

COP28: Five reasons for optimism on climate

By Matt McGrath

Environment correspondent at COP28 in Dubai

It's easy to feel overwhelmed by bad news about climate change. Even for those of us used to covering it every day as journalists, it can sometimes seem relentless.

Of course we are right to worry. This year will be the warmest twelve months in 125,000 years, scientists say, as its impacts hit home in every corner of the Earth.

But as delegates try to reach a deal at the COP28 climate summit in Dubai, there are some real reasons to be optimistic too. Here's a look at some of them:

1 - The secret solar revolution

On streets and in estates all over the UK, there's a silent solar insurgency going on.

Every month this year around 17,000 houses added solar panels right across Britain.

Even in parts of the UK not known for their sunny days, homeowners are sticking the silicon to their roofs; about 8% of homes on the Isle of Anglesey in north Wales are now powered by solar, in Aberdeenshire, it's close to 6%.

Driving this boom is cost - solar is not just the cheapest form of electricity now, according to some it is the cheapest in history.

It's not just people putting up panels in an orderly way, according to Jenny Chase, a solar expert from BloombergNEF, we're seeing a growing amount of "balcony solar" as well.

"You literally just put your solar module somewhere maybe on your balcony, maybe in your garden, and that can cover your house's instantaneous demand when it's sunny," she told BBC News.

"It doesn't go into the grid, it doesn't store it, you don't need to register it. It's just shaving a little bit off your power use."

The world is following suit. China has installed more solar this year than the US has in the past three decades.

There's now real hope that power from the Sun will be the key to a safer Planet Earth.

2 - The EV that pays for itself

The right time to buy an electric car must rank as one of the most popular dinner conversations across the UK.

Sales are generally booming, with some 18% of new vehicles sold around the world in 2023 powered by batteries.

But high costs and worries about the range of an electric vehicle are real deterrents at present.

However new technology is in the process of changing that perception and possibly making EVs more cost effective.

The idea is called Vehicle2Grid, or V2G and it's essentially the kit needed to send and receive power from your car to your house and on to the national grid.

The idea is that if you can charge the car when energy is cheap, you can sell it back to the grid when it's more expensive and turn a profit.

With cars spending 95% of their time parked up, they are perfectly suited to the role of buying and selling energy, like little four wheeled market traders.

This is critically important for the national grid which is in the process of adding more and more renewables like wind and solar, and needs somewhere to send that power when it's too windy or sunny.

And imagine if you were charging your car with energy from your own solar panels - you could sell this free energy to the grid for a decent margin, trials have shown.

3 - Betting on big batteries

All across the UK, large scale battery farms are springing up at amazing speed - this one I visited in Buckinghamshire was completed in just 10 months.

It can power 300,000 homes for up to two hours and is one of the biggest in Europe.

Prices for storage on this scale continue to tumble, and experts estimate that by the end of this decade there will be enough batteries in place to power 18 million homes across the UK. That's an astonishing rate of growth.

According to experts, batteries are the key link in the chain that will makes net zero achievable for electricity production.

What is net zero?

"If you didn't have storage, you could only have a certain amount of renewable energy," Peter Kavanagh, chief executive of Harmony Energy, told BBC News. His company is installing large scale batteries across the UK and Europe.

"When you add storage into the mix, it makes it a lot easier to get to a majority share of renewable energy. So we can go much further to reach net zero and it makes a 100% renewables grid technically possible."

4 - Here comes the judge

Clarity from the courts is another reason to be cheerful about climate change.

A number of major climate cases go before the judges in the next 12 months

Whatever way they rule, it will spell out exactly where the law stands on what's legal and who's responsible for rising temperatures.

One of the biggest climate suits in history is taking place in the US, where Oregon's Multnomah County is making a \$52bn damages claim against a range of oil and gas producers for causing a massive heatwave back in 2021.

If they win this case, it will have huge legal and financial implications, potentially leading to dozens more lawsuits against fossil fuel producers, similar to the court struggles that big tobacco endured in the past.

One of the lawyers in the case is Jeffrey Simon, who's well known for winning a big money opioid civil suit in Texas.

He says that the courts are emerging as the most powerful lever for climate action, by hitting fossil fuel producers in their pockets.

"Getting the defendants to reduce their emissions is not within the reach of the civil justice system in the US, but holding them accountable for the harm they've caused, and the misrepresentations they've made, which has slowed adaptation to those problems, is definitely within their power," he told BBC News.

5 - "When hope and history rhyme..."

My fifth reason to be cheerful about climate is history.

Looking at this challenge from a historical perspective really shows how much progress has been made in an incredibly short period of time.

Just eight years ago, when the Paris climate agreement was signed, this remarkable document didn't contain any mention of coal, oil and gas, which are the biggest sources of planet warming gases.

Now as negotiators from all over the world meet in Dubai for COP28, there's a real hope that the parties will agree to finally end the use of these fuels in some shape or form this century.

This would consign to history the root cause of climate change and give the world a fighting chance of defeating our biggest collective threat.

How climate change worsens heatwaves, droughts, wildfires and floods

Extreme weather is becoming more frequent and more intense in many places around the world because of climate change.

Here are four ways climate change is linked to extreme weather.

1. Hotter, longer heatwaves

Even a small increase to average temperatures makes a big difference.

This is because the whole distribution of daily temperatures shifts to warmer levels, making hotter days more likely and more extreme.

"A small shift makes a big difference". A line chart showing how small changes in the climate increases the probability of more hot weather and more extreme weather. Scientists use computer simulations to assess whether extreme weather events have been made more likely by warming caused by humans.

For example, the intense heatwaves that hit southern Europe and the southern US and Mexico in July 2023 would have been "virtually impossible" without human-caused climate change, according to the World Weather Attribution network (WWA).

But these events are no longer rare. If global warming reaches 2C above the pre-industrial period - before humans started burning fossil fuels at scale - these events are expected to happen every two to five years, the WWA warns.

In the UK, temperatures topped 40C for the first time on record in July 2022. This would have been extremely unlikely without climate change, the WWA says.

As well as happening more frequently, heatwaves are becoming longer and more intense in many places, including the UK.

This can happen as a result of heat domes, which are areas of high pressure where hot air is pushed down and trapped in place, causing temperatures to soar over large areas.

One theory suggests higher temperatures in the Arctic - which has warmed more than four times faster than the global average - are causing strong winds called the jet stream to slow, increasing the likelihood of heat domes.

A graphic showing how heat domes are formed. 1) A mass of warm air builds up in still and dry summer conditions 2) High pressure in the atmosphere pressures the warm air down 3) The air is compressed and gets even hotter

Is the UK getting hotter?

Life at 50 degrees

2. Longer droughts

Linking climate change with specific individual droughts can be difficult. The availability of water depends on more than just temperature and rainfall.

But longer and more intense heatwaves can worsen droughts by drying out soil. This makes the air above warm up more quickly, leading to more intense heat.

Increased demand for water from humans, especially farmers, in hot weather puts even more stress on the water supply.

In parts of East Africa, there were five failed rainy seasons in a row between 2020 and 2022, as the region suffered its worst drought for 40 years.

WHAT IS CLIMATE CHANGE

Climate change has made droughts like this at least 100 times more likely, according to the WWA.

3. More fuel for wildfires

Fires happen naturally in many parts of the world. It's difficult to know if climate change has caused a specific wildfire to spread because other factors are also relevant, such as changing land use.

But climate change is making the weather conditions needed for wildfires to spread more likely, according to the UN's climate body, the IPCC.

Extreme and long-lasting heat draws more and more moisture out of the ground and vegetation.

These tinder-dry conditions provide fuel for fires, which can spread at an incredible speed, particularly if winds are strong.

Rising temperatures may also increase the likelihood of lightning in the world's northernmost forests, increasing the risk of fires.

Canada experienced by far its its worst wildfire season on record in 2023, with around 18 million hectares (45 million acres) burned.

Climate change more than doubled the likelihood of the extreme "fire weather" conditions in eastern Canada that allowed the fires to spread, according to the WWA.

Canada's worst wildfire season

Extreme wildfires are projected to become more frequent and intense in future across the globe, according to a recent report by the UN Environment Programme (UNEP). This is due to the the combined effects of shifting land use and climate change

The number of the most extreme fires may rise by as much as 50% by 2100, UNEP suggests.

How do wildfires start?

4. More extreme rain

For every 1C rise in average temperature, the atmosphere can hold about 7% more moisture.

This can result in more droplets and heavier rainfall, sometimes in a shorter space of time and over a smaller area.

A chart showing how record temperatures cause extreme rainfall. 1) More heat from sun causes greater evaporation 2) More moisture forms clouds 3) Heavier rain
Parts of northern Libya were hit by devastating floods in September as a result of extreme rainfall and two major dam collapses. The heavy rainfall was made as much as 50 times more likely by climate change, according to the WWA.

The destruction was exacerbated by social and political instability in the country, which hampered efforts to adequately prepare for and respond to such storms - for example by maintaining dams.

Not all extreme rainfall events can be attributed to climate change, as other factors including changes to land use can play a role. For example, the WWA says that climate change only had a "limited" role in the heavy rainfall that hit northern Italy in May 2023.

But globally, the frequency and intensity of heavy rainfall events has increased over most land regions due to human activity, according to the IPCC.

And heavy precipitation will generally become more frequent and intense with further warming, the IPCC says.

Global temperatures are rising because of human activity, with more intense heatwaves and rising sea-levels among the consequences.

Things are likely to worsen in the coming decades, but urgent action can limit the worst effects of climate change.

What is climate change?

Climate change is the long-term shift in the Earth's average temperatures and weather conditions.

The world is now about 1.1C warmer than in the late 19th Century.

Change in global temperature compared to the pre-industrial average. Temperatures were around average until about 1950, but have increased since, regularly exceeding 1C of warming in the last decade.

Are humans causing climate change?

The climate has changed throughout the Earth's history. But natural causes cannot explain the particularly rapid warming of the past century.

This recent climate change has been caused by humans.

It is mainly because of the widespread use of fossil fuels - coal, oil and gas - in homes, factories and transport.

When fossil fuels burn, they release greenhouse gases - mostly carbon dioxide (CO₂). This traps extra energy in the atmosphere near the Earth's surface, causing the planet to heat up.

Since the start of the Industrial Revolution - when humans started burning large amounts of fossil fuels - the amount of CO₂ in the atmosphere has risen by about 50%.

The CO₂ from burning fossil fuels also has a distinctive chemical fingerprint. This matches the type increasing in the atmosphere.

Over the last 800,000 years, CO₂ concentrations in the atmosphere have fluctuated between about 180 and 300 parts per million in a sawtooth like pattern. Today, CO₂ levels are around 420 parts per million and have risen sharply over the last century - a near vertical line on the graph.

What are the effects of climate change so far?

A global average temperature increase of 1.1C might not sound much.

However, it has had a huge effect on the environment, including:

more frequent and intense extreme weather, such as heatwaves and heavy rainfall
rapid melting of glaciers and ice sheets, contributing to sea-level rise

huge declines in Arctic sea-ice

ocean warming

People's lives are also changing.

For example, parts of East Africa recently suffered their worst drought in 40 years, putting more than 20 million people at risk of severe hunger. In 2022, European heatwaves led to an abnormal increase in deaths.

How will future climate change affect the world?

The more temperatures increase, the worse the impacts of climate change become.

Limiting long-term temperature rises to 1.5C is crucial, according to the UN's climate body, the IPCC.

The science is not completely certain, but the impacts of 2C global warming versus 1.5C could include:

Extreme hot days would be on average 4C warmer at mid-latitudes (regions outside the poles and tropics), versus 3C at 1.5C

Sea-level rise would be 0.1m higher than at 1.5C, exposing up to 10 million more people

More than 99% of coral reefs would be lost, compared with 70-90% at 1.5C

Twice the number of plants and vertebrates (animals with a backbone) would be exposed to unsuitable climate conditions across more than half their range

Several hundred million more people may be exposed to climate-related risks and susceptible to poverty by 2050 than at 1.5C.

Infographic showing much greater loss of species at higher levels of global warming
The 1.5C limit was partly designed to avoid crossing so-called "tipping points".

Beyond these points, changes could accelerate and become irreversible, such as the collapse of the Greenland Ice Sheet. However, it's not clear precisely where these thresholds sit.

About 3.3 to 3.6 billion people are highly vulnerable to climate change, the IPCC says.

People living in poorer countries are expected to suffer most as they have fewer resources to adapt.

This has led to questions about fairness, because these places have typically been responsible for a small percentage of greenhouse gas emissions.

However, knock-on impacts could be felt over wide areas. For example, crop failures linked to extreme weather could raise global food prices.

What are governments doing about climate change?

In a landmark agreement signed in Paris in 2015, almost 200 countries pledged to try to keep global warming to 1.5C.

To achieve this, net zero CO₂ emissions should be reached by 2050. Net zero means reducing greenhouse gas emissions as much as possible, and removing any remaining emissions from the atmosphere.

Most countries have, or are considering, net zero targets.

However, greenhouse gas levels are still rising quickly and the world is "likely" to warm beyond 1.5C, the IPCC says.

Chart showing projected trends in emissions and levels of warming. According to current policies, the world is heading for around 2.7C warming by 2100. [November 2022]

However, there has been progress in some areas like renewable energy and electric vehicles.

World leaders meet every year to discuss their climate commitments. The next summit (COP28) will be held in the United Arab Emirates between 30 November and 12 December 2023.

Major changes need to come from governments and businesses, but small changes by individuals can help:

take fewer flights

use less energy

improve home insulation and energy efficiency

switch to electric vehicles or live car-free

replace gas central heating with electric systems like heat pumps

eat less red meat

More on Climate Change bottom strapline

Top image from Getty Images. Climate stripes visualisation courtesy of Prof Ed Hawkins and University of Reading.

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