced countries.[14] If these green technologies are to be used as part of the green transition, just global frameworks on the extraction of these natural resources are required to ensure that countries of the Global South are much more closely involved in, and see equitable compensation for the process.[15]



1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO_2) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO_2 includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

16. Climate Change, Poverty & Inequality

Climate change is deeply intertwined with global patterns of inequality and is making poverty worse.

Emissions are related to inequitable wealth distribution. Most of the economic growth in recent decades has been captured by the wealthiest and climate change is largely due to the lifestyles of the richest. **The richer people are, the more they consume, the more they emit GHGs and cause temperatures to rise**. Between 1990 and 2015, estimates say that the richest 1% of the worldâ□□s population was responsible for more than twice as much carbon emissions as the poorest 50% of humanity.[1] The estimated average carbon footprint of the worldâ□□s richest 1% could be up to 175 times larger than that of someone in the poorest 10%.[2] Overall, since 1990, **50% of people who emit the least are responsible for 10% of emissions and 10% of people who emit the most are responsible for 50% of emissions**.[3] Moreover, researchers argue that ''the concentration of political and economic power that accompanies the concentration of wealth plays an important role in increasing environmental degradation and preventing pro-environmental

actions."[4]

Yet, **the poorest and most vulnerable people bear the brunt of impacts while contributing the least to the crisis**. Human costs are and will be concentrated in poor countries, because most of them are already naturally warmer, but also because their systems are less resilient to shocks and their economies offer less margin for adaptation. By 2030, these poorest countries will bear a burden of annual adaptation costs of $300 billion[5] (this is only for health and deaths, the real number is likely higher). The hundreds of millions of projected climate refugees will largely be amongst the poorest as well.[6] The crisis is also driving up harmful practices, such as child marriage, amongst vulnerable populations.[7]

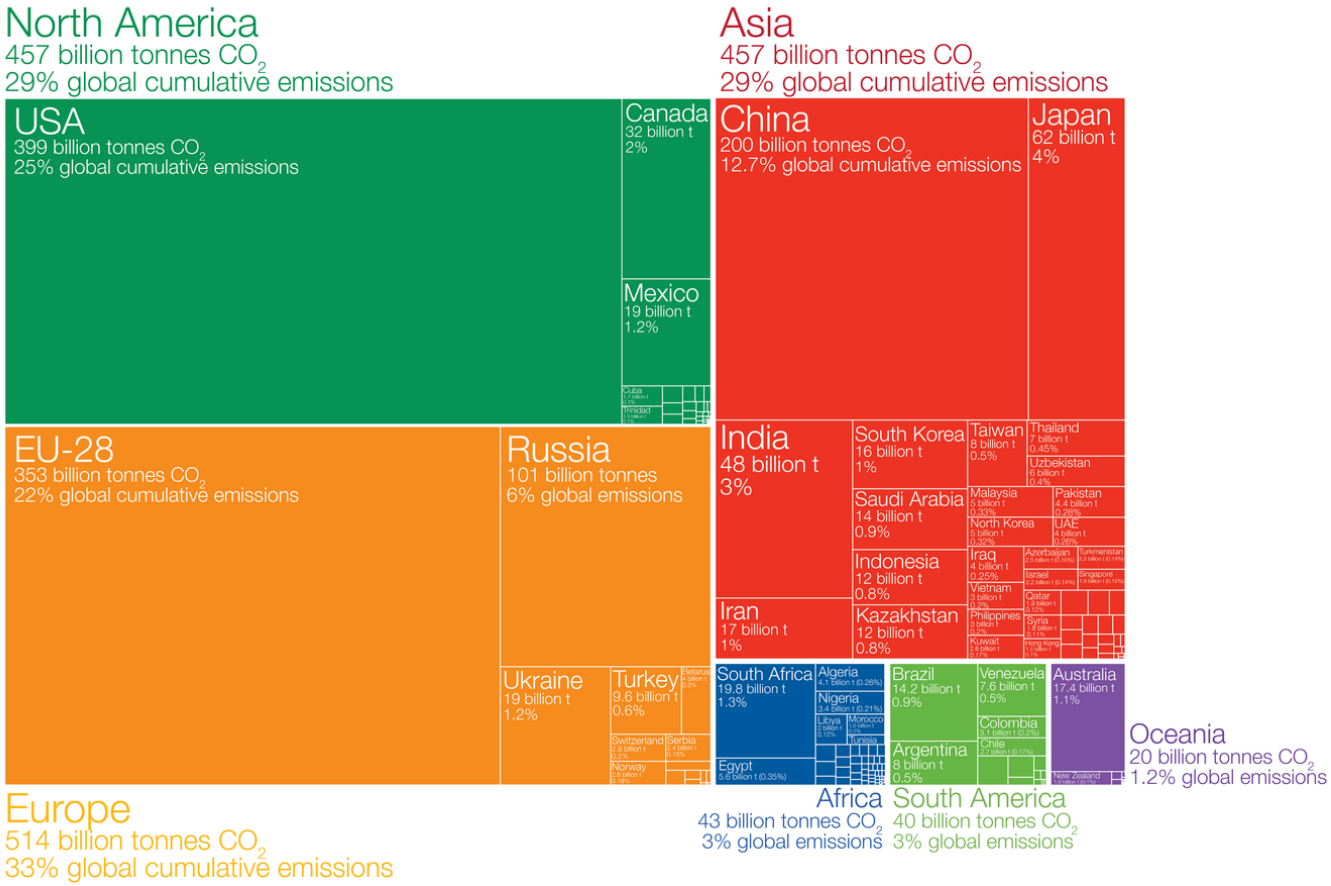
At the level of countries, up until 1950, more than half of historical CO2 emissions were emitted by Europe. But now, the United States has emitted more CO2 than any other country to date - it is responsible for 25% of historical emissions.[8] **Europe and North America, who combined have produced 62%[9] of global cumulative emissions despite encompassing only about 18% of the global population,[10] have a moral responsibility to be exemplary and reach net zero as quickly as possible. Yet, countries are not homogenous. The poorest people in any country are far from polluting as much as the wealthiest**. In each country, certain social groups are particularly vulnerable to crises, for example, female-headed households, children, persons with disabilities, Indigenous Peoples and ethnic minorities, landless tenants, migrant workers, displaced persons, sexual and gender minorities, older people, and other socially marginalized groups.[11] The root causes of their vulnerability lie in a combination of their geographical locations; their financial, socioeconomic, cultural, and gender status; and their access to resources, services, decision-making power, and justice.

The climate crisis accelerates the consequences of equity gaps already widening in recent years.[12] These facts are critical to keep at the forefront of the debate on what 'fair' climate policies are. Given the disproportionately high environmental impact of rich populations, it is vital to work with these populations to drastically reduce their carbon footprints and consequently make a significant dent in global emissions.[13] Wealth provides rich populations with a financial buffer that allows them to adapt much more easily than poorer populations to the lifestyle changes necessary for meaningful climate action. For example, richer populations can better afford to buy more expensive â□□greenâ□□ products and services[14] and are more supportive of climate action because they can afford to be.[15] Small changes that could be manageable for richer populations, largely based in the Global North, could make the difference between life and death in the Global South. **Climate action must accompany economic justice - making poor people richer and redistributing wealth in a more equitable and just manner**. The redefinition of global, national and local governance in public and private sectors alike is at the heart of the solution.

Who has contributed most to global CO_2 emissions?

Our World in Data

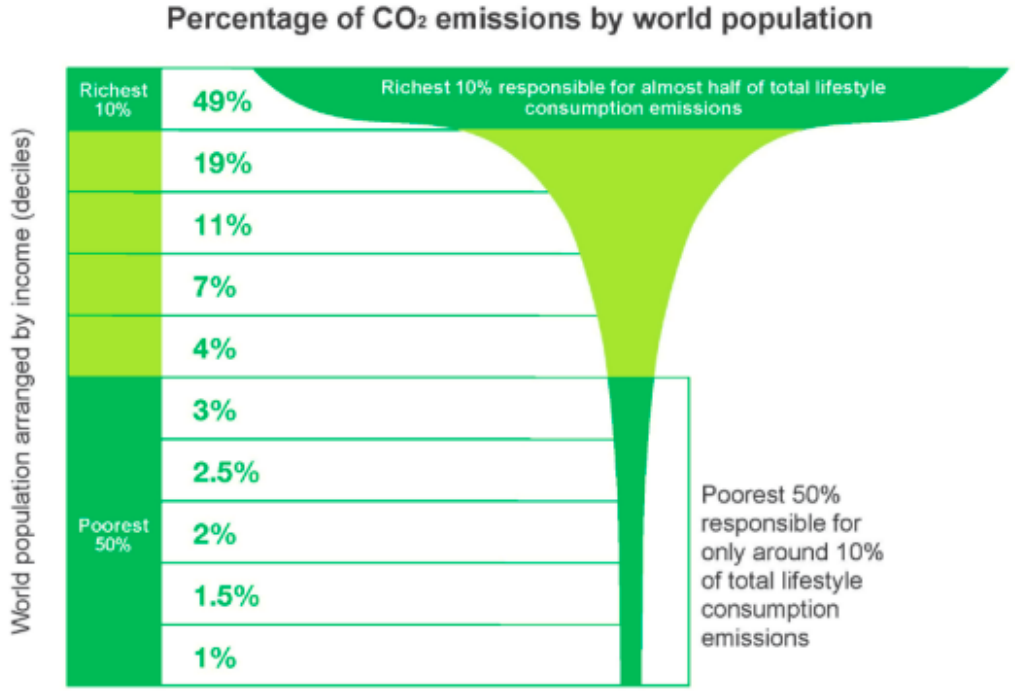
Cumulative carbon dioxide (CO_2) emissions over the period from 1751 to 2017. Figures are based on production-based emissions which measure CO_2 produced domestically from fossil fuel combustion and cement, and do not correct for emissions embedded in trade (i.e. consumption-based). Emissions from international travel are not included.



Figures for the 28 countries in the European Union have been grouped as the 'EU-28' since international targets and negotiations are typically set as a collaborative target between EU countries. Values may not sum to 100% due to rounding.

Data source: Calculated by Our World in Data based on data from the Global Carbon Project (GCP) and Carbon Dioxide Analysis Center (CDIAC).
This is a visualization from OurWorldinData.org, where you find data and research on how the world is changing.

Figure 1: Global income deciles and associated lifestyle consumption emissions



Source: Oxfam

17. Climate Financing

The money needed to combat the crises is available, it just needs to be accessible to those who need it most

A common critique of calls for meaningful climate action is that the green transition will cost too much and will disproportionately affect poorer people.[1] As the effects of climate change are felt around the world, in particular in the least developed countries most at risk from rising sea levels, desertification and extreme weather events, the need for investment in adaptation, resilience building and loss and damages increases. **However, climate action has so far been chronically underfunded by the global financial system**[2] . Adaptation finance needs are 10-18 times as great as current international adaptation investment. Failure to address this gap will inevitably lead to greater climate impacts and subsequent loss and damage underlining the importance of both public and private investment in climate adaptation.[3]

The money needed for funding climate action is available but the current system of development finance is wholly inadequate for the challenge facing us and must be reformed to make funding accessible to those people and initiatives who need it most.[4] The poorest countries in the world are borrowing money at high interest rates to adapt to climate change they did not cause and then have to handle unsustainable debt payments and surcharges by creditors in developed

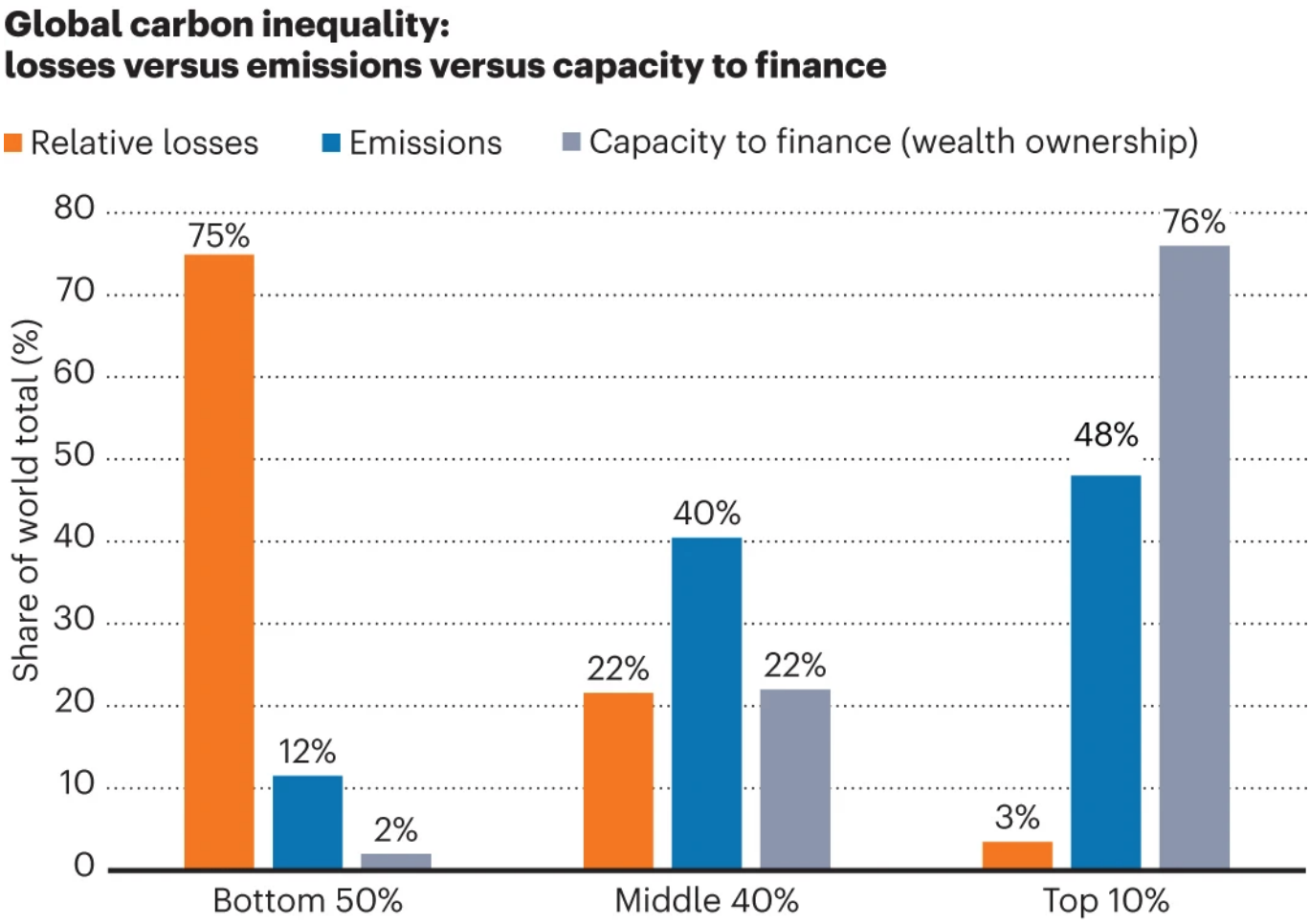
countries who have caused and then insulated themselves from the worst effects of climate change. This is neither fair nor effective in promoting sustainable economic development and leaves these countries with less money to help their own people. Proposed reforms such as those suggested under the Barbados-led â□□Bridgetown Initiativeâ□□ include unlocking an additional $1 trillion in funds from world development banks for climate resilience, creating a â□□Global Climate Mitigation Trustâ□□ and establishing grants and loans with the lowest interest rates for countries investing in climate mitigation measures.[5] [6]

Global political cooperation and commitment is required to collect and effectively distribute the money required to fund an effective and just green transition. Tax evasion and an endless number of tax loopholes which make it easier for companies and the wealthy to avoid paying their fair share remain prevalent throughout the world.[7] Currently, tax havens collectively cost governments between $500 billion and $600 billion a year.[8] Unfortunately, a global minimum tax of 15% on multinationals, which had been agreed upon by 140 countries and territories in 2021 has been â□□dramatically weakened by a growing list of loopholes,â□□ drastically lowering the revenue generated by the agreement.[9] Moreover, despite the richest 1% of the worldâ□□s population owning 43% of all global financial assets[10] and capturing double the income of the bottom 99% since 2020,[11] the worldâ□□s 2700+ billionaires have effective tax rates equivalent to 0%-0.5% of their wealth.[12] A global minimum tax on billionaires of 2% coupled with a (loophole-free) global minimum corporation tax of 15% could fund the estimated $500 billion a year needed to address the challenges of climate change in developing countries.[13]

Broader corrective taxes such as a carbon tax, nitrogen-fertiliser tax[14] or a single-use plastic tax[15] allow governments to incorporate the environmental costs of carbon based products into their price thereby discouraging their use and providing revenue that can then be used to finance the green transition.[16] For much of the population, carbon-based products remain cheaper than â□□greenâ□□ alternatives. This â□□Green Premiumâ□□ is a result of the higher costs of making a product the â□□clean wayâ□□ as well as the artificially low price of carbon-based products.[17] Thus, these levies are meant to â□□correctâ□□ the price of environmentally harmful products to accurately reflect their true cost to society and the damage they inflict on the environment.

Such measures must be designed to ensure that the poorest and most marginalised populations are not disproportionately burdened. â□□Fuel poorâ□□ households are the most reliant on carbon-based products and services due to their artificially low prices and the high up-front cost of switching to cleaner alternatives and thus would be disproportionately affected by an increase in price from corrective taxes.[18] To address this disparity, some of the revenue generated from corrective taxes could be used to subsidise the cost of the transition for poorer households.[19]

United Nations Secretary-General Antonio Guterres openly criticised the "grotesque greed" of oil and gas companies and their financial backers and urged governments globally to "tax these excessive profits" to support the most vulnerable people.[20] â□□The godfathers of climate chaos â□□ the fossil-fuel industry â□□ rake in record profits and feast off trillions in taxpayer-funded subsidies,â□□ he said. â□□It is a disgrace that the most vulnerable are being left stranded, struggling desperately to deal with a climate crisis they did nothing to create."[21] [22]



18. Fake solutions

The planetary crisis agenda is plagued by fake solutions promoted to continue business as usual.

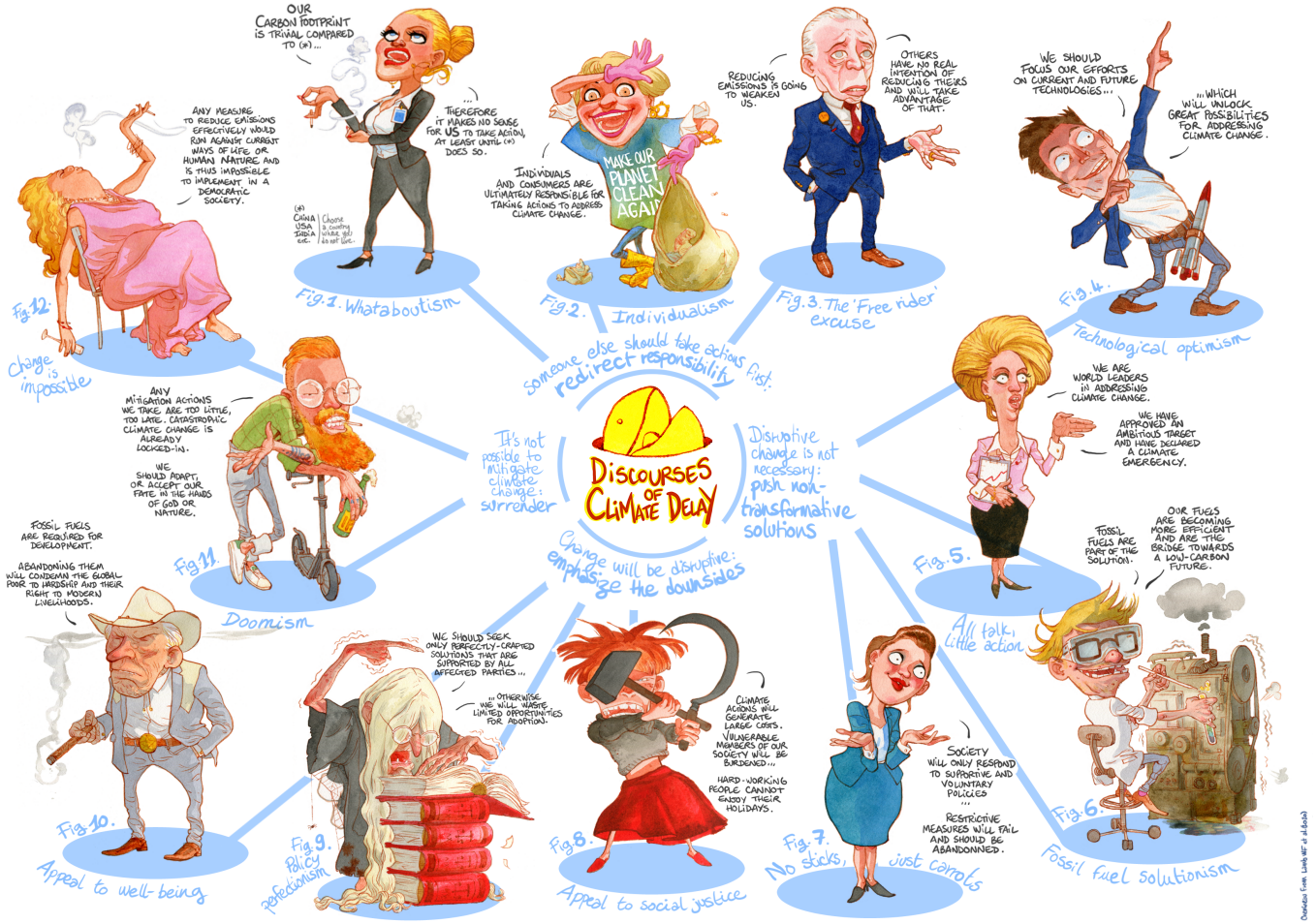
Finance-related and technology-based myths are regularly used by industries, lobbies and politicians as decoys to keep denying that our lives cannot be the same anymore. These â□□weak sustainabilityâ□□ solutions are banking on assurances that hypothetical technologies are â□□just around the cornerâ□□ and will substitute for ecosystem services that are threatened by climate change without the need for deep rooted transformation of our global economic, social and governance systems. The ''terraforming'' narrative makes regular comebacks to let people believe humanity will have the time and ability to transfer to another planet.[1] Geoengineering solutions[2] promise to dim the sun or improve the atmosphere by sending chemicals into space - ignoring the dramatic consequences on Earth.[3] More credible and powerful is the carbon offsets industry which promises to invest financial contributions in environmental projects around the world in order to balance out peopleâ□□s and companies' emissions. Yet studies found that more than 90% of rainforest carbon offsets by the biggest global certifier are worthless and do not represent genuine carbon reductions.[4]

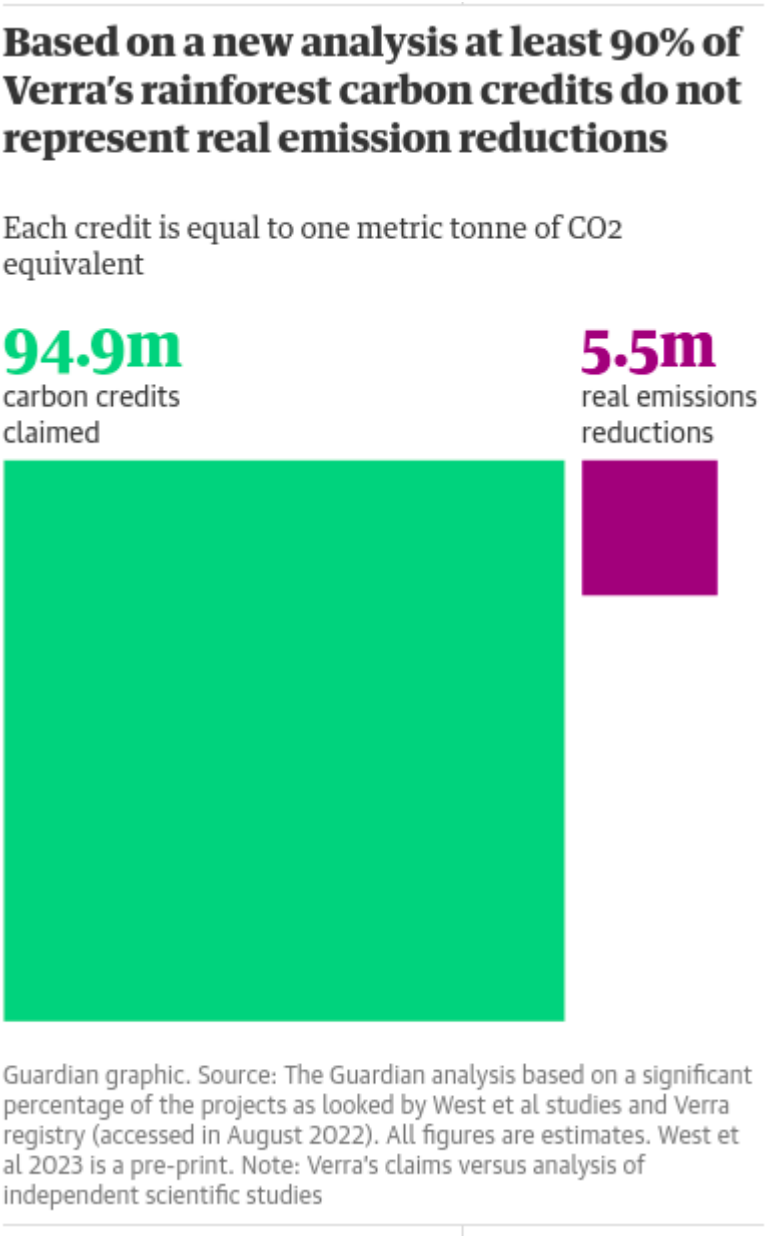
Along the same lines, the tree-planting efforts promised by Shell, TotalEnergies, Eni and BP to compensate their business would cover an enormous amount of land,[5] when the IPCC warns that such large-scale afforestation could increase food prices by about 80 percent by 2050, pushing

millions more people into hunger.[6] **Calculations show that even if we maximise the amount of vegetation all land on Earth could hold, there arenâ□□t enough trees in the world to offset our current global emissions and there never will be**.[7] Compensation and offsetting pledges are red herrings to avoid discussing the reduction of emissions. Similarly, the promise of a ''green aviation'' based on biofuels hides the untenable competition for land use it would create against food production and biodiversity conservation when experts and researchers agree that only the reduction of the number of flights can decarbonise aviation.[8] The carbon capture approach is also an empty promise the fossil fuel economy is bidding on. Carbon capture is far from being doable at scale (only at selective points for high-emission industries such as steel and cement) and doesnâ□□t eliminate all other negative impacts, including social ones, of current models.[9] [10] Finally, developed countries regularly publish emission rates which hide indirect emissions from goods produced abroad and later imported, or ''cloud'' activities.[11]

Denial, lies, and disinformation are actively generated by those who benefit financially from the current system.[12] As youth climate activists put it: ''Every time you hear someone say that our problems can be solved by businessdriven technological progress, you ought to be cautious â□□ isnâ□□t that, what for the most part caused them in the first place? **Every time a technology is presented as the â□□easyâ□□ solution, we ought to ask: who is promoting it?''**[13]

For consumers attempting to buy sustainably produced products and services and lower their carbon footprint, **manipulated figures, deliberately misleading labels, a lack of transparency and false offsetting promises have made it nearly impossible to make environmentally conscious purchases without copious amounts of research**. For several years now, environmental promises have been invading shelves, online marketplaces and advertising with little to no evidence of genuine commitments and actions. Widespread greenwashing makes it ever more difficult to distinguish between companies taking meaningful steps towards lowering their ecological footprint and those attempting to manipulate their consumer base with false promises, manipulated figures and small, inadequate gestures.[14] One of the latest inaction tactics are â□□discourses of climate delayâ□□ which accept the existence of climate change but justify inaction or inadequate efforts. â□□â□□In contemporary discussions on what actions should be taken, by whom and how fast, proponents of climate delay would argue for minimal action or action taken by others. They focus attention on the negative social effects of climate policies and raise doubt that mitigation is possible."[15]


Discourses of Climate Delay
someone else should take actions first: redirect responsibility
Disruptive change is not necessary: push non-transformative solutions
Change will be disruptive: emphasize the downsides
It's not possible to mitigate climate change: surrender
Fig.1. Whataboutism
Fig.2. Individualism
Fig.3. The 'Free rider' excuse
Fig.4. Technological optimism
Fig.5. All talk, little action
Fig.6. Fossil fuel solutionism
Fig.7. No sticks, just carrots
Fig.8. Appeal to social justice
Fig.9. Policy perfectionism
Fig.10. Appeal to well-being
Fig.11. Doomism
Fig.12. Change is impossible



19. Recycling

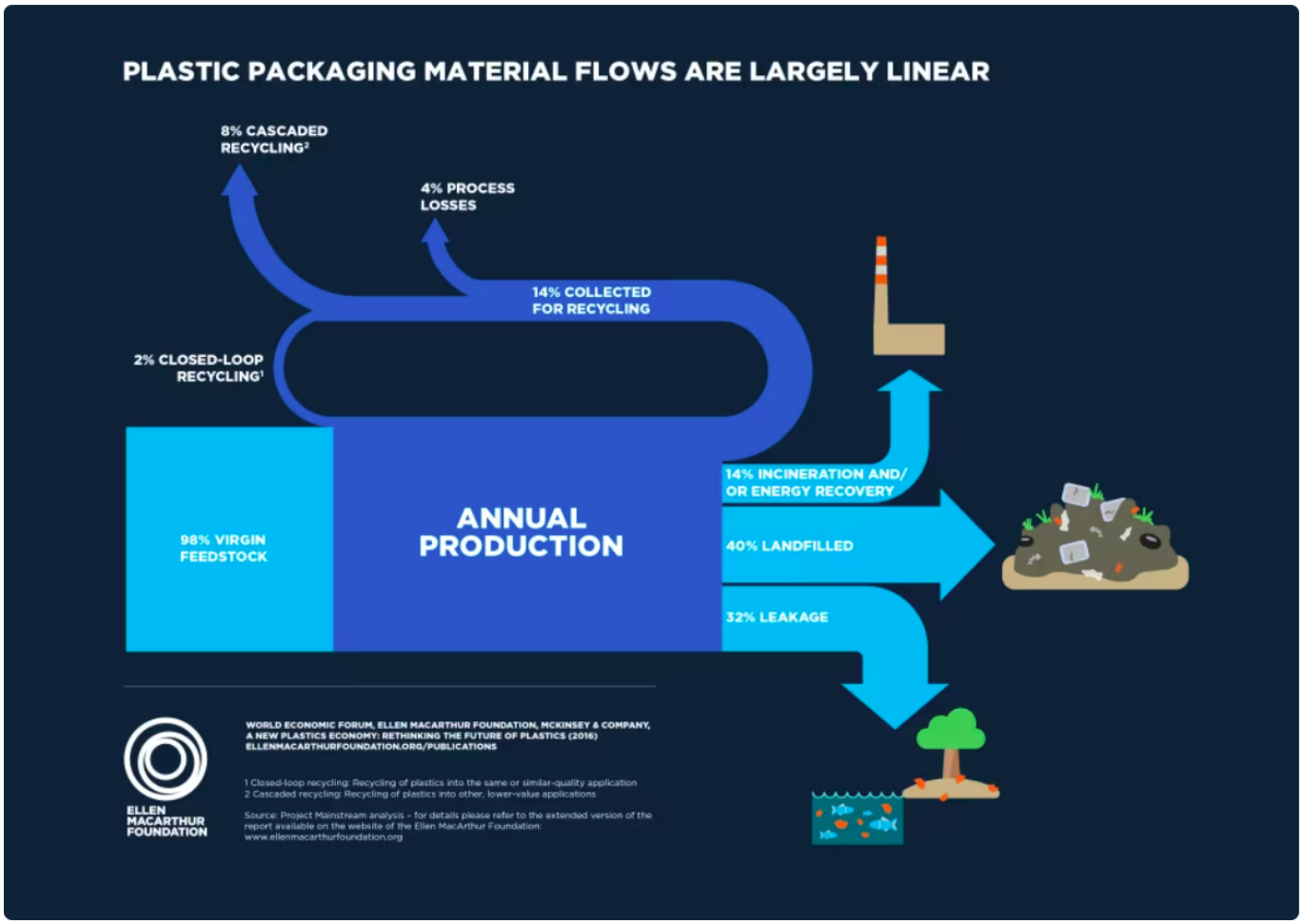
Recyclingâ□□s capacity is limited. Rethinking product design, reducing waste and reusing materials are important for reducing our ecological impact.

Despite labels declaring plastic products â□□100% recyclableâ□□ or â□□made with recycled material,â□□ less than 10% of plastic waste is actually recycled.[1] In fact, no plastic packaging in the US meets the threshold (a recycling capacity of 30%) to be credibly called â□□recyclable.â□□[2] **The vast majority of supposedly recyclable plastic is either incinerated, ends up in landfill or as pollution in our streets, fields, rivers, lakes and oceans.**[3] Those who use and discard this waste often do it in good faith, and do not see or feel the adverse effects of this pollution which is instead

shipped to developing countries where the 50 largest landfill sites impact the daily lives of 64 million people, emitting greenhouse gasses, harming local wildlife and contaminating soil and groundwater.[4] **In spite of this abysmal environmental track record, plastic production and use is forecast to double over the next 20 years, and quadruple by the early 2050s**.[5]

Paper, aluminum and glass recycling rates fare better, and unlike â□□recyclableâ□□ plastic can be recycled multiple times. However, **paper still accounts for over a quarter of total waste at landfills**[6] **while 7 million tons of aluminium**[7] **and approximately 79% of glass is thrown away each year.**[8] Although digital technologies play an ever more prominent role in our daily lives, E-waste recycling systems have not caught up with the vast increase in production and use. **Only 22.3% of E-waste was recycled in 2022 with the rest left to landfills where it poses a high risk of soil and water pollution from heavy metals.**[9]

Recycling labels are incoherent and inconsistent, often deliberately so to confuse consumers into purchasing supposedly â□□greenâ□□ products that are cheaper to produce but will never be recycled.[10] For the small percentage of products that are actually recycled, the recycling process involves substantial amounts of energy, much of it generated from fossil fuels.[11] Some forms of recycled plastic contain toxic chemicals generated in the recycling process which make them unfit for many consumer uses and pose a health risk to workers, their families, nearby residents and consumers including children.[12] [13] Focusing on hypothetical breakthroughs in recycling technology that have yet to come to fruition and the expansion of recycling services worldwide will not adequately address the problem. We should instead focus on the other two â□□Rsâ□□: Reuse and Reduce. **Reducing waste and reusing products that would otherwise be discarded will significantly cut our levels of consumption, our carbon footprint and our ecological impact**. This requires a significant shift in our values away from coveting the new, towards viewing waste as a valuable commodity and seeing the value in the used and the durable.



20. Renewable Energy

Renewable energy alone will not meet current energy demands.

Energy has historically been renewable: wind has powered boats and mills for centuries; wood was used by blacksmiths. It wasnâ□□t until the Industrial Revolution and the widespread adoption of coal and a few decades later, oil and gas that our energy consumption became unsustainable and harmful to our environment on a massive scale. â□□Renewableâ□□ sources of energy including hydroelectric, geothermal, solar and wind power have existed in some form for decades, but development and expansion was slow while fossil fuels reigned supreme in the 20th and early 21st century. Although investment in clean energy sources is picking up around the world, renewables made up only 30.2% of the worldâ□□s electricity generation mix in 2023.[1] **Development of clean energy, even at todayâ□□s rapid pace, is not enough to halt the climate crisis. While shifting to clean energy sources is vital, we must also drastically reduce our energy consumption** if we are to achieve a level of clean, sustainable energy use that will mitigate future impacts. Technological advances in improving energy efficiency will only get us so far. We must also change our lifestyles to be more aware of the energy we use on a day-to-day basis and reduce our use as much as possible. Behavioral changes encouraged or mandated at government, local and community levels through policy, financial incentives and social pressure can be effective in reducing energy consumption.[2][3][4][5]

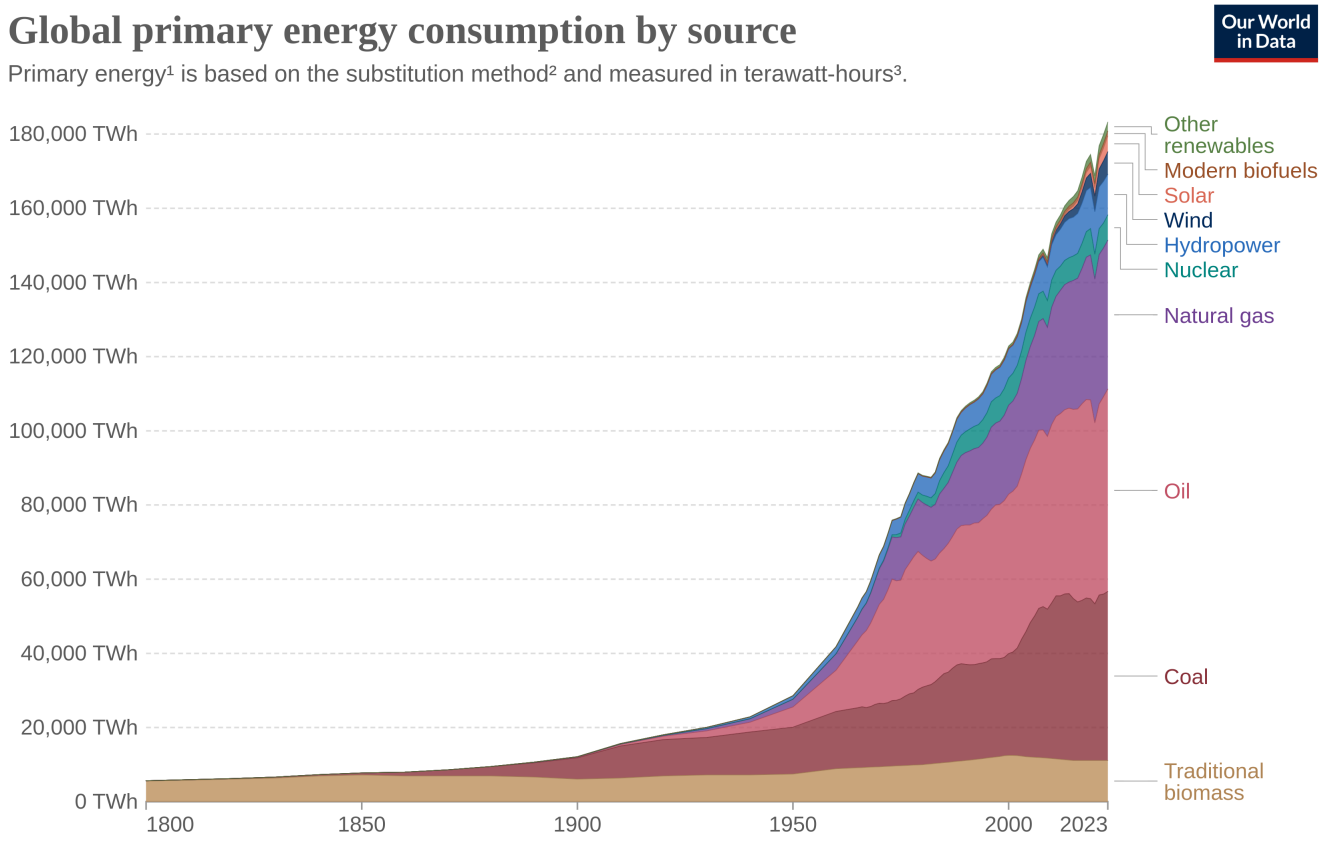
Energy production comes at both a financial and environmental cost that consumers must factor in

when using it. Abundant and cheap energy is a distortion of the realities of energy production. For example, governments of the world offered $7 Trillion dollars of subsidies to the fossil industries in 2023, freeing consumers from consumers over $5 trillion of environmental costs teh same year[6] .

Although fossil fuels are by far the most environmentally damaging form of energy production, clean energy sources also have adverse environmental impacts. **Clean energy production including wind, solar and hydroelectricity can harm the environment through mining materials for production technologies like wind turbines and solar cells; disrupting local wildlife in the region where energy plants are set up or contributing to pollution through the poorly managed disposal of defunct equipment.**[7] Increasing awareness of the costs of energy production can help reduce consumption.[8] [9]

The debate around the use of nuclear energy remains contentious and its future role in addressing the worldâ□□s energy needs remains in question. Although nuclear energy has reduced global CO2 emissions by over 60 gigatonnes in the past 50 years[10] as nuclear power plants produce no carbon emissions, concerns over the disposal of nuclear waste as well as safety, health and security risks at power plants[11] have repeatedly halted or delayed its widespread adoption. Scientists argue that â□□unless nuclear energy is meaningfully incorporated into the global mix of low-carbon energy technologies, the challenge of climate change will be much more difficult and costly to solveâ□□[12] with some claiming that a nuclear-free green transition is in fact impossible.[13]

Unless we rapidly and drastically increase clean energy production; improve clean energy storage and transportation technologies; and significantly curb our energy use, renewables alone will provide nowhere near enough power to maintain our current standards of living without a significant investment in nuclear power production.[14] However, two in five nuclear plants operate on the coast leaving them and the 516 million people within an 80km radius of them highly vulnerable to accidents triggered by climate-change induced sea level rise.[15] If nuclear power is to be pursued as part of the solution to our current unsustainable energy production and consumption levels, **massive investment is needed to â□□climate-proofâ□□ existing and future power plants as well as for research on nuclear waste solutions and to work to address the many legitimate concerns relating to health, safety and security.**



1. Primary energy: Primary energy is the energy available as resources – such as the fuels burnt in power plants – before it has been transformed. This relates to the coal before it has been burned, the uranium, or the barrels of oil. Primary energy includes energy that the end user needs, in the form of electricity, transport and heating, plus inefficiencies and energy that is lost when raw resources are transformed into a usable form. You can read more on the different ways of measuring energy in our article.

2. Substitution method: The 'substitution method' is used by researchers to correct primary energy consumption for efficiency losses experienced by fossil fuels. It tries to adjust non-fossil energy sources to the inputs that would be needed if it was generated from fossil fuels. It assumes that wind and solar electricity is as inefficient as coal or gas. To do this, energy generation from non-fossil sources are divided by a standard 'thermal efficiency factor' – typically around 0.4 Nuclear power is also adjusted despite it also experiencing thermal losses in a power plant. Since it's reported in terms of electricity output, we need to do this adjustment to calculate its equivalent input value. You can read more about this adjustment in our article.

3. Watt-hour: A watt-hour is the energy delivered by one watt of power for one hour. Since one watt is equivalent to one joule per second, a watt-hour is equivalent to 3600 joules of energy. Metric prefixes are used for multiples of the unit, usually: - kilowatt-hours (kWh), or a thousand watt-hours. - Megawatt-hours (MWh), or a million watt-hours. - Gigawatt-hours (GWh), or a billion watt-hours. - Terawatt-hours (TWh), or a trillion watt-hours.

21. The internet and IT

<u>The environmental impact of digitalisation and the ICT sector is rapidly growing.</u>

Despite tech proponents hailing technological advancements and digitalisation as the key to a green future, the adverse impact of the use of digital technologies on the environment is substantial and has been largely downplayed by big tech companies.[1] **Much of ICTâ□□s current and projected environmental impact comes from â□□invisibleâ□□ sources such as data use and storage**. Information on every photo taken, video streamed, email sent and file saved is digitally stored

somewhere - most commonly on a server in one of the thousands of data centres around the world.[2] In order to store the data of billions of users,[3] these centres require an estimated 200 terawatt hours of energy per year, more than the national consumption of Iran[4] and almost 1% of the worldâ□□s electricity demand.[5] Watching online videos generates approximately 300 million tons of CO2 per year with streaming services producing the same level of carbon emissions as Chile.[6] Data centres also require immense amounts of water, enough to fill 120,000 Olympic sized swimming pools per year,[7] to cool down servers and prevent overheating, and for electricity production. This intensive water use exacerbates regional water stress including in regions already subject to drought.[8]

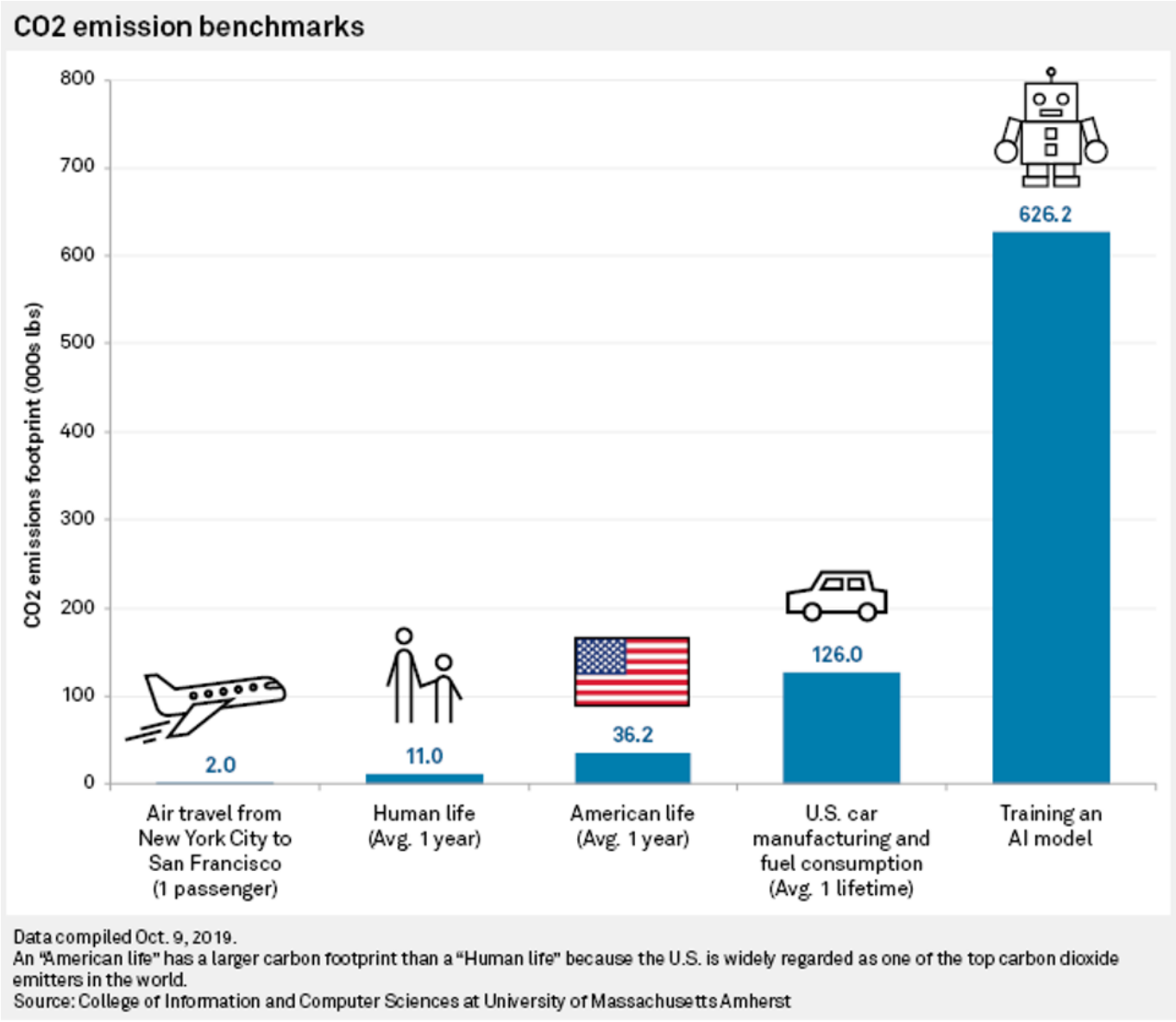
As digitalisation and internet use expand, the demand for data centres and their subsequent energy use has skyrocketed, increasing the environmental impact of the ICT sector. Although tech companies are making efforts to control the energy consumption by ensuring data centres are both â□□ultraâ□□ energy efficient and reliant on clean energy production, **the expected increase in demand, including from the rise of AI makes managing ICTâ□□s future energy consumption a serious concern**.[9] In spite of its many potential uses in the green transition,[10] the high-energy use of AI models has further escalated the electricity consumption of data centres. The training of a single language model can produce a carbon footprint equivalent to around 300,000kg of carbon dioxide emissions.[11] In comparison to search engines such as Google, AI platforms like ChatGPT require an additional 10TWh of electricity per year, increasing the already soaring carbon emissions from data centres.[12]

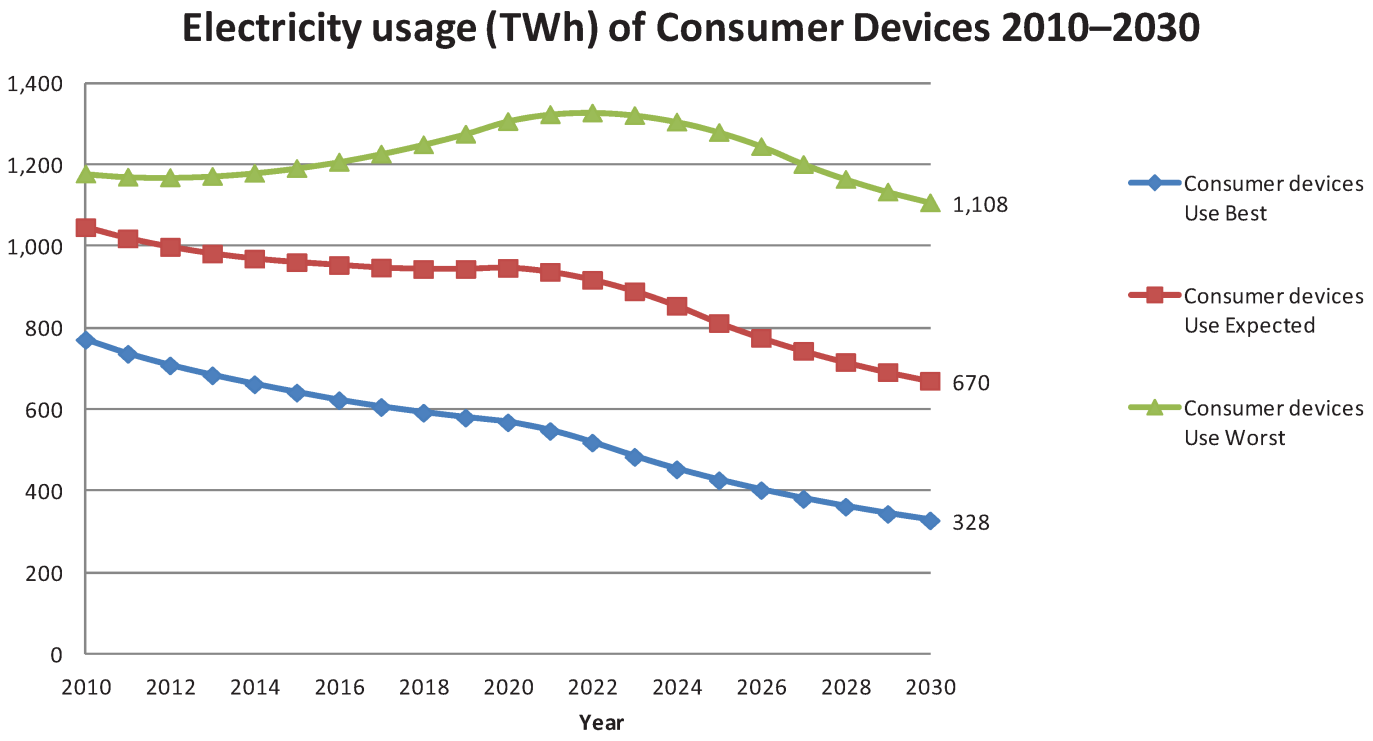
Reducing data usage is necessary to reduce the worldâ□□s ballooning digital carbon footprint.[13] **Up to 90% of the data created and stored on energyhungry servers is not reused or accessed again, becoming â□□digital wasteâ□□[14] that is responsible for extensive energy wastage.**[15] The approximately 120 trillion spam emails sent each year create 36 million tons of CO2 emissions annually. About 3.6 billion trees would need to be planted each year to offset the pollution from spam emails alone.[16] **To avoid emissions spiraling out of control as data usage continues to grow exponentially, we need to better manage and reduce our digital footprint** by reducing our data usage and deleting redundant data.

E-waste also accounts for a significant amount of ITâ□□s environmental impact, generating 580 million metric tons of CO2 in 2020[17] and contributing to land and water pollution. An industry-wide culture and business model built upon frequently replacing rather than repairing devices generates approximately 62 million metric tons of E-waste annually with this number expected to increase to over 80 million tons by 2030[18] if we are to carry on with our current consumption patterns. **Tech firms continue to design devices that need to be replaced frequently and are difficult to recycle. This â□□throw awayâ□□ culture also incentivises continually high levels of device production**. 160,000 laptops are disposed of everyday in the EU alone and for every new laptop having to be made in replacement, an average of 316kg of CO2 is created, 190,000 liters of water is used and 1,200kg of earth and rock is mined.[19] Similarly, smartphones generated approximately 146 million tons of CO2 in 2022 with the bulk of these emissions (83%) coming from manufacturing, shipping and first-year usage.[20] In all, 100 billion tons of raw materials are extracted each year, often under violent and exploitative circumstances for the production of digital devices.[21]

Children could be exposed to hazardous chemicals (lead, mercury, cadmium, persistent organic pollutants) in e-waste when not managed properly. The main routes of childrenâ□□s exposure are through ingestion of food, water, breast milk, soil, and dust, as well as dust-contaminated objects

such as toys and surfaces; inhalation of particles and aerosol gases and particulate matter from open burning; dermal exposure to corrosive chemicals; and transplacental exposure. Due to childrenâ□□s physiological and behavioural attributes, **children are uniquely vulnerable to the health impacts of ewaste**, such as neurodevelopmental and cognitive, endocrine disruption, fetal growth and development, bone, liver, heart, lung, kidney damage, and immune system suppression.[22] [23]





22. Public Opinion

Despite declining trust in institutions, public recognition of climate change and support for climate action is growing; but climate change education is vital for action to be effective.

As evidence of climate change has mounted to the point of irrefutability in the past few decades, public acceptance of humanityâ□□s role in the crisis has too become overwhelming. While just over half of respondents in a 1992 international survey viewed climate change as â□□a very serious problem,â□□[1] **a 2023 report found that 93% of respondents across 14 countries believe that climate change â□□poses a serious and imminent threat to the planet.â□□**[2] These figures vary greatly across world regions with almost 39% of people in East Asia and the Pacific and 32% of North Americans believing that global warming is caused mostly by â□□natural patterns in the Earthâ□□s environmentâ□□ rather than human activity in 2019 compared to just 18% of people in Latin America and the Caribbean where man-made climate change is more widely accepted (78%). A further 6% of the global population remain convinced that global warming does not exist.[3]

However, growing belief in the climate crisis does not correlate with trust in governments and institutions to take effective action to combat the crisis. In a 2023 international survey only 50% of respondents trust governments to â□□do what is right when it comes to climate change.â□□[4] **Equally concerning are the falling levels of trust in the information provided by climate scientists,**[5] **government leaders and the media**[6] **on the planetary crises in several world regions.**[7] Unsurprisingly, concern over the climate crisis and low trust in institutions to take action has led to

high levels of â□□climate pessimismâ□□ - over 55% of respondents are â□□worried about climate change andâ□¦ not hopeful we can overcome its challenges.â□□[8]

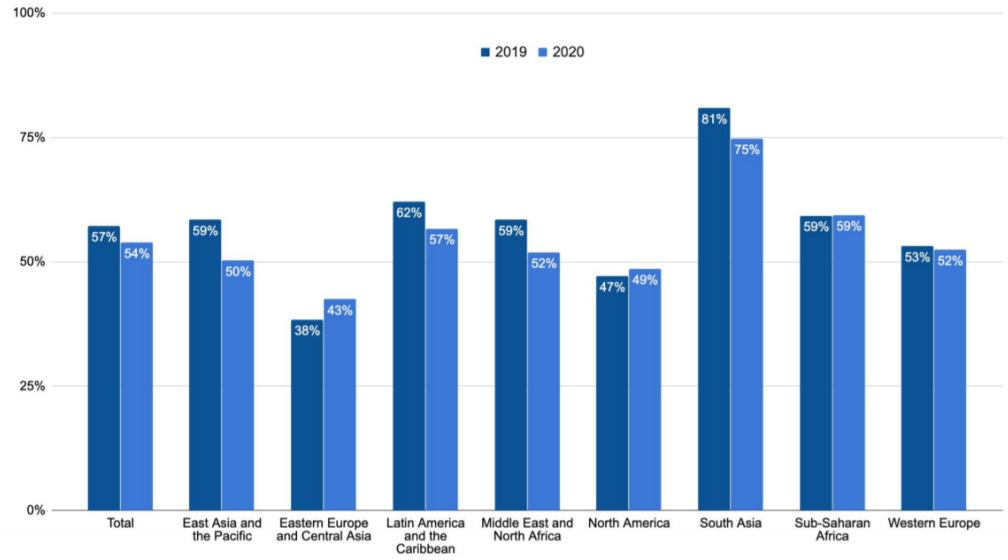
In spite of this climate pessimism and distrust in government, national governments are still considered the most impactful group in addressing climate change and **80% of people across 77 countries want stronger climate action from their world leaders.**[9] Young people in particular are overwhelmingly (86%) hopeful that humans can reduce most of the effects of climate change.[10] **Majorities in most countries (upwards of 70%) are prepared to adapt their lifestyles to help address global climate change[11] but require adequate support to make the necessary changes**. High costs, lack of institutional support, inadequate availability of green alternatives and a lack of information are all cited as significant barriers to adopting a â□□climate-friendly lifestyle.â□□[12]

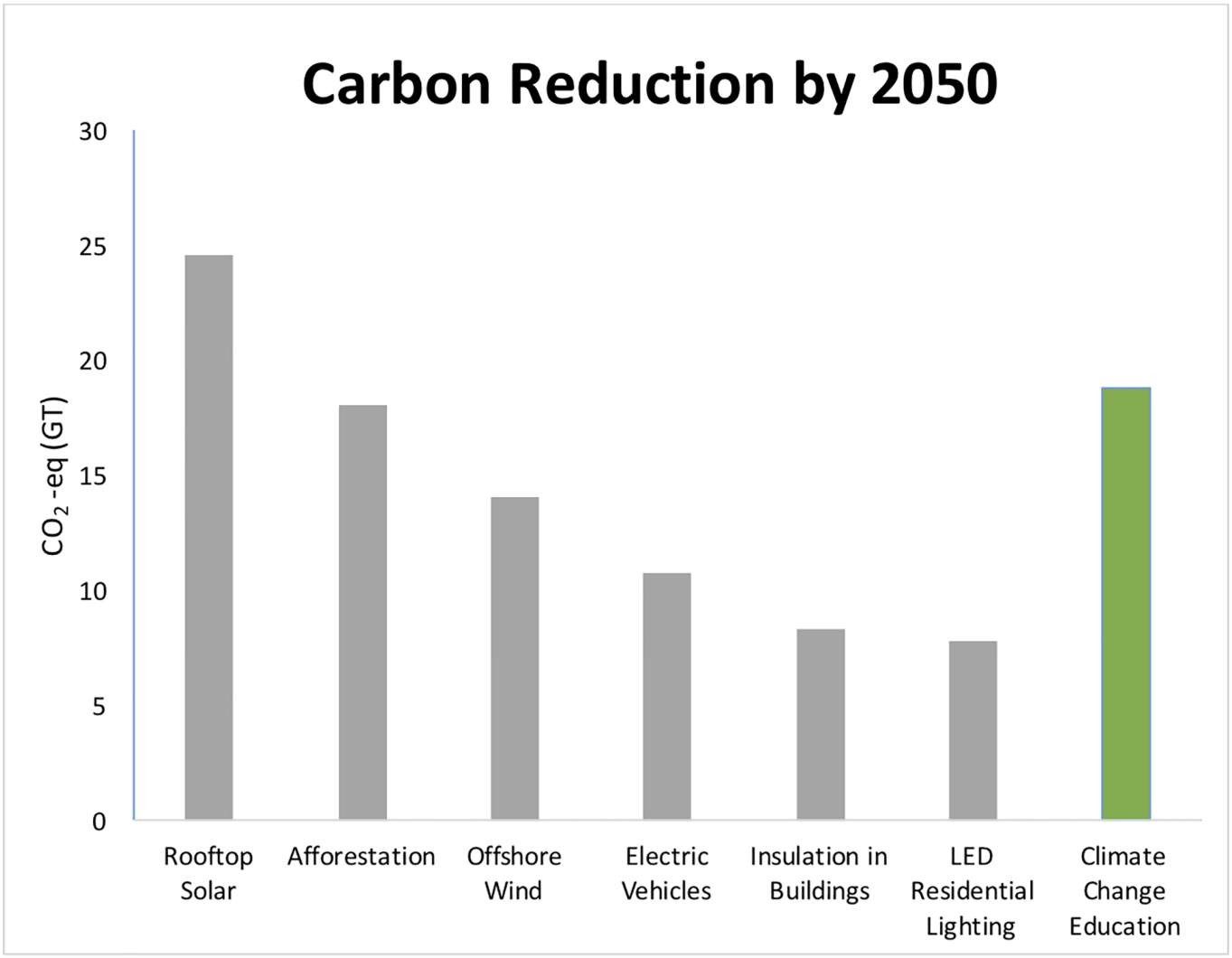
Despite decades of warnings from climate scientists, **the â□□knowledge gapâ□□ between lay people and experts on the severity of climate change and what actions can most effectively mitigate the crisis remains a substantial barrier to climate action**. A 2021 UNESCO study of 46 national education plans found that more than half of curricula made no mention of climate change and only 19% made reference to biodiversity.[13] This inadequate climate change education is reflected in a 2023 UNICEF-Gallup poll which found that **only half of young people aged between 15-24 in 55 countries were able to identify the correct definition of climate change**.[14] The knowledge gap is particularly prominent in low and lower-middle income countries.[15] Incorporating climate change education (CCE) into schools and improving knowledge of the multiple planetary crisis facing us among all generations could make a significant impact in efforts to fight climate change.[16]

Climate action is still possible even in communities with high levels of climate denial, skepticism and apathy. Climate denialism is correlated with political affiliation, level of education, carbon intensity of the regional economy and lower income levels leaving these communities vulnerable to climate related shocks as they remain unprepared to take steps to increase their resilience.[17] However, studies have shown that **highlighting economic, health or social benefits of climate action can increase support for pro-environmental actions** among these groups.[18] More specifically, when attempting to work with deniers on pro-environmental actions, **focusing on how climate actions can promote a better society can be an effective method of engaging with and gaining the support of such communities.**[19] Often, climate skeptics hold pro-environmental views on certain topics and can be engaged on efforts to prevent deforestation and curb pollution which can in turn be linked to support for renewable energy solutions as solutions to poor air quality.[20]

QUESTION
How much do you trust what scientists say about the environment?

Percentage saying "a great deal" or "a lot"

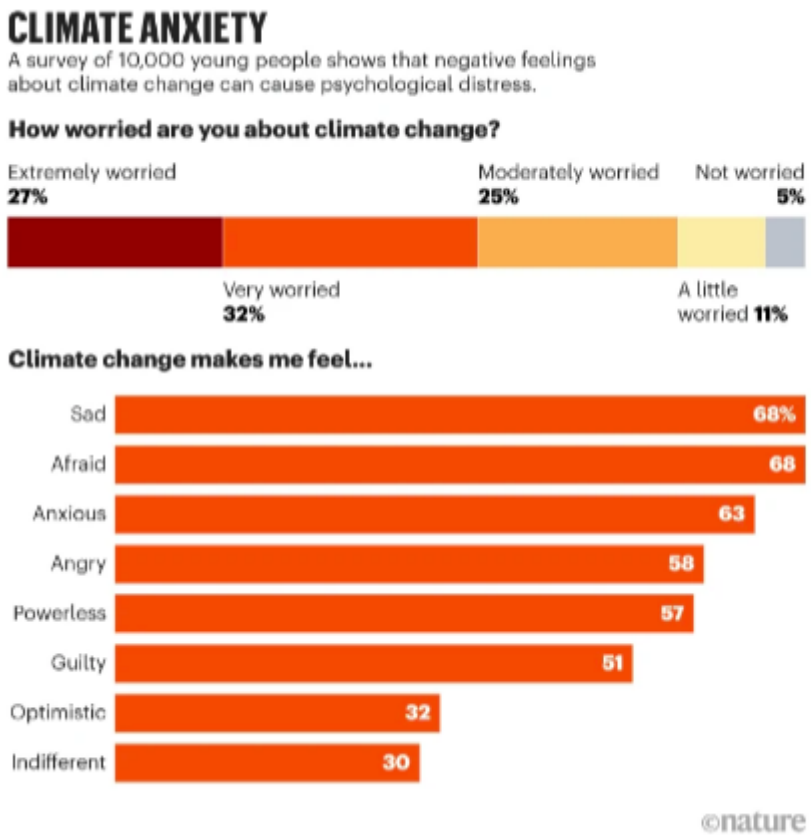




23. Climate & Mental Health

Young people's anxieties about the climate intersect with other mental health challenges, particularly in environments where access to support and services is limited.

Eco-anxiety, defined as a chronic concern about environmental decline, is increasingly discussed among young people who feel particularly vulnerable to the effects of the climate and ecological crisis. While not responsible for these challenges, young people, particularly in low- and middle-income countries, face heightened fears about their future. This anxiety, though not yet proven to directly cause widespread mental disorders, is reported as a significant concern. A 2021 survey found that nearly 60% of 16-25 year-olds felt "very worried" or "extremely worried" about climate change, especially in countries like the Philippines and India, where climate impacts are already being felt.[1] Eco-anxiety can serve as both a source of stress and a motivator for action, with many young people expressing a desire for meaningful proenvironmental engagement and activism. Providing young people with the resources and knowledge to act on these concerns can transform ecoanxiety into a catalyst for positive change, rather than a driver of emotional distress.[2][3][4]



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