Emergency on Planet Earth Overview & Key Facts

This document contains a selection of key facts from Scientists for XR's <u>Emergency on</u> <u>Planet Earth</u> (EPE) guide. All content in the EPE has been fact-checked and endorsed by our large and diverse team of climate scientists and ecologists as listed at the bottom of that document. Please refer to the EPE for further info and for all links and primary sources.

Note: the facts in green have been added to this document since the EPE was published in September 2020, so have not been formally reviewed.

1. The Climate & Ecological Crisis – overview:

- Carbon dioxide levels (a greenhouse gas that causes heating of our planet) are higher today than at any point in the last 3 million years. They are rising around 100 times faster than any previous natural change in the last 800,000 years.
- All 20 of the hottest years on record have occurred in the last 22 years and the past four years have been the hottest on record. The years 2016 and 2020 were the joint hottest years EVER RECORDED
- In 2019, nearly 400 temperature records were broken across 29 countries, June 2019 was the hottest June and July 2019 was the hottest month ever recorded.
- January 2020 was the warmest January ever recorded in Europe, May 2020 was the hottest May ever and September 2020 was the warmest on record. In April 2020 there was a "megadrought" in the US, and 2020 also saw a Siberian heatwave that was made 600 times more likely by climate change and California wildfires that expanded beyond 1 million acres – more than in any year on record.
- It is almost certainly now hotter than any time in the last 125,000 years
- The current rate of heating of our planet is equivalent to five nuclear bombs going off every second.
- All this extra heat is causing melting of ice caps, rising sea levels and damage to wildlife, as well as changes to our climate that can result in the spread of diseases and extreme weather such as heatwaves, forest fires, droughts, storms and floods. Such events can not only damage our homes, affect our health and harm our wildlife, but they can also prevent the crops that feed us from being able to grow.
- 2020 saw the wettest February in the UK, while in October 2020 storm Alex hit France and Italy hard bringing over a month's worth of rain to some parts of the UK. During this time the UK had its wettest day on record with enough rainfall to fill Loch Ness.

- The number of extreme climate-related disasters including extreme heat, droughts, floods and storms has doubled since the early 1990s. More than two thirds of all extreme weather events investigated were made more likely, or more severe, by human-caused climate change. According to Morgan Stanley, from 2016-2018 climate-related disasters cost the world \$650 billion. Some insurance companies are already warning that they will soon stop insuring basements in London, New York and Mumbai.
- Outside air pollution (mostly due to burning fossil fuels) causes 4.8 million early deaths a year. A staggering 9 out of 10 people on our planet breathe polluted air. In London, 24 people die every day due to air pollution. Damages to health from air pollution alone cost over 4% of GDP in the 15 countries with highest emissions
- Rising temperatures allow the bacteria that cause deadly diarrhoea to thrive, which is leading to increased spread of infectious diseases such as malaria and dengue fever. Rising temperatures are also creating conditions for tropical diseases to spread to parts of the world where they are not usually seen. According to The Lancet: "Climate change is the biggest health threat of the 21st century."
- Over the past 40 years, the amount of ice we have lost from our planet averages out to around 300 double-decker-bus-sized chunks of ice every second. Melting glaciers threaten the water supplies of 1.9 billion people living downstream. If we keep going as we are all the polar bears will soon be gone.
- Humanity's collective action has caused wildlife populations to decline by an estimated 60% (now nearly 70%) since the 1970s. One million more species are at risk of extinction in the coming decades due to human action, including many of the insects that are required to pollinate our crops. By 2050, 99% of our corals will have been wiped out. Corals are some of the most important and diverse ecosystems on the planet which support up to one million other species and provide food, protection from storms and livelihoods for nearly one billion people.
- Deforestation in the Brazilian Rainforest is now occurring faster than three football fields a minute
- 95% of what we eat relies on healthy topsoil. Yet over the past 150 years, due to intensive farming practices – along with deforestation, more extreme rainfall (that washes topsoil away into rivers), and increased erosion due to climate change – a third of our soils are now classified as being moderately or highly degraded, and more than 80% of our soil-rejuvenating earthworms.
- The IPCC report stated that in order to have even a 50% chance of remaining below 1.5°C warming, global carbon dioxide emissions must now "decline by about 45% from 2010 levels by 2030, reaching net zero around 2050".

- To do this we need to see a global reduction in emissions of 8% every year, starting NOW
- It is now widely understood that if we go above 1.5°C warming we risk setting off irreversible chain reactions beyond human control, which are predicted to have catastrophic impacts on our planet.
- However, global emissions are still rising and at our current emissions rates, we are on track to go over 1.5°C heating by around 2030 and to hit 2°C heating by around 2050 – a level deemed by the Paris Agreement to be "dangerous" and that we MUST stay below.
- By 2030, dwindling crop yields due to climate change could push more than 100 million people within developing countries below the poverty line. Climate change-related illnesses are predicted to be killing an extra 250,000 people every year.
- By 2040, Bangladesh, Vietnam and Thailand are predicted to be threatened by annual floods, sparking mass migration. 8% the global population will see a severe reduction in water availability. Sea levels have risen 60cm in the Gulf of Mexico, where hurricanes now deliver devastating storm surges
- The IPCC predicts that, if things keep going as they are, by 2050 an additional 350 million people across the globe will be at risk of heat stress, an additional 420 million people will frequently be exposed to extreme heatwaves, and an additional 65 million people will be exposed to exceptional heatwaves.
- Without adaptation, climate change may depress growth in global agriculture yields up to 30% by 2050. The 500 million small farms around the world will be most affected.
- By 2050, rising sea levels are projected to make land currently inhabited by more than 300 million people likely to flood at least once a year. Without major investment, flooding in cities across the globe is forecast to cost over US\$1 trillion per year
- By around 2050 it's predicted that as many as 1.5 billion MORE people bringing the total to 5 billion people are likely to face shortages of food and clean water, particularly those in Africa and South Asia. That's one in every two people.
- On our current path, by 2050 it is estimated that there could be up to 200 million environmental migrants. Mass migration and famine are likely to take us towards civil unrest and ultimately war, raising the terrifying possibility of societal collapse.
- By the 2050s, 2 billion people will face 60 degree temperatures for more than a 10th of the year. In much of the world, masks are needed daily to protect your lungs from smog. The Northeast US now sees 25 major floods a year, up from one a year in

2020. 140 million people are displaced by food and water insecurity or extreme weather events.

- Without drastic action, Earth's temperature is on course to rise by a terrifying 3°C or even 4°C by the end of the century. That amount of heating would make some parts of the world simply too hot for people and animals to live on, and would cause enough sea level rise that could flood the homes of hundreds of millions of people, eventually submerging some countries completely.
- Scientists have warned that at 4°C of heating "It's difficult to see how we could accommodate eight billion people or even half of that. There will be a rich minority of people who survive with modern lifestyles, no doubt, but it will be a turbulent, conflict-ridden world." By 2100 we would have been heading towards a population of around 11.2 billion.
- In a 4C world, rising seas have rendered coastlines unrecognisable and Florida has largely disappeared. Coral reefs have largely vanished, taking with them a quarter of the world's fish habitats. Many insects have been consigned to history, causing massive crop failures due to lack of pollinators. Severe drought affects 40% of the planet. An area the size of Massachusetts burns in the US every year and Southern Spain and Portugal have become a desert, tipping millions into food and water insecurity.
- The carbon footprint of the average American is over 250 times that of individuals in several African countries.

2. Some key facts about global heating and why it's an emergency

Who says we are in an emergency?

- Ban Ki-Moon, Former UN Secretary General: "This is an emergency and for emergency situations we need emergency action."
- Sir David Attenborough: "We are facing a man-made disaster on a global scale. Our greatest threat in thousands of years"
- Professor James Hansen, former Director of the NASA Goddard Institute for Space Studies: "We are in a planetary emergency."
- Professor Schellnhuber, Founding director of the Potsdam Institute for Climate Impact Research: "Based on sober scientific analysis, we are deeply within a climate emergency state but people are not aware of it."
- Professor Lonnie Thompson, director of the Byrd Polar Research Centre: "Virtually all of us [scientists] are now convinced that global warming poses a clear and present danger to civilization."
- In November 2019, a group of more than 11,000 scientists from 153 countries declared "clearly and unequivocally that the Earth is facing a climate emergency" and that without deep and lasting changes, the world's people face "untold human suffering".

- A recent report from JP Morgan economists warned that human life "as we know it" could be threatened by climate change, and that without action being taken there could be "catastrophic outcomes". It said that climate change "is a global problem but no global solution is in sight."
- Pope Francis: "The urgent need for interventions can no longer be postponed." "Listen to the cry of the earth and the cry of the poor, who suffer the most."
- Rowan Williams, Former Archbishop of Canterbury: "The future of the human race is now at stake."

How hot is it and why should we care?

- 19 of the top 20 hottest years have occurred in the last 19 years, and the past four years have been the hottest on record.
- In 2019, nearly 400 temperature records were broken across 29 countries
- July 2019 was the hottest month ever recorded
- As of July 2020, January 2020 was the warmest January ever recorded in Europe, we saw the hottest May ever and we already have an 85% chance that 2020 will turn out to be the hottest year on record.
- We are currently 1.1C hotter than pre-industrial times, about 150 years ago
- Temperatures are higher today than they have been in at least 2,000 years
- The *rate* of temperature rise is unprecedented in past 10,000 years long before human civilisation began
- The current rate of heating of our planet is equivalent to five nuclear bombs going off every second
- All this extra heat is causing melting of ice caps, rising sea levels and damage to wildlife, as well as changes to our climate that can result in the spread of diseases and extreme weather such as heatwaves, forest fires, droughts, storms and floods.
- Such events can not only damage our homes, affect our health and harm our wildlife, but they can also prevent the crops that feed us from being able to grow.
- As temperatures continue to rise, events like this will become more and more common.
- Even if you're lucky enough to escape the direct impacts of these events, remember most of us depend on food that's been imported from other parts of the world; so if crops are damaged by extreme weather events far away, that's likely to lead to price rises or even shortages of certain foods where YOU are too.
- For example, the UK imports around 50% of its food, including around 70-80% of its fruit and vegetables.
- By around 2050, if things keep going as they are, it's predicted that as many as 1.5 billion MORE people 5 billion people in total are likely to face shortages of food and clean water, particularly those in Africa and South Asia. That's one in every two people.
- The latest CCC report tells us that by the 2050s, 700,000 more people in England will be at risk of severe flooding, a quarter of the farmland in England and Wales will only support grass most years, and our thirst for water in England will be 1.1bn litres greater than the water we actually have.

Why is it so hot?

- Carbon dioxide is a greenhouse gas. Greenhouse gases cause heating of our atmosphere.
- Carbon dioxide has been being released in enormous quantities due to human action since the beginning of agriculture, but especially since the start of the Industrial Revolution.
- Carbon dioxide is released by the burning of fossil fuels, by deforestation, and from the ploughing of our soils.
- Other greenhouse gases released in huge quantities due to human action include methane from paddy fields and from cow farts, and nitrous oxide from animal waste and chemical fertilisers.
- Carbon dioxide levels are higher today than at any point in the last 3 million years.
- Carbon dioxide levels are rising today 100 times faster than any previous natural changes in the last 800,000 years
- Scientists have found a "human fingerprint" on climate change, proving that the excess carbon dioxide in our atmosphere has come from the burning of fossil fuels and that it is this excess which is causing the atmosphere to heat up.
- Other factors such as sunspots and volcanoes have had negligible impact on global heating.
- According to the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report: "Evidence for man-made warming of our climate system is unequivocal."
- Analysis of 11,602 peer-reviewed articles on "climate change" and "global warming" published in 2019 found the scientific consensus on global warming being caused by human action has now reached 100%.
- Stefan Rahmstorf, Professor of Physics of the Oceans at Potsdam University: "In just 100 years, fossil fuel use has more than undone 5000 years of natural cooling. It's hotter now than any time in the history of human civilisation. We are catapulting ourselves out of the Holocene into uncharted territory. Current life on Earth is not adapted to this."

What do we need to do?

- In 2016, the Paris Agreement was signed by 175 countries and the European Union, which pledged to "keep a global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C"
- In 2018, a special report from the IPCC a large group of scientists known as the Intergovernmental Panel on Climate Change whose job it is to weigh up all the science related to climate change - laid out why it is essential that we limit warming to 1.5°C.
- It warned that if we reach heating of 1.5°C or higher, we increase the risk of long-lasting or irreversible changes to our planet – such as the total loss of some ecosystems.
- The report said that at 1.5°C heating, many people across the globe will struggle to cope with the changing climate, especially the very poorest and most vulnerable people in the world, and that every extra bit of warming matters.

- It is now widely understood that if we go above 1.5°C warming we risk setting off irreversible chain reactions beyond human control, which are predicted to have catastrophic impacts on our planet.
- McKinsey Global Institute Climate Risk and Response Report, 2020: "While adaptation is now urgent and there are many adaptation opportunities, climate science tells us that further warming and risk increase can only be stopped by achieving zero net greenhouse gas emissions."

How do we stay below 1.5C?

- The IPCC report stated that in order to have even a 50% chance of remaining below 1.5°C warming, global carbon dioxide emissions must now "decline by about 45% from 2010 levels by 2030, reaching net zero around 2050".
- The latest UN Emissions Gap Report says in order to achieve this emissions must reach a peak in 2020 at the *latest* and then there must be unprecedented, rapid reductions in global carbon emissions of at least 8% per year.
- Even if we DO manage to cut emissions in half by 2030, to achieve net zero by 2050 we'd still need to suck in LOADS of carbon dioxide from the air.
- To do this we'd need to plant trillions of trees, in an area at least the size of the United States of America, and also invent extra technology to pull carbon dioxide out of the atmosphere.
- It's true that some Carbon Capture and Storage (CCS) technology does already exist, but not in a way that's anywhere close to being reliable enough or being able to be used on large enough scales.
- Professor Stephan Harrison, Professor of Climate and Environmental Change, University of Exeter: "We have all the resources we need to deal with this. There is nothing magical about reducing carbon dioxide in the atmosphere. There is nothing magical about the greenhouse effect. We know exactly how to deal with it. We just don't have the political or economic will to do this."

Where are we currently heading?

- Keeping heating below 1.5C is a target most countries are not set to meet.
- Although global carbon dioxide emissions are not rising quite as steeply as they used to be, they are still going up.
- At our current emissions rates, we are on track to go OVER 1.5°C heating by around 2030 and to hit 2°C heating by around 2050 which would break the promise made in the Paris Agreement.
- Without drastic action, Earth's temperature is on course to rise by a terrifying 3°C or even 4°C – by the end of the century.
- That amount of heating would make some parts of the world simply too hot for people and animals to live on, and cause an amount of sea level rise that could flood the homes of hundreds of millions of people, eventually submerging some countries completely.
- Professor Johan Rockström, director of The Potsdam Institute for Climate Impact Research, fears that in a 4°C-warmer world: "It's difficult to see how we could accommodate eight billion people or even half of that. There will be a rich minority of people who survive with modern lifestyles, no doubt, but it will be a turbulent,

conflict-ridden world." By 2100 we would have been heading towards a population of around 11.2 billion.

3. Key facts about what's going on as a result of global warming and other changes to our planet?

Extreme weather happening NOW

- Climate change results in more frequent and more extreme heatwaves, heavier rainfall, stronger winds, more extreme tropical storms and more intense hurricanes.
- In general, wetter areas are getting wetter increasing the risk of flooding and dryer areas are getting drier increasing the risk of droughts and forest fires.
- The number of extreme climate-related disasters including extreme heat, droughts, floods and storms has doubled since the early 1990s
- More than two thirds of all extreme weather events investigated were made more likely, or more severe, by human-caused climate change.
- According to Morgan Stanley, from 2016-2018 climate-related disasters cost the world \$650 billion.
- The clean-up bill following the storms in the UK in February 2020 is set to top £360 million, with the average household claiming £36,000 on insurance.
- Some insurance companies are already warning that they will soon stop insuring basements in London, New York and Mumbai.
- Alex Hynes, Managing Director of Scotland's railway: "Britain's railways can no longer cope with the effects of the climate crisis."
- We are headed towards more wildfires, killer storms and heatwaves, rising sea levels, droughts, flooding and desertification putting food supplies at risk.
- Dr Sunita Narain, Director General of the Centre for Science and Environment: "Join the dots. It's happening. It's happening in your world, it's happening in my world. And let's be very clear about this it is going to get much worse."
- Professor Peter Stott, the Met Office: "World leaders should be listening not just to scientists but also to the people who are being affected by extreme weather events right now. They are seeing it with their own eyes and suffering from it. Humanity just won't be able to cope with the world we are heading for."

What will happen to our weather by 2050?

- The IPCC warns that we will be experiencing extreme heat waves of the kind seen in 2019 every summer.
- The IPCC predicts that an additional 350 million people across the globe will be at risk of heat stress, an additional 420 million people will frequently be exposed to extreme heatwaves, and an additional 65 million people will be exposed to exceptional heatwaves
- The UK is predicted to see a trebling of heat-related deaths with 7,000 dying due to excess heat each year.
- Tropical cyclones are more likely to be hitting Western Europe.

• Michael Mann, director of the Pennsylvania State Earth System Science Centre: "Unrestrained climate change means we will see many more [hurricane] Harveys in the future."

Melting ice and rising seas NOW

- Increased temperatures melt ice from above whilst warming oceans melts sea ice from below
- Warm water expands and takes up more space, causing sea levels to rise
- Water from melting ice sheets and glaciers also causes sea level rise
- Over the past 40 years, the amount of ice we have lost from our planet averages out to 300 double-decker-bus-sized chunks of ice *every second*.
- In the Arctic, sea ice has shrunk by 40% since 1979. It is now declining at a rate of 12.8% per decade.
- If we allow the sea ice loss to continue, scientists say that all the polar bears will soon be gone.
- In February 2019, at a time when sea ice in this region is usually growing, an area of ice in the Bering Sea shrank by 566,000 square km that's the loss of an area larger than the size of Spain.
- Antarctica has lost three trillion tonnes of ice in the past 25 years and is now losing 252 billion tonnes a year that's six times more than it was 30 years ago.
- Scientists are terrified that parts of what's known as the West Antarctic Ice Sheet are showing signs of an unstoppable and irreversible collapse. That could lock in several metres of sea level rise in the coming centuries, which would be absolutely catastrophic.
- Melting glaciers threaten the water supplies of 1.9 billion people living downstream, who depend on fresh water for domestic supplies, irrigation and industry.
- The Environment Agency estimates that 800 coastal homes in the UK will be lost in the next 15 years and that rising seas are likely to eventually force many people to have to relocate.

What will happen to sea levels and flooding by 2050?

- The IPCC predicts that the combination of rising seas and more intense storms will mean in many low-lying megacities and small islands the sort of extreme flooding events previously occurring only once a century could be happening every year.
- Rising sea levels are projected to make land currently inhabited by more than 300 million people likely to flood at least once a year.
- Without major investment, flooding in cities across the globe is forecast to cost over US\$1 trillion per year
- The UK will be one of the worst affected, with large parts of the English coastline and areas around its rivers, such as Sussex, Kent, Cambridgeshire and Central London, predicted to regularly fall below sea level.

Threats to global food supplies NOW

• Over 124 million people across 51 countries and territories are already facing crisis levels of acute food insecurity or worse, requiring immediate emergency action.

- 95% of what we eat relies on healthy soils, yet, due to intensive farming practices, deforestation, and more extreme weather events, more than one third of our planet's fertile topsoil has been lost in the past 150 years with a subsequent reduction both in the yields of crops and in how nutritious they are.
- Today, topsoil across the globe is being lost a whopping 10–100 times faster than it can be regenerated.
- This problem is made worse by the fact that we've lost 80% of our earthworms creatures that usually play a key role in the restoration of degraded soils.
- The UK has some of the most degraded soils on Earth, with nearly 85% of fertile peat topsoil in East Anglia having been lost since 1850, and the remainder at risk of being lost over the next 30–60 years.
- In August 2020, the National Farmers' Union announced that the UK was facing the worst wheat harvest since the 1980s due to consecutive seasons of extreme weather - with yields likely to be down by up to 40%. As a result, some millers have already increased the price of flour by 10%.

What will happen to global food supplies by 2050

- Jim Yong Kim, Former President of The World Bank: "Climate change will lead to battles for food."
- Professor Mark Maslin, Professor of Climatology at University College London: "We know that with increased storms, increased floods, droughts and heat waves, production of food will be more problematic. Ensuring people have access to clean, safe drinking water will become much more difficult."
- Land degradation and climate change are predicted to reduce crop yields by an average of 10% globally and up to 50% in certain regions.
- If things keep going as they are, it's predicted that as many as 1.5 billion MORE people 5 billion people in total are likely to face shortages of food and clean water, particularly those in Africa and South Asia. That's one in every two people.
- It is estimated that continued loss of pollinating insects would affect more than 75% of global food crop types, risking US\$235-577 billion of global crop output annually.

Threats to global water supplies NOW

- Climate change is making droughts longer and harsher.
- Professor Mark Maslin, Professor of Climatology at University College London: "We know that with increased storms, increased floods, droughts and heat waves, production of food will be more problematic. Ensuring people have access to clean, safe drinking water will become much more difficult."
- United Nations world water development report: An estimated 3.6 billion people (nearly half the global population) already live in areas that are potentially water-scarce at least one month per year.
- Melting glaciers threaten the water supplies of 1.9 billion people living downstream
- The melting of glaciers in both the Andes and the Himalayas threatens the water supplies of hundreds of millions of people, leading to a potential reduction in water supply for more than 240 million people in the Himalayan region alone.
- In Europe, the loss of mountain glaciers will have devastating impacts on the provision of fresh water to France, Germany, Spain such as the Rhone in France

and the Rhine in Germany, as well as the Bulgarian Black Sea Coast and the Caspian Sea Coast.

• According to the Greater London Authority, London is likely to have water supply problems by 2025 and "serious shortages" by 2040.

What will happen to global water supplies by 2050?

- Sir James Bevan, chief executive of England's Environment Agency: "On the present projections, many parts of our country will face significant water deficits by 2050, particularly in the southeast, where much of the UK population lives."
- By around 2050, the IPCC warns that 410 million people living in urban areas will be regularly exposed to severe drought.

Threats to health

- Rising temperatures allow the bacteria that cause deadly diarrhoea to thrive, which is leading to increased spread of infectious diseases such as malaria and dengue fever.
- Rising temperatures are also creating conditions for tropical diseases to spread to parts of the world where they are not usually seen.
- According to The Lancet: "Climate change is the biggest health threat of the 21st century."
- It has been estimated that if all countries met the Paris Agreement to stay below 2C, we could avoid 138,000 premature deaths a year across the entire European region of the World Health Organisation.
- Damages to health from air pollution alone cost over 4% of GDP in the 15 countries with highest emissions

Biodiversity loss on land

- Habitat destruction, climate change, overconsumption and pollution, are having a huge impact on the animals, plants and other species that we share our planet with.
- A recent report warns that a "biological annihilation" of wildlife is eroding the foundations of economies, livelihoods, food security, health and quality of life worldwide.
- Humanity's collective action has declined population sizes of thousands of species of mammals, birds, fish and reptiles by an estimated 60% since the 1970s
- Land insects have declined by about 43% since the 1960s
- More than a quarter of 116,000 assessed species were found to be threatened with extinction, including 25% of mammals
- Over 10% of insect species are now threatened with extinction
- 70 out of the top 100 human food crops that supply about 90% of the world's nutrition are pollinated by bees, yet there's been a "drastic decline" in numbers of bumblebees across Europe and North America and bees are now threatened with extinction.
- An estimated 1 million more species are threatened with extinction over the next few decades due to human action
- Species are going extinct 100 to 1,000 times faster than they would be doing naturally

- The 400 vertebrate species that went extinct in the last 100 years should have taken around 10,000 years to disappear naturally.
- Scientists say we have entered the Sixth Mass Extinction event.
- The State of Nature report found that the UK was "amongst the most nature-depleted countries in the world", with 1 in 4 British mammals now at risk of extinction
- Losing the diversity of our ecosystems, combined with climate breakdown, will place huge strains upon our social systems and it is feared that this could result in the collapse of our globally interconnected network of civilizations resulting in great suffering and the deaths of many hundreds of millions and perhaps even billions of people.
- Sir David Attenborough: "This isn't just about losing wonders of nature. With the loss of even the smallest organisms, we destabilise and ultimately risk collapsing the world's ecosystems the networks that support the whole of life on Earth."
- Over the next century, the combination of rapid changes in climate and human-caused damage to our land will present terrestrial ecosystems with an environment that is unprecedented in recent evolutionary history - one that has not been seen in at least the last 65 million years.

Biodiversity loss in the oceans

- Marine heatwaves are sweeping oceans "like wildfires", with extreme temperatures killing swathes of sea-life and destroying crucial species that provide shelter and food to many others such as seagrass, kelp and corals.
- Repeated heat stress has now caused nearly half of the world's corals to bleach and then die.
- Coral reefs are some of the most important and diverse ecosystems on the planet, which support up to one million other species and provide food, protection from storms and livelihoods for nearly one billion people.
- By 2030 we will have lost 70-90% of our coral reefs.
- By 2050, more than 99% of our corals will have been wiped out.
- Excess carbon dioxide in our atmosphere also causes increases in the acidity of our oceans, which affects marine life, from shellfish like clams and oysters to whole coral reef communities, by removing minerals that they require in order to grow their shells and skeletons.
- Ocean acidification is occurring approximately ten times faster than anything experienced during the last 300 million years jeopardising the ability of ocean systems to adapt.
- Our oceans are already more acidic today than they have been in 65 million years.
- It is thought that extreme changes in ocean acidity like this may have played a large role in mass extinction events in our prehistoric past.
- Rising temperatures also deplete oxygen levels in water, which can lead to suffocation of the sea creatures living within it.
- In the last 70 years, low-oxygen ocean zones have grown by more than 4.5 million square km an area roughly as large as the entire European Union whilst the number of ocean 'dead zones' (areas with exceedingly low oxygen) has increased by a factor of 10.

Air pollution

- Professor Thomas Munzel, Specialist in Interventional Cardiology, Risk Factors and Prevention, University Medical Centre of Mainz: "There is an air pollution pandemic"
- According to the World Health Organisation, a staggering 9 out of 10 people on our planet breathe polluted air.
- Outside air pollution causes 4.8 million extra early deaths a year
- Across Europe, toxic air results in nearly 800,000 early deaths each year.
- In the UK, air pollution results in 28,000 to 36,000 premature deaths a year and over 60% of people in England are living in areas which exceed the World Health Organisation's legal limits for air pollution
- Air pollution in London has been estimated to cause the deaths of 24 people every single day.

Water pollution and plastic

- More than 80% of wastewater resulting from human activities is discharged into rivers or sea without any pollution removal.
- Nitrates from animal waste and agricultural fertilisers can find their way into lakes and coastal waters and cause algal blooms which poison waters and dramatically reduce the growth of plants and fish through a process called eutrophication
- 300-400 million tonnes of heavy metals, solvents, toxic sludge, and other wastes from industrial facilities are dumped annually into the world's waters.
- An estimated 300 kg of plastic enters the ocean every second.
- Plastic pollution has resulted in the presence of more than 100 million particles of macroplastics in only 12 regional seas worldwide, and 51 trillion particles of microplastic floating on the ocean surface globally.
- The Great Pacific Garbage Patch, which is halfway between Hawaii and California, contains more than 1.8 trillion pieces of plastic, weighs more than 43,000 cars and is three times the size of France.
- Off the coast of Oregon, USA, there's an average of 11 tiny pieces of plastic to every oyster. Nearly all of these microplastic pieces came from clothing fibres or abandoned fishing gear.
- A huge proportion of 'recycling' ends up in the ocean, buried in landfill or even being burned. Whilst it's still better to separate recyclable items from landfill, the best option is to reduce the amount of plastic that you use in the first place.

Deforestation

- Since the onset of agriculture about 12,000 years ago, the number of trees worldwide has dropped by nearly half the loss of a staggering 3 trillion trees.
- Forest cover is now at only 68% of what it was in preindustrial times.
- Around 15 billion trees are now being cut down each year
- Deforestation in the Brazilian Rainforest is now occurring faster than three football fields a minute
- In July 2019 alone, Brazil lost an area of forest bigger than the size of Greater London.
- Deforestation releases the same amount of carbon every year as driving 600 million cars

• Deforestation, cow burps and farts, and fertilisers produce more greenhouse gases than all the world's cars, lorries and planes put together

Livestock farming / food consumption

- The IPCC estimates that, if the entire spectrum of food production were factored in from growing crops to transportation and packaging - up to 37% of all greenhouse gas emissions come from the global food system.
- Currently 26% of the planet's ice-free land is being used for livestock grazing
- An area the size of Panama (18 million acres) being lost to livestock production each year.
- One third of our croplands are currently being used to grow food to feed livestock
- Whilst 80% of the world's farmland is used for livestock, it provides us with less than 20% of the world's calories and only one third of the protein
- See below on individual action

Mass displacement, civil unrest and societal collapse

- In the first six months of 2019, extreme weather events displaced a record seven million people from their homes.
- On our current path, by 2050 it is estimated that there could be up to 200 million environmental migrants
- Mass migration and famine are likely to take us towards civil unrest and ultimately war, raising the terrifying possibility of societal collapse.
- Lord Nicholas Stern, Professor of Economics and Government: "Climate change is the result of the greatest market failure the world has seen. We risk damages on a scale larger than the two world wars of the last century. What we are talking about is extended world war. People would move on a massive scale. Hundreds of millions, probably billions of people would have to move."
- Professor Joseph Stiglitz, Economist, recipient of the Nobel Memorial Prize in Economic Sciences: "The climate emergency is our third world war. Our lives and civilization as we know it are at stake, just as they were in the Second World War."
- Michelle Bachelet, United Nations High Commissioner for Human Rights: "Climate crisis is the greatest ever threat to human rights. The economies of all nations, the institutional, political, social and cultural fabric of every state, and the rights of all your people, and future generations, will be impacted."
- Major General Munir Muniruzzaman, former chairman of the Global Military Advisory Council on Climate Change: "Climate change is the greatest security threat of the 21st century"

Threats to our economy

- Mark Carney, former Governor of the Bank of England: "Once climate change becomes a defining issue for financial stability, it may already be too late."
- Mark Carney also said: Efforts to reverse global warming will lead to "major changes" in the UK economy. Companies that fail to respond to climate change "will go bankrupt without question"

Climate justice: the poor will suffer the most, due to the lifestyle of the wealthy

- The poorest in the world will suffer the most, when generally they've contributed the least to the problem people who are socially, economically, culturally, politically, institutionally or otherwise marginalized are often highly vulnerable to climate change.
- The carbon footprint of the average American is over 250 times that of individuals in several countries in Africa
- Dr Sunita Narain, Director General of the Centre for Science and Environment: "You have to understand, this is also a crisis for the world. The fact is that if the poor are suffering today, then the rich will also suffer tomorrow."

4. Key facts about how global governments are making things WORSE

Banks

- Bank financing for fossil fuels has actually INCREASED every year since the Paris Agreement was signed in 2016.
- In 2018 alone, \$654 billion was spent funding fossil fuels
- The 35 leading investment banks have financed the fossil fuel industry with £2.2 trillion since the Paris Agreement .
- 15% of global carbon emissions come from investments made through the City of London
- Nine of the world's top fossil fuel investors of the last three years have global or national headquarters in the City of London.
- Among UK-based banks, Barclays and HSBC have given £158 billion to fossil fuel industries since the Paris Agreement, making them the worst offenders in Europe.
- According to an NGO Global Witness report in April 2019, over the next decade the global oil and gas industry are planning on spending a further \$4.9 trillion on exploration and extraction in new fields.

Governments are funding MORE fossil fuel use

- There is enough carbon in already-running oil, gas and coalfields to take us not just over 1.5°C but also way past the 2C "safe" limit set by the Paris Agreement, the impacts of which would be devastating.
- Despite repeated pledges to end fossil fuel subsidies by 2025, governments from the seven largest advanced economies in the world continue to provide at least US\$100 billion each year to support the production and consumption of oil, gas and coal
- According to a report from the European Commission in 2019, the UK has the biggest fossil fuel subsidies of the whole of the EU
- Over the past five years, the UK has spent £2.5 billion on fossil fuel projects the vast majority being in low- and middle-income countries.
- The UK spends £10.5 billion a year supporting fossil fuel companies in the UK, significantly more than the £7.3 billion a year it spends supporting renewable energy. It should be noted that the government argues that this 'financial support' is not technically a 'subsidy'.
- In 2018 alone, Britain increased its support for fossil fuel projects overseas to almost £2 billion

• The UK government plans to spend £1 billion supporting a fracking company in Argentina - money that the government had previously committed to spending on green energy.

Embedded carbon emissions in UK imported goods

- Nearly half of the UK's carbon footprint comes from emissions embedded in our products and released overseas and are therefore not included in our official carbon accounting figures.
- In October 2019 the Office for National Statistics said the UK had become the biggest net importer of carbon dioxide emissions per capita in the G7 group of wealthy nations – outstripping the US and Japan – as a result of buying goods manufactured abroad.
- 90% of UK emissions associated with the consumption of manufactured products are embedded within them, so only 10% goes into our carbon accounting figures.
- 8% of the UK embedded emissions for manufactured products come from China.

UK Government inaction

- In July 2019 a damning report from the Committee on Climate Change the government's own official climate change advisers, warned that the government is failing to cut emissions fast enough.
- It found that, over the past year, the government had delivered just 1 of 25 critical policies needed to get emissions reductions back on track.
- The most recent report from the CCC, published in July 2020, revealed another *staggering failure* of the government to listen to its own advisors and to meet its own targets.
- The 2020 CCC report showed that, of the 21 key indicators to show progress towards meeting carbon budgets and the 2050 target, only 4 were on track.
- Not only that, but of the 31 milestones for actions recommended by the CCC last year in order to get to net zero by 2050, only 2 had been fully achieved and there had been partial progress on 15, with the other 14 showing no progress.
- The latest report also stated that the carbon budgets that the UK had put in place are not consistent with getting to net zero by 2050, and that we need to see much steeper reductions in emissions.
- Indeed, we've been off track to meet the fourth and fifth carbon budgets (2023-2032) for four years now, which were only going to take us towards an 80% reduction in emissions by 2050 anyway, not even net zero.
- The 2020 report warned that not a single sector had demonstrated resilience for a 2°C hotter world, a temperature we are projected to be hitting around 2050
- Terrifyingly, the report also stated that a governmental priority should now be preparing us for the possibility of a 4°C hotter world, a situation that, in 2008, the CCC had advised the government was the threshold of "extreme danger", to be avoided at all costs.
- The 2020 report also warned that even though we have seen a temporary drop in emissions due to COVID-19, we mustn't use this as an excuse to ramp up emissions again. Indeed, it is the total accumulated emissions over time that matters, not how much in any one year, and if we make this period just a blip and emissions recover it

will have made almost no difference in the long run. We need to cut our emissions by far more than this every year.

- The report stated that the next few months "have huge significance", and that if we prioritise the economy without thinking about climate change we could be locking ourselves into even higher emissions in the long term.
- According to the Joint Nature Conservation Committee, a government advisory body, the UK is set to miss 14 out of 19 of its biodiversity targets for 2020.

5. Key facts about what we need to do now

- Individual actions help, but the answer to Earth's emergency MUST involve political, collective action proportionate to the scale of the crisis
- Our individual carbon footprint an average of 6 or so tonnes in the UK is certainly important but is tiny compared to the 40 billion tonnes of carbon dioxide emitted globally.
- The 15.7 tonne carbon footprint of the average American is over 250 times that of the average person in several African countries.
- We'd need to plant trillions of trees to stay below 1.5C warming an area of new forest the size of the United States of America
- Greta Thunberg: "Until you start focusing on what needs to be done rather than what is politically possible there is no hope. We cannot solve a crisis without treating it as a crisis. We need to keep the fossil fuels in the ground and we need to focus on equity. And if solutions within this system are so impossible to find then maybe we should change the system itself."
- Natural climate solutions, such as the transition to sustainable food and land use systems, could create 70 million jobs by 2030, bring 1 billion people out of poverty and add US\$ trillions in productive growth.

6. What we can do as individuals - remembering individual action is not nearly enough (not covered in EPE)

Stopping flying

- In the words of a recent headline in The Financial Times: "The only way to hit net zero by 2050 is to stop flying."
- A flight from London to Rome produces 4 times more carbon emissions than travelling the equivalent distance by international rail
- Return transatlantic flights for a family of four emit the same amount of carbon as 13 years of that family's electricity emissions combined.
- Less than 18% of the world's population has ever set foot on a plane, yet everyone pays the price of the emissions.
- 85% of carbon offsetting schemes fail to reduce emissions from airlines
- Food flown into the UK emits a hundred times more carbon dioxide than food that's been shipped in

Cutting down on meat and dairy

- Cutting out livestock and replacing the calories with plant products would free up 76% of the world's agricultural land for reforestation, habitat restoration and other less intensive forms of agriculture.
- Going plant-based is the single biggest way that you can reduce your impact on the planet
- The latest research shows that cutting out all animal products would give a whopping 28% reduction in global greenhouse gas emissions across all sectors of the economy.
- If we want to protect the planet from the dangerous impacts of climate change the amount of beef eaten by people in rich countries such as the UK and the US needs to fall by a whopping 90% and the amount of milk by 60%.
- In a single day, the 1.5 billion cows on our planet produce around 680 billion litres of methane
- For every 100g of protein, beef produces up to 105kg of greenhouse gases, while tofu produces less than 3.5 kg and nuts, peas and pulses produce even less
- Producing a kilo of beef requires 50 times more water than for a kilo of tomatoes, cabbages or potatoes, and a kilo of chicken requires 14 times more.

Reducing food waste

- Around 1.3 billion tonnes of household food is wasted every year. That's equivalent to a mountain over 8 times the height of the Eiffel Tower, and 3km across.
- In the UK, nearly 5 million tonnes of household food is wasted every year.