IMPERIAL
Grantham Institute

Climate communicators' evidence bank

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Introduction

The need for easy access to robust, up-to-date facts and figures was identified as part of a project working with climate scientists to support them in sharing their expertise in meaningful and compelling ways with wider audiences.

This evidence bank provides evidence on a range of topics related to climate change that come up frequently in the media and wider public debate: the state of play on carbon budgets; the level of deployment of low-carbon technologies; and the climate impacts that are already being experienced and are expected to be experienced in future.

In this edition, we have also included some information about President Trump's record on climate and low-carbon technology deployment during his previous term in office.

Using the evidence bank

What is this evidence bank for?

The purpose of this evidence bank is to make it easy to find robust, up-to-date facts and figures on key aspects of climate change mitigation, impacts and adaptation.

It also provides short briefings on relevant contextual information (such as government policies) that it might be useful to be aware of before engaging on public platforms.

Who is this evidence bank for?

This evidence bank is for communicators who need to comment or share perspectives on topical issues relating to climate change, such as government announcements, news stories and other current events.

How to use this evidence bank

The facts and figures in this evidence pack may be useful for climate communicators when preparing for "set piece communications opportunities" such as media interviews, panel discussions and keynote addresses. It is designed to be used alongside our "Communicating on 1.5°C" toolkit for climate scientists.

We do not suggest that users attempt to memorise all the facts presented here! Rather, we hope it will provide a useful list from which communicators can select appropriate facts to illustrate their speaking points. Each section contains facts at the global level (for engagement with international audiences) and at the UK (for domestic audiences).

How was this evidence bank developed?

The need for easy access to robust, up-to-date facts and figures was identified through a series of focus groups with climate scientists, which explored challenges to effective communication experienced by the scientific community.

The evidence presented in this document was identified through a desk-based process and reviewed by Nicole Kuchapski, Cait Hewitt, Dr Caterina Brandmayr, Dr Robin Lamboll, Dr Ben Clarke and Dr Clair Barnes.

Updates and additions

We plan to update this document periodically. If you have any feedback or suggestions for topics to include in the future, please leave us some comments here: https://forms.office.com/e/XwFsuvYXjX

1. Progress towards 1.5°C & Carbon budgets

Global

Global warming to date

- Human-induced global warming is currently estimated at 1.3°C.[1]

Carbon budgets

- To limit warming to 1.5°C, our remaining carbon budget would be exhausted in 2029 based on current emissions.[2]

Global warming projections

- On our current trajectory, we are predicted to reach 1.5°C of warming in the early 2030s.[3]
- Without changes to current pledges to reduce emissions, the chance of limiting warming to 1.5°C is virtually zero.[4]
- If we do not improve the ambition and delivery of emissions reductions, the world will be on course for a temperature increase of 2.6-3.1°C over the course of this century.[5]

Emission reduction commitments

- The UNEP (United Nations Environment Programme) projects that, under current policies, 11 of the G20 nations will miss their 2030 emission reduction targets (Nationally Determined Contributions, or NDCs), including the UK.[6]
- Current NDCs are predicted to reduce 2030 emissions by up to 10% (compared to 2019 emissions). This is not enough to meet the Paris Agreement goals: a 28% reduction is needed to limit warming below 2°C, while a 42% reduction is required to limit warming below 1.5°C. These estimates have not changed since the 2023 emissions gap assessment.[7]
- The upcoming 2035 NDC targets need to reduce global emissions by 57% and 37% (compared to 2019) to keep warming below 1.6°C* and 2°C, respectively.[8]
- At COP29 (November 2024):
    - three countries (the United Kingdom, Brazil and the United Arab Emirates) announced new 2035 NDC targets. [9] (See below for more on the UK's NDC).
    - Canada, Chile, the European Union, Georgia, Mexico, Norway, and Switzerland announced that their forthcoming NDCS would introduce economy-wide emissions reduction targets in line with limiting warming to 1.5°C.[10]
    - Countries from the G-ZERO coalition, including Bhutan, Madagascar, Panama, and Suriname, announced that they had already achieved net zero greenhouse gas emissions.[11]

* This is a pathway that allows for temporary overshoot of 1.5°C

Policy context - Global

- All parties to the Paris Agreement must submit an NDC every five years representing their 'highest possible ambition' to reduce emissions. Each new NDC must represent a 'progression' from their previous NDC. The 2035 NDCs are due for submission in early 2025 ahead of COP30.*

UK

Emission reduction commitments

- The UK's NDC for 2030 is to reduce greenhouse gas emissions by at least 68% compared to 1990 levels.[12]
- In 2024, the independent climate advisory body the Climate Change Committee (CCC) recommended that the UK's forthcoming 2035 NDC should commit to reducing emissions by 81% (compared to 1990 levels). At COP29, Prime Minister Keir Starmer announced that this target would form part of the UK's 2035 NDC.[13]
- The UK also has a legally binding target to achieve Net Zero greenhouse gas emissions by 2050.[14] Scotland has its own target to become a net zero economy by 2045.[15]

Progress on cutting emissions

- The UK has achieved all three of its carbon budgets to date (which go up to 2022). A major contributor has been the phasing out of coal power and increases in renewable electricity generation. The UK phased out coal power more quickly than almost every other nation and was the first G7 country to phase-out coal power.[16]
- However, progress has slowed and the CCC has warned that the UK is not on track to achieve its 2030 NDC goal.[17] The UNEP also predicts that the UK will miss its 2030 NDC target.[18]

Future emission reductions

- The CCC highlight agriculture, buildings and transport as key sectors to decarbonise to meet the UK's next emissions reduction milestone in 2027.[19]

Policy context - UK

- The UK's 2035 NDC is currently in preparation and is due in early 2025.* The Prime Minister has already announced the headline target, which will be at least an 81% reduction of greenhouse gas emissions by 2035, compared to 1990 levels.*
- The government is due to agree the seventh carbon budget (for 2038-2042) in 2025. The CCC will issue its advice in February 2025.*

Further resources - Progress towards 1.5°C & Carbon budgets

- Climate Change Tracker: This website provides up-to-date data on climate indicators based on the IPCC AR6 methods, in collaboration with the Indicators of Global Climate Change (IGCC) initiative.
- UK Climate Change Committee : The UK's independent adviser on climate change, which regularly reports to Parliament on the UK's progress in reducing emissions and adapting to climate change.
- European Scientific Advisory Board on Climate Change: An independent body which provides the EU with scientific knowledge and advice about climate change, evaluates EU climate policy, and assesses how best to meet targets.
- House of Commons Library Research Briefing: The UK's plans and progress to reach net zero by 2050 (26 September 2024). This briefing summarises the context of net zero, the plans in place to reach this goal, and current progress.
- Grantham Institute Background Briefing: Limiting temperature increase to 1.5°C above pre-industrial levels. A short explainer on the Paris Agreement 1.5°C target and our progress towards it.
- Grantham Institute Background Briefing: Pledges and policies: are we on track to meet climate goals? A short overview of global pledges and policies to reduce emissions and the size of the gap remaining to meet climate goals.
- Grantham Institute Background Briefing: Why is achieving net zero necessary? A short explainer on the rationale for net zero.
- Granthan Research Institute Explainer: Why should the UK take action on climate when it is responsible for only a relatively small fraction of today's global emissions? A short explainer on the UK's international roles and responsibilities.

2. Low-carbon technology deployment & mitigation action

Global

Deployment of renewables

- Between 2010 and 2023, global solar photovoltaic capacity increased 40 times and wind power six times.[20]
- A target to triple renewable energy capacity by 2030 was agreed in 2023 at COP28.[21] The IEA forecasts that growth in renewable energy capacity is currently on track to fall just short of this goal (growing by 2.7 times by 2030).[22]
- In 2023, renewable energy made up 30% of global power generation. The IEA predicts that this will rise to 46% in 2030. [23]
- Solar and wind power are predicted to make up 95% of growth in renewable power generation until 2030.[24] The required growth in solar power to reach the COP28 target is already on track to be achieved.[25]
- The exponential growth in renewable energy capacity is rapidly exceeding modelled predictions. For example, twenty years ago, the IEA projected that electricity from solar power would reach 929 TWh by 2030, but by 2022 solar power generation had already far exceeded this level, reaching almost 1,300 TWh.[26]
- In 2023, China commissioned as much solar PV as the entire world did in 2022.[27]

Cost reductions in renewables

- Renewable energy costs are lower than ever; 81% of new renewable electricity projects provide cheaper electricity than the average fossil fuel plant.[28]
- The global average cost of electricity for solar power decreased by 90% from 2010-2023, with decreases of 70% for onshore wind and of 63% for offshore wind over the same period. In 2023, all three renewable power sources provided cheaper energy on average than fossil fuels. The costs of battery storage projects declined by 89% from 2010-2023.[29]
- The cost reductions for renewable energy technologies have consistently outperformed the predictions. For example, annual cost reductions for solar photovoltaics (solar panels) of 2.6% had been predicted between 2010 and 2020. Costs actually declined by 15% per year over this period.[30]

Uptake of electric vehicles (EVs)

- Sales of electric cars (plug-in hybrid and battery electric vehicles) have increased rapidly, up from 550,000 globally in 2015 to almost 3 million in 2020 (almost 5% of total sales), and almost 14 million in 2023 (around 18% of all

sales).[31] EV sales are now predicted to reach 45% of global passenger-vehicle sales by 2030 and 73% by 2040.[32]

- The uptake of EVs has exceeded earlier expectations. In 2020, BNEF predicted that 10% of new car sales in 2025 would be for EVs.[33] In fact as soon as 2022 EVs represented 14% of new car sales.[34]
- Globally, the lifetime emissions of a medium-sized battery electric car sold in 2023 will be half as much as a conventional equivalent.[35]

Cost reductions in electric vehicles

- Electric cars are getting cheaper over time. The IEA estimate that in China, more than 60% of electric cars sold in 2023 had a cheaper upfront price than their average conventional car equivalent. However, electric cars remained 10%-50% more expensive than conventional equivalents in Europe and the US. A rapid transition to electric vehicles (supported by policy) is key to bringing more affordable models to market.[36]
- The total cost of ownership includes fuel costs, insurance, maintenance and depreciation as well as the upfront price of vehicles. Higher fuel efficiency and lower maintenance costs can mean that electric vehicles are cheaper to run than conventional cars. And when petrol prices are higher than electricity prices there are further cost benefits.[37]

Policy context - Global

- COP28 Global renewables and energy efficiency pledge – this details the COP28 commitments regarding renewable energy and energy efficiency.
- International Energy Agency Global EV Policy Explorer – A summary of the key announced policies related to EVs.

UK

Deployment of renewables

- In 2023, renewable energy made up 48% of power generation in the UK.[38]
- The Government recently announced a mission to deliver clean power by 2030. This transition will primarily rely on increased deployment of offshore wind, supported by deployment of onshore wind and solar power alongside storage solutions such as batteries and making better use of the opportunity to flex demand to match clean power supply.[39]
- The 2024 renewable energy auction was the largest to date. 131 new green infrastructure projects were approved, including the largest offshore windfarm in Europe. These projects could power the equivalent of 11 million British homes.[40]

Cost of renewables

- The lifetime cost of building and operating onshore wind, offshore wind and solar developments was estimated by the Office for Budget Responsibility (OBR) in 2023 to be less than that of gas. Importantly, this *includes* the additional systems costs relating to the fact that renewables can only operate when the wind is blowing or sun is shining.[41]
- Recent high energy bills in the UK have been driven by increases in fossil fuel prices after Russia invaded Ukraine in 2022. The price of electricity in the UK is set by gas generation, so when gas prices go up, so does the price of electricity.[42]

Uptake of electric vehicles (EVs)

- The uptake of EVs in the UK has exceeded expectations.[43]
- Sales of electric cars (battery electric and plug-in hybrid) have been rapidly increasing in the UK, from 29,000 in 2015 to 178,000 in 2020, and 450,000 in 2023 (around 25% of all cars sold in 2023).[44] This rapid growth is already having a meaningful impact on emissions, according to the Climate Change Committee.[45] (It should also be noted, however, that the CCC also states that despite this progress, the rate of emissions reductions from surface transport still needs to "increase significantly" between now and 2030, which will require the uptake of electric vehicles to "accelerate rapidly".)[46]

Cost reduction of electric vehicles (EVs)

- Charging a medium-sized electric car at home can cost less than half the price (~8p per mile) of refuelling an equivalent petrol vehicle (~13p-17p per mile, as of January 2024). Some suppliers offer charging tariffs of under 3p per mile. Charging an EV on the public network costs about the same as fuelling an equivalent petrol car [47]
- The cheapest electric cars sold in the UK in 2023 retailed for £27,000-£30,000.[48]

- Autotrader reports that price drops for EVs are closing the price gap between electric and conventional vehicles in the second-hand EV market. In some cases, EVS are even substantially cheaper, with differences of £600 reported.[49]

Domestic heating

- Only 48% (as of 2022) of English homes were energy efficiency rating band C or higher. The government's aspiration is for as many homes as possible to achieve this level by 2035.[50]
- The UK is significantly behind other European countries in heat pump installation, but the recent increase in grant funding for the Boiler Upgrade Scheme (from £5000 to £7500 per installation) has already increased installation rates.[51]

Policy context - UK

- The Clean Power 2030 Action Plan was published in December 2024.
- The Government recently announced that it would be creating a new publicly owned energy company, Great British Energy, to boost clean energy deployment.
- The Zero Emissions Vehicle (ZEV) mandate requires 80% of new cars and 70% of new vans sold in Great Britain to be zero emission by 2030, increasing to 100% by 2035.

Further resources – low-carbon technology deployment and mitigation action

- IPCC Fact Sheets on Mitigation of Climate Change, including information on agriculture, buildings, carbon dioxide removal, demand side responses, energy, finance & investment, industry, transport and urban systems.
- International Energy Agency Renewable Energy Progress Tracker (October 2024): Up to date summary of historical renewable energy deployment, current deployment, and renewables ambitions by 2030.
- International Energy Agency World Energy Outlook (October 2024): Annual report of global energy analysis and projections in the context of emissions, energy security, and economies.
- UK Digest of United Kingdom Energy Statistics (DUKES) – Government data sets on UK energy production and use. (30 July 2024)
- National Energy System Operator (NESO), Clean Power 2030: Advice on achieving clean power for great Britain by 2030 advice on what will be needed in generation, flexibility and the grid to meet achieve the 2030 clean power target.
- House of Commons Research Briefing: Energy efficiency of UK homes (22 July 2024)
- House of Commons Research Briefing: Electric vehicles and infrastructure (12 July 2024)
- House of Commons Research Briefing: Help with energy efficiency, heating and renewable energy in homes (10 January 2024)
- Grantham Institute Background Briefing: How cost-effective is a renewables-dominated electricity system in comparison to one based on fossil fuels? A short explainer on renewable energy system costs.
- Grantham Institute Background Briefing: How reliable is a renewables-dominated electricity system in comparison to one based on fossil fuels? A short explainer on flexibility and intermittency
- Grantham Institute Background Briefing: How well equipped is the UK charging infrastructure to support greater uptake of electric vehicles? A short explainer on the rollout of charging infrastructure in the UK.
- Grantham Institute Background Briefing: How well suited are heat pumps to UK homes and how economical area they? A short explainer on heat pumps.

3. Impacts of climate change

i. What impacts are we seeing already?

Global

Scale of climate change impacts

- Approximately 3.3–3.6 billion people live in contexts that are very vulnerable to climate change[52] – approximately 40% of the world's population.[53]
- But almost everyone is experiencing climate change; analysis by Climate Central showed that 96% of the global population experienced climate-change-affected temperatures in 2021-22.[54] On the 13th August 2024, half of all people worldwide (4.1 billion people) experienced unusual temperatures made at least three times more likely by climate change.[55]

Extreme weather events – rainfall and flooding

- Heavy rain in October 2024 in Spain led to flooding which killed over 200 people, displaced 400 people, and disrupted access to clean water and electricity for thousands more. This is the highest death toll of any flood event in Europe since 1967. A super rapid analysis concluded that climate change had made the rainfall more likely and more intense.[56]

Extreme weather events – extreme heat

- The IPCC has concluded that "it is *virtually certain* that hot extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s" with "*high confidence* that human-induced climate change is the main driver". In other words, every heat wave in the world is now made stronger and more likely to happen because of human-caused climate change.[57]
- July 2024 saw extreme heat across the Mediterranean. Morocco saw temperatures over 48°C which were linked to at least 21 deaths. This heatwave was made ~3°C hotter by climate change and would have been almost impossible without greenhouse gas emissions from human activities. This extreme heat also affected events such as the Paris 2024 Olympics.[58]

Extreme weather events – storms

- Hurricane Helene affected much of the Southeastern United States in September 2024, killing over 220 people - the highest death toll from a hurricane in the mainland US since 2005. A further two million people were left without power. Climate change has made landfalls in the same region and of the same magnitude as Helene about 150% more frequent.[59]

Sea level rise

- Global mean sea level has increased by an estimated 0.20m from 1901-2018.[60]
- Scientists predict that the Maldives, which is inhabited by half a million people likely to be the first country to lose its land because of climate change-related sea level rise.[61] The country is already trying to adapt, having constructed a climate-resilient artificial island raised 2m above sea level. Climate change in the Maldives is also causing severe coral bleaching, which has prevented important development projects from continuing.[62]

UK

Extreme weather events – rainfall and flooding

- October 2023 to March 2024 was the wettest period on record for the UK and the third on record for Ireland. The storm rainfall in the autumn/winter of 2023 was made about 20% heavier by human-caused climate change. This increased rainfall and flooding significantly impacted farming in the UK, reducing crop yields and requiring land restoration. For example, vegetable production in the UK dropped by 4.9% from 2022 to 2023. In response to this damage the government mobilised a one-off grant of £60 million to help farmers recover.[63]

Extreme weather events – extreme heat

- The July 2022 heatwave involved a prolonged period of heat from July 10-25th which peaked on July 18-19th. This was the first time that temperatures of 40°C and above were recorded in the UK. The heatwave contributed to wildfires that destroyed 20 homes in East London and up to 1,256 excess deaths. The event was made at least 10 times more likely and ~2°C hotter by climate change.[64]

Exposure to impacts overseas – disease risk

- Modelling suggests that London is currently warm enough for mosquitos and ticks to survive. If these species were to establish, there would be an increased risk of spreading diseases like Lyme disease and dengue fever.[65]

Exposure to impacts overseas – food security

- Extreme weather in 2018 (including extreme summer heat and dry spells), may have increased household food bills by an estimated £7.15 a month according to the Centre for Economics and Business Research (Cebr).[66]
- The ECIU estimate that, compared to 2021, British households are likely to have paid an extra £361 for food in 2022 and 2023 due to the impacts of climate change domestically and internationally [67] – almost £7 per week.

Further resources – impacts of climate change

- WMO State of the Climate 2024 An annual summary and update of key climate indicators, including surface air and ocean temperatures, sea ice extent and sea level.
- Attribution studies of recent extreme weather events: World Weather Attribution
- World Weather Attribution: Guidance on discussing extreme weather events and their links to climate change. Guidance from WWA on how to discuss extreme weather, climate change, and attribution studies for the media.
- National Centers for Environmental Information: Global climate report – An analysis of global temperatures and precipitation, including historical data.
- Carbon Brief: How climate change affects extreme weather around the world – Global analysis of extreme weather events, and the proportion that can be linked to climate change.
- European Commission: Consequences of climate change – A summary of the natural, social, business, and territorial consequences of climate change.
- Met Office: State of the UK Climate 2023 – A review of the climate and significant meteorological events of the year.
- Met Office: Impacts of climate change – A summary of the current and future impacts of climate change.
- Vousdoukas, M.I., Athanasiou, P., Giardino, A. et al. Small Island Developing States under threat by rising seas even in a 1.5 °C warming world. Nat Sustain 6, 1552–1564 (2023). https://doi.org/10.1038/s41893-023-01230-5. This paper assesses future flood risk due to sea level rise for SIDS, and estimates the damage that could be prevented by limiting warming to 1.5°C.
- Grantham Institute Background Briefing: Autumn and winter storms in the UK 2023-24. A short explainer exploring the role that climate change played in the very active storm seasons experienced in the UK and Ireland.

ii. What future projected impacts are expected?

Global

Extreme heat

- Extreme heat can cause heatstroke, disrupt sleep, damage organs, worsen chronic conditions, and can even cause death. It may also prevent healthcare services from operating, for example through power shortages, transport disruption, water shortages, and health impacts on healthcare workers.
- Older and less-abled adults, children, pregnant people, those certain medical conditions, and people taking certain medications are at the highest risk of these negative health effects.[68]
- People with higher exposure are also at greater risk, including those who: work outdoors; live in poor quality housing; are poor, displaced or experiencing homelessness; and athletes and attendees of outdoor events.[69]
- High humidity can make the impacts of extreme heat worse.[70]

Impacts at 1.5°C	**Impacts at 2°C**	**Impacts at 3°C**
Almost 14% of the world population could be exposed to severe heat waves at least once every 5 years.[71]	Almost 37% of the world population could be exposed to severe heat waves at least once every 5 years (around 1.7 billion more people than in the 1.5°C scenario).[72]	
Across the world's largest cities, annual longest heat wave duration could be 16.3 days (global average). The average city may experience 4.9 heat waves per year.[73]	Across the world's largest cities, annual longest heat wave duration could be 18.4 days (global average). The average city may experience 5.4 heat waves per year.[74]	Across the world's largest cities, annual longest heat wave duration will be 24.5 days (global average). The average city may experience 6.4 heat waves per year.[75]
547 million people will be exposed to 30 or more days at 35°C+ each year.[76]		701 million people will be exposed to 30 or more days at 35°C+ a year.[77]

Extreme rainfall

- Extreme rainfall can result in crop damage, soil erosion, and increased flood risk. Flood events may result in property damage and mortality.[78]

Impacts at 1.5°C	Impacts at 2°C
• Average rainfall will increase by approximately 2%, but the frequency of rainfall extremes will increase by an estimated 17%.[79]	• Average rainfall will increase by approximately 4%, but the frequency of rainfall extremes will increase by an estimated 36%.[80]

Sea level rise

- Even if warming is kept below 1.5°C, sea levels will rise by 15–23cm by 2050, putting coastal communities at risk of flood damage and loss of land.[81] Countries at risk include Pakistan and the Netherlands, as well as small islands with low-lying land areas like Fiji.[82]

Transmissible diseases

Impacts at 1.5°C	Impacts at 2°C
• Climate warning can increase the transmission of certain diseases (including malaria, dengue, chikungunya, yellow fever, Zika, West Nile virus, and Lyme disease) by increasing species' ranges, activity periods, or altering the seasonality of disease transmission cycles.[83]	• Many climate-sensitive health risks (including undernutrition, malaria, dengue, chikungunya, yellow fever, Zika, West Nile virus, and Lyme disease) are predicted to be greater under 2°C compared to 1.5°C of warming.[84]

UK

Extreme heat

Impacts at 1.5°C	Impacts at 2°C
• Average annual heat-related mortality will increase from ~1400 (in 1990–2019) to ~2500.[85]	• Average annual heat-related mortality will more than double from ~1400 (in 1990–2019) to ~3700.[86]
Summer maximum temperatures are likely to increase. Summer maximum temperatures will be approximately: • **32.9°C in London** (2.3°C hotter than 1981-2000 baseline of 30.6°C), • **31.3°C in Manchester** (2.7°C hotter than 1981-2000 baseline of 28.6 °C), and • **26.2°C in Aberdeenshire** (1.8°C hotter than 1981-2000 baseline of 24.4°C.[87]	Summer maximum temperatures are likely to increase. Summer maximum temperatures will be approximately: • **33.8°C in London** (3.2°C hotter than 1981-2000 baseline of 30.6°C), • **31.5°C in Manchester** (2.9°C hotter than 1981-2000 baseline of 28.6 °C), and • **26.9°C in Aberdeenshire** (2.5°C hotter than 1981-2000 baseline of 24.4°C.[88]
	• The schools most at risk of extreme heat[†] may experience internal temperatures above 26°C for up to 50% of school days, and up to 15 school days above 35°C in an average year.[89]
	• Average additional direct fiscal costs[‡] of heatwaves could be £420 million per year (2024-25 prices).[90]

[††] Risk categorisations were based on the Generalised Additive Model (GAM) simulated ensemble mean risk (expected annual total number of days the school overheats) for the 35°C overheating threshold and the 2°C global warming. High risk = the top 10% of schools in the risk metric (i.e. above the 90th percentile of the risk metric).

[‡] Direct costs include, for example, increased costs on the health system. Indirect costs might include losses to the economy from reductions in productivity and employment.

Extreme rainfall

Impacts at 1.5°C	Impacts at 2°C
• England and Wales could receive a projected 8 days (currently 7) per year of intense and prolonged rainfall that could lead to river flooding.[91]	• England and Wales could receive a projected 9 days per year of intense and prolonged rainfall.[92,93]
	• Climate change is the dominant factor affecting future flood risk. Under 2°C of warming, Expected Annual Damages will increase by an estimated £4.2bn by the 2080s.[94] • The areas with the largest future flood risk are Hull, the City of Portsmouth, and Sedgemoor District Council.[95]
	• Average additional direct fiscal costs[§] of river and surface flooding could be £260 million per year (2024-25 prices).[96]

Exposure to impacts overseas – disease risk

- Increased temperatures mean the UK will become more suitable for multiple new mosquito species and lengthen activity periods for some species. This may increase the transmission of diseases like chikungunya, dengue, and zika.[97]

Exposure to impacts overseas – food security

- The UK is particularly reliant on imports of fruit and vegetables (only 17% and 55% respectively is produced domestically). The Government's UK Food Security Index 2024 notes that "supply can be affected where imports are from countries vulnerable to climate change and extreme weather".[98]

[§] Direct costs might include, for example, the cost of repairing infrastructure or compensating households and businesses for uninsured losses. Indirect costs might include losses to the economy resulting from a reduction in productivity and employment.

Further Resources – future projected risks

- PROVIDE Climate Risk Dashboard : An interactive platform with detailed predictions of how various overshoot scenarios of the Paris Agreement temperature thresholds will impact the environment and economies.
- Met Office Local Authority Climate Service: An interactive resource to help local UK authorities understand current and future climate risks in their area.
- House of Commons Library Research Briefing: Climate change adaptation and resilience in the UK (27 March 2024). This explains the targets for climate change adaptation in the UK, the current policy approach, and an overview of progress.
- UK Health Security Agency Health Effects of Climate Change in the UK: state of the evidence 2023. This report provides evidence, analysis and recommendations based on climate change projections for the UK.

Policy context

Global

- The Adaptation Fund (established 2001) allows climate-vulnerable communities in developing countries to fund climate resilience projects. The fund is financed by governments, private finance, and Certified Emission Reductions (CERs).
- The Early Warnings for All initiative (launched 2022) aims to improve knowledge, monitoring, warning dissemination, and response capabilities for those most at risk from climate change.
- The Loss and Damage fund, designed to improve the negative effects of climate change that cannot be avoided by mitigation and adaptation efforts, was agreed at COP28 in 2023, where US$662 million was pledged for the fund. This was increased to US$731 million at COP29, but still falls far short of the US$150-300 *billion* annual loss and damage costs by 2030 estimated by the High-Level Expert Group on Climate Finance.

UK

- The UK's third National Adaptation Programme (NAP3) details the government's plans to adapt to the impacts of climate change from 2023 to 2028.
- There are also adaptation plans for the devolved nations: Northern Ireland, Scotland and Wales.
- The CCC's assessment concluded that "NAP3 falls short of what is needed."*
- The CCC has now started the Independent Assessment of UK Climate Risk that will underpin the UK's Fourth Climate Change Risk Assessment (CCRA4). The assessment will be delivered in 2026.

4. First Trump Presidency (2017-2020)

Trends

Trends in emissions

- US emissions from fossil fuels decreased by over 10% from 2017 to 2020 (5304.55 Mt CO_2 to 4759.79 Mt CO_2).[99]

Trends in renewable energy

- The US' total renewable energy capacity increased by over 28% from 2017 to 2020 (260.5 GW to 333.7 GW), primarily due to increased deployment of solar power and onshore wind.[100]

Policy Changes

- The New York Times report that the previous Trump administration reversed, revoked, or rolled back 98 rules associated with environmental protection.[101]
- President Trump announced his intention to withdraw the US from the Paris Agreement in 2017. UN regulations delayed this withdrawal to November 2020.[102] On his first day in office in 2021, President Biden started the process to re-enter the US into the Paris Agreement, which officially occurred in February 2021.[103]

State and city level action

- Climate action continued at the state and city level. For example, the America Is All In coalition aims to meet the obligation of the Paris Agreement and has more than 5,000 members, including 11 states, 361 local governments and 2,964 businesses.[104]

International climate policy introduced 2017-2020

Despite President Trump's actions to roll back US climate policies, there were examples of other countries strengthening their commitments:

- In 2017 Sweden introduced a target to achieve net zero greenhouse gas emissions by 2045 at the latest, and net negative emissions after this. Emissions in 2045 would be at least 85% lower than in 1990.[105]
- In 2019, the UK made its 2050 net zero greenhouse gas emissions target legally binding. This superseded the previous legally binding target to reduce emissions by 80% compared to 1990 levels by 2050.[106]

Further resources – Trump presidency 2017-2020

- Carbon Brief (2024) Experts: What does a Trump presidency mean for climate action? – A summary of opinions of how a second trump presidency may impact climate action in the US from scientists, policy experts, and campaigners. Key quote: "Trump's win will not change the global green transition. Green energy is becoming cheaper and more competitive. This economic trend, not politics, will lead action from now on."
- World Resources Institute (2024) Trump May Thwart Federal Climate Action, but Opportunities for Progress Remain – a summary of the first Trump presidency's record on climate change and predictions for Trump's second presidency.
- New York Times (2021) The Trump Administration Rolled Back More Than 100 Environmental Rules. Here's the Full List. – A summary of environmental policies changed by the Trump administration, based on Regulation Trackers for environment-related policy changes from Harvard Law and Columbia Law.

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