Written evidence submitted by the Met Office

Environmental Audit Committee: Heat Resilience and Sustainable Cooling

Introduction

The Met Office is the UK's National Meteorological Service (NMS), a Public Sector Research Establishment (PSRE) and an Executive Agency of the Department for Science, Innovation and Technology. We are responsible for monitoring and predicting the weather; providing the National Severe Weather Warning Service (NSWWS); and in February 2023, became a Category 2 responder. This formally recognised our well-established role in supporting the resilience community, particularly in response to weather hazards.

In addition, the Met Office Hadley Centre provides climate science and services to help governments, industries and people understand and prepare for climate change, including the monitoring of global and national climate variability. Within this, the Met Office Hadley Centre Climate Programme (MOHCCP) delivers policy relevant scientific evidence and advice for the UK Government and beyond to address the societal challenges of climate change, helping to build a more climate resilient future.

Weather and climate play a number of roles in human health, including through air quality, food quality and availability, flooding, potential changes in the range of vector borne disease, and through the impact of high temperature[1]. It is in this capacity that we respond to this inquiry, focussing on work delivered by the Met Office which is relevant to questions 1 to 6 of the terms of reference. In addition to the response below, we have contributed to a separate joint submission by the Met Office Academic Partnership Programme, a collaboration between the Met Office and various Academic Institutions, which focusses on the Partnership's areas of work. Further information can be provided on request of the Committee.

Inquiry response

1. **What evidence exists on the relationship between heat and human health (mortality and morbidity), and which communities are worst affected?**

The latest Intergovernmental Panel on Climate Change (IPCC) AR6 WGII assessment[2] finds that extreme heat events in all regions have resulted in human mortality and morbidity. The UK's Third Climate Change Risk Assessment Technical Report[3], supports this finding within the UK, stating that 'the risk of acute mortality increases at high temperatures'. Human-induced warming has led to a rise in global mean temperatures resulting in the increased intensity and frequency of extreme heat events and all regions currently experience at least 10 additional days per year when thermal deaths are expected to occur.[4] The UK may see an average of 15 million days of outdoor work lost to heat-stress in a 2°C warmer world, potentially representing more than £1.5 billion in

[1] Heat health is affected by a combination of weather factors in addition to temperature, such as humidity, wind and air quality.
[2] IPCC (2022): *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, et al, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.
[3] Kovats, S. and Brisley, R. (2021) 'Health, communities and the built environment. In: The Third UK Climate Change Risk Assessment Technical Report' [Betts, R.A., Haward, A.B., Pearson, K.V. (eds.)]. Prepared for the Climate Change Committee, London
[4] Nikolaos Christidis, Dann Mitchell, Peter A. Stott (2019) "Anthropogenic climate change and heat effects on health", *International Journal of Climatology* 39 (12) pp. 4751-4768 **https://doi.org/10.1002/joc.6104**

economic losses. These impacts are greater if warming reaches 4°C[5]. With this in mind, the Met Office has begun work to quantify how this increase in extreme events may impact the population of the UK and further afield.

Climate attribution[6] is a scientific technique that can be used to quantify the role of climate change in the probability or intensity of an extreme event, or to quantify the role of climate change in the scale of impacts from an extreme event. Several studies have demonstrated this link.

1.1. Effect of anthropogenic warming on health relevant thermal extremes

The Met Office conducted a study[7] aiming to quantify the human influence on high-temperature-induced stress and on mortality. This is done through studying two indices: High Risk Warming (HRW) and High Risk Days (HRD), which describe the intensity and frequency, respectively, of thermal-death-related warming. The study compares the HRW and HRD over a historic period covering the 20th century, and also analyses the indices in projections of future climate under climate change.

The study revealed that the intensity and frequency of thermal-death-related warming in Central England has risen at a decadal rate of 0.1°C and 1.7 days, respectively, since the beginning of the 20th century. Globally, results show temperatures have already increased by 1°C across all continents (compared to pre-industrial levels), and in the future emissions scenario RCP4.5[8], it is expected to exceed 3°C in all regions by 2100. Furthermore, there are currently at least ten more days of 'dangerous' warming[9] per year across all continents, which is projected to increase globally to at least 50 days.

Whilst it is beyond the scope of this research to specify projected mortality figures, it does provide projections of the regional intensity and frequency of future warming to enable Governments and policymakers to mitigate thermal deaths through the planning and implementation of effective adaptation strategies.

1.2. Climate variability affecting mortality

A study within the UK Climate Resilience Programme[10] developed a suite of new datasets and statistical models of regional mortality, attributed to non-optimal temperatures[11]. By combining up-to-date mortality, hospital admissions and weather and climate data, they provide an estimate of how climate variability has affected mortality in the past and how it could potentially change into the future. Results, using the UK Climate Projections to assess future changes to UK mortality associated with the changing climate,[12] show that temperature

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[5] Laura C. Dawkins et al, (2023) 'Assessing climate risk using ensembles: A novel framework for applying and extending open-source climate risk assessment platforms' *Climate Risk Management*, Vol. 40, 100510, https://www.sciencedirect.com/science/article/pii/S2212096323000360. (https://www.sciencedirect.com/science/article/pii/S2212096323000360)

[6] Attributing extreme weather to climate change https://www.metoffice.gov.uk/research/climate/understanding-climate/attributing-extreme-weather-to-climate-change

[7] Nikolaos Christidis, Dann Mitchell, Peter A. Stott (2019) "Anthropogenic climate change and heat effects on health", *International Journal of Climatology* 39 (12) pp. 4751-4768 https://doi.org/10.1002/joc.6104

[8] Representative Concentration Pathway

[9] Where the temperature is above the optimum temperature

[10] Programme jointly led by the Met Office and UKRI with the study undertaken by the University of Reading https://www.ukclimateresilience.org/projects/addressing-the-resilience-needs-of-the-uk-health-sector-climate-service-pilots/

[11] Available through the Environmental Public Health Surveillance System portal https://www.gov.uk/government/publications/environmental-public-health-surveillance-system/environmental-public-health-surveillance-system-ephss and the CEDA archive https://catalogue.ceda.ac.uk/uuid/d15196fa0aec4cf4b489f62f866a1a72

[12] https://iopscience.iop.org/article/10.1088/1748-9326/ac50d5#:~:text=Global%20warming%20levels%20beyond%20around,%25)%20by%206%20%C2%B0C; https://www.ukclimateresilience.org/wp-content/uploads/2020/06/Pilot_Service_for_Health_Sector_summary_V1.pdf

attributed mortality in the UK is strongly linked to changes in global mean temperature, particularly in summer. When global mean temperature exceeds 2°C above pre-industrial levels, the number of deaths due to hot weather accelerates rapidly, without significant climate and social adaptation measures. The difference between a 3°C and 4°C world is stark, with an estimated 1181 additional summer deaths per year in a 3°C world (compared to current day) and 4183 additional summer deaths in a 4°C world.

1.3. Likelihood of future extreme heat events

Several other Met Office attribution studies that have calculated the role of climate change in UK and European heat extremes, all finding that notable recent heatwaves are more likely or more intense due to climate change. For example, temperatures above 35 °C are becoming increasingly common in the southeast, while by 2100 many areas in the north are likely to exceed 30 °C at least once per decade. Summers which see days above 40 °C somewhere in the UK have a return time of 100-300 years at present but, without mitigating greenhouse gas emissions, this can decrease to 3.5 years by 2100.[13]

The Met Office is developing capability to deliver attribution studies as a climate service. This means that information from attribution studies will be more readily available to be used as part of communications during, or shortly after, extreme events. For example, during the extreme heat event of July 2022, climate attribution statistics were included in part of the weather warning communications to highlight the unprecedented nature of the heat for the UK. This was used alongside specific advice to help the public take action to stay safe.

Social adaptation measures, such as early warning systems (see question 3) and air-conditioning installation, can result in an increase in the temperature the human population can comfortably endure[14]. The ability to sustainably implement these adaption methods, alongside the size of the change, will influence which communities are worst affected.

2. How can sustainable cooling solutions and adaptation strategies be implemented in such a way as to minimise overheating, reduce energy consumption and prevent overloading of the electricity grid during peak demand?

To implement adaptation strategies in a way which mitigates any impacts on the electricity grid, such as overloading during peak demand, they need to first be stress tested in a theoretical environment to understand how often impacts may be seen, both now and in the future.

2.1. Adverse weather scenarios for future electricity systems

Underpinned by the UK Climate Projections set of national weather scenarios, the Met Office worked with the National Infrastructure Commission and Climate Change Committee to develop a dataset of adverse weather scenarios for future electricity systems for the UK and Europe[15] which is designed to aide the stress testing process, in particular, supporting the test of future highly renewable electricity systems to evaluate resilience to

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[13] Christidis, N., McCarthy, M. & Stott, P.A. (2020) The increasing likelihood of temperatures above 30 to 40 °C in the United Kingdom. *Nat Commun* **11**, 3093 https://doi.org/10.1038/s41467-020-16834-0

[14] Lowe, D., Ebi, K.L. and Forsberg, B. (2011) Heatwave early warning systems and adaptation advice to reduce human health consequences of heatwaves. *International Journal of Environmental Research and Public Health*, **8**(12), 4623–4648.

[15] Adverse weather scenarios for future electricity systems: long duration events, National Infrastructure Commission www.nic.org.uk/studies-reports/national-infrastructure-assessment-old/adverse-weather-scenarios-for-future-electricity-system-long-duration-events/

challenging weather and climate conditions. The dataset is freely available to download from the Centre for Environmental Data Analysis archive[16] and is based on physically plausible weather conditions. It represents a range of possible extreme events as well as the effect of future climate change. This includes summertime 'wind drought peak demand events', which characterise a combination of high temperatures (high demand for cooling) and low wind speeds (low renewable generation), which will be relevant for testing future cooling solutions.

Initial exploration of the data[17] indicates that European-wide summertime 'wind drought peak demand events' may increase in duration and severity due to the increase in temperature leading to an increase in cooling demand. This could have important implications for the European-wide electricity grid and may need to be considered as part of future adaption strategies.

3. What actions can be taken to protect those most vulnerable to the impacts of extreme heat?

One of the first steps needed to protect the most vulnerable from the impacts of extreme heat is understanding where extreme heat is more likely to occur and how this is likely to change in the future. Once the future climate risks and impacts are understood, communicating these to decision makers, and ensuring that they have access to robust evidence of climate risks at both national and local levels and over different timescales, will be key to supporting planning and preparedness for protecting vulnerable populations from the impacts of extreme heat. The Met Office have been exploring how our existing and emerging capabilities could support both the planning for, and response to, extreme heat events in the UK. We work at all levels: directly with Government, providing publicly available national services and supporting local authorities. In addition, the Met Office are conducting research that could support the expansion of these services in the future. In all these activities, partnership is vital for representing the transdisciplinary nature of extreme heat.

Some examples are outlined below, from services for responding to current weather conditions to long-term climate services and research to support future decision making.

3.1. UK Climate Projections

The UK Climate Projections[18] (UKCP) are a set of publicly available tools and data produced by the Met Office for the Department for Environment, Food and Rural Affairs and, originally, the Department for Business, Energy and Industrial Strategy. It provides the most comprehensive picture yet of our current climate and how the climate could change over the next century, including where extreme heat is more likely to occur. Government, businesses and individuals can use this data to inform decisions about responding to the changes in the UK climate. UKCP provides many innovative approaches to climate projection, including the use of "convection-permitting" models[19] to better simulate the present-day climate, provide credible climate information at hourly timescales and improving the ability to project the effects of extreme events at local scale.

The Met Office has extended this work to co-develop a prototype heat service for UK cities[20], with Belfast as the pilot location, aiming to produce actionable information to help decision-makers understand heat risks within

[16] Dawkins, L. et al. (2021) 'Adverse Weather Scenarios for Future Electricity Systems' NERC EDS Centre for Environmental Data Analysis, https://catalogue.ceda.ac.uk/uuid/7beeed0bc7fa41feb10be22ee9d10f00

[17] Section 4.3 https://nic.org.uk/app/uploads/MetOffice_NIC_CCC_Phase2bReport.pdf

[18] UK Climate Projections www.metoffice.gov.uk/research/approach/collaboration/ukcp/index

[19] Future Climate for Africa: "What are convection-permitting models?"https://futureclimateafrica.org/news/what-are-convection-permitting-models-and-how-can-they-improve-understanding-of-extreme-weather-in-africa/

their city[21]. Key requirements included producing evidence of heat impacts to raise awareness and inform climate planning, understanding where the most vulnerable people are located within the city and heat mapping to inform new development.

The prototype service integrates the latest high-resolution Climate Projections, which provides climate information at spatial scales on par with weather forecasts, with enhanced detail over urban areas. Socio-economic and built environment data provides decision-relevant impact and risk information on extreme heat at the sub-city scale that incorporates future climate.

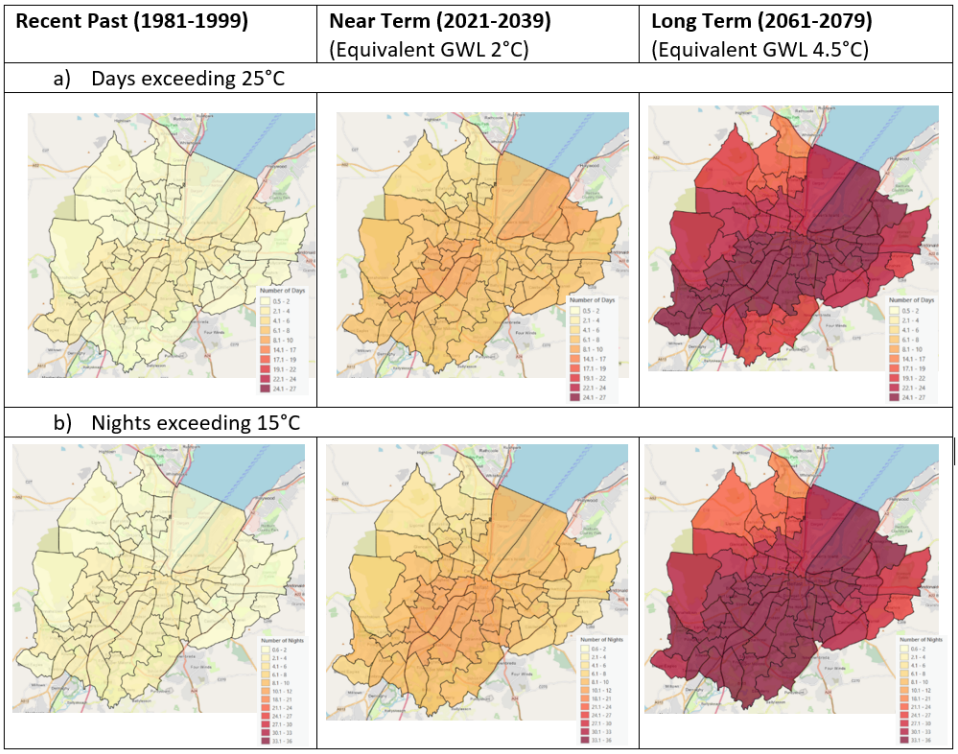

Figure 1 – example from Belfast study (Number of days/nights when daily maximum/minimum temperature exceeds 25°C/15°C in summer (JJA) at electoral ward level for Belfast under RCP8.5).

The outputs from the analysis have helped decision makers in Belfast to build in depth understanding and communicate evidence on heat hazards, vulnerability and impacts within the local area.

3.2. Local Authority Climate Service

The Met Office's new Local Authority Climate Service (LACS) is being developed to help Local Authorities who need to embed climate action in the heart of their local communities and the services that they provide. It acts as a bespoke Climate Projections Explorer, using ArcGIS software to allow local authorities to view climate data for their local area. This enables planners to view their local authority boundary, selecting a range of observations and datasets which relate to heat risks. The LACS is expected to go live later in the year and aims to provide a tailored climate tool for local authorities to support coordinated action at a local level towards adaptation, which

[20] Funded through the Strategic Priorities Fund UK Climate Resilience Programme
[21] UK Climate Resilience Programme: Belfast's Urban Heat Service www.ukclimateresilience.org/blog/belfasts-urban-heat-climate-service

includes extreme heat. When live, it will also host workshops with stakeholders, including Local Partnerships and Adaptation Scotland, to improve their ability to help others.

3.3. Spatial climate risk assessment frameworks

Currently, in many instances, risk associated with extreme heat is assessed based on regional 'weather files'[22]. These are not spatially consistent[23], meaning often only one weather file is used per region to represent every location in the region. This approach doesn't always capture the local climate.

To effectively consider climate risk from extreme heat across multiple locations, it is important to access climate information that is relevant to each geographical location. This helps climate risk to be understood in a spatially consistent way and supports local decision makers to understand location-specific impacts to vulnerable demographics in their communities. One approach for quantifying climate risk in a spatially consistent way is to use a form of quantitative risk assessment framework, for instance using an approach known as a catastrophe model in the insurance sector. The use of this type of climate risk assessment could be expanded further to increase support to the most vulnerable during, and in advance of, periods of extreme heat.

The Met Office is exploring how representation of climate information could be more accurate and support more targeted risk assessments and adaptation measures. As part of the UK Climate Resilience Programme, the Met Office have developed a novel framework involving the application and extension of the CLIMADA open-source climate risk assessment platform[24]. This framework combines spatially consistent information on hazards and the exposure and vulnerability of at-risk systems. The framework can be applied to any region, hazard or risk metric of interest (provided suitable data is available). As a case study, the team used this approach to show that the UK may see an average of 15 million days of outdoor work lost to heat-stress in a 2°C warmer world, potentially representing more than £1.5 billion in economic losses. These impacts are greater if warming reaches 4°C. This new methodology can be used to better inform climate risk management, as well as related planning and decision-making.

The Met Office are currently working with the Department for Education (DfE) and University College London (UCL) to apply this framework to assess heat related climate risk in schools. This will help DfE prioritise adaptation support to those schools that are most at risk.

3.4. Health Protection Research Unit

The National Institute of Health Research-funded Health Protection Research Unit in Environmental Change and Health provides research to support decision making relating to the impacts and responses to environmental change that affect human health, including heat. Funded by the National Institute of Health Research since 2020 (for five years), the Unit is led by the London School of Hygiene and Tropical Medicine, in partnership with UKHSA, the Met Office and University College London. The Unit's research on heat aims to examine variations in heat risk to health over time and spatially, behavioural insights and risk communication relating to extreme hot weather

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[22] Mylona. A (2017) "The use of UKCP09 to produce weather files for building simulation" *Building Services Engineering Research and Technology* Vol.33 (1) pp 51-62 https://doi.org/10.1177/0143624411428951

[23] Meaning that the risk varies across locations in line with the spatial variability in the hazard (i.e. capturing urban heat islands) and allows for the impact of a given extreme heat event at different locations to be assessed in a consistent way.

[24] Laura C. Dawkins et al, (2023) 'Assessing climate risk using ensembles: A novel framework for applying and extending open-source climate risk assessment platforms' *Climate Risk Management*, Vol. 40, 100510, https://www.sciencedirect.com/science/article/pii/S2212096323000360. (https://www.sciencedirect.com/science/article/pii/S2212096323000360)

events and the health impacts of droughts. The Unit also researches the direct impact of heat on populations and healthcare resources, and indirectly impacts on the built environments (e.g. impacts on indoor living conditions).

3.5. Public Weather Service

Through the Public Weather Service, the Met Office provides the UK civil contingency community – including central government, the devolved administrations, and Category 1 & 2 responders – and citizens with accurate, consistent and timely weather information to minimise the risk of weather-related impacts to life, property, businesses and infrastructure. When forecasting models begin to identify the potential for a period of high temperatures to affect parts of the UK in the coming days, the Met Office liaises closely with partner agencies such as the UK Health Security Agency, Cabinet Office and the Devolved Governments to communicate the nature of the risk and to jointly assess possible impacts. This enables ongoing dynamic risk assessment to be carried out, the issuing of appropriate warnings, the implementation of mitigation measures, along with effective and consistent public communications. Where appropriate the Public Weather Service aims to provide a link between extreme weather and climate in order to increase the uptake of warnings and advice.

3.6. National Severe Weather Warning Service

The Met Office warns the UK public and emergency responders of severe or hazardous weather which has the potential to cause danger to life or widespread disruption through the National Severe Weather Warning Service (NSWWS). Warnings combine both the likelihood of the event happening and the impact the conditions may have that pose an immediate risk to life, property or national infrastructure. Warnings are provided up to seven days ahead for rain, thunderstorms, extreme heat, wind, snow, lightning, ice and fog. These warnings are given a colour (yellow, amber or red) depending on a combination of both the impact the weather may have and the likelihood of those impacts occurring.

In 2021, this service was expanded to include extreme heat warnings, with the first ever red warning for extreme heat issued on 15 July 2022 for 18-19 July 2022. Impact statements included in the warning specify how the health of certain vulnerable demographics is likely to be affected. For example, a medium likelihood, medium impact Amber warning for extreme heat will include the statements:

- *"Adverse health effects are likely to be experienced by those vulnerable to extreme heat"*
- *"The wider population are likely to experience some adverse health effects including sunburn or heat exhaustion (dehydration, nausea, fatigue) and other heat related illnesses".*

A high likelihood, high impact Red warning for extreme heat will include the statement:

- *"Population-wide adverse health effects experienced, not limited to those most vulnerable to extreme heat, leading to serious illness or danger to life".*

3.7. The UKHSA (UK Health Security Agency) Weather-Health Alerting System

In operation since 2004, The UKHSA (UK Health Security Agency) Weather-Health Alerting System[25], in partnership with the Met Office, is intended to provide early warning to the health and social care sector, the responder

[25] Further information on the Heat Health Alert Service, and the meaning behind yellow, amber and red alerts. https://www.metoffice.gov.uk/weather/warnings-and-advice/seasonal-advice/heat-health-alert-service

community, the voluntary and community sector, and Government departments in England when adverse temperatures are likely to impact on the health and wellbeing of the population. This service is England only. Heat-Health Alerts and Cold-Health Alerts are part of the Weather-Health Alerting system with Heat Health Alerts running from 1 June to 30 September. UKHSA and the Met Office jointly monitor the weather forecasts and, when episodes of hot weather are identified, both organisations undertake a combined risk assessment to determine the expected impacts, the likelihood of those impacts occurring, and the appropriate alert issued. The updated health alerts are complementary to, and run alongside, the Met Office UK-wide National Severe Weather Warnings. Should conditions for an alert be reached outside of the June to September period, an extraordinary heat-health alert will be issued and stakeholders are advised to take the usual public health actions as recommended in the Government's 2023 Adverse Weather and Health Plan[26].

In summer 2023, the Heat-Health Alerts will transition to an impact-based alerting, which will provide users with information over and above the fact that hot weather is likely to occur. It will give an indication of the impacts likely to be observed as a result of the temperatures.

4. **To what extent do the Government's Climate Change Risk Assessment and National Adaptation Programme (as well as other related strategies such as the Net Zero Strategy and Heat and Buildings Strategy) identify and address the risks from extreme heat?**

The Met Office is content that UK policy makers have access to and are drawing upon relevant and recent scientific evidence to inform policy decisions. For example, the Met Office UK Climate Projections (UKCP18) were used to inform plans for mitigation of and adaptation to possible future scenarios in the Government's most recent Climate Change Risk Assessment (CCRA3). A team of experts, led by the University of Exeter in partnership with the Met Office, prepared the report. The Met Office provided key new science to underpin the Risk Assessment, including new research on wildfires, extreme weather, and implications of tipping points in the climate system for the UK. This was combined with expertise on a number of sectors, including health, from across the UK research community. The UKCP projections are also a key source of information for implementation of the Third National Adaptation Programme, providing evidence on climate hazards expected for future climate, including providing information at both a 2°C and 4°C warming scenario.

Whilst the CCRA3 reports provide the information needed by policy makers to establish the need for climate adaptation, as well as prioritize the actions, there are opportunities to further refine understanding of health-related climate risks and to help to optimize national and local adaptation responses. These include further research on compound risks (where multiple hazards combine to produce a potential impact) and cascading risks (where one impact can drive further impacts on a system). Additionally, there are opportunities to better understand, through research, the economic aspects of both health impacts and climate adaptation, and to monitor good practice in adaptation. Finally, the Met Office notes the opportunities for further consideration of

[26] Adverse Weather and Health Plan (2023) https://www.gov.uk/government/publications/adverse-weather-and-health-plan

how to scale-up climate services related to adaptation, from the pilot or demonstrator stage to nationally applicable services.

5. **How effectively is the Government working across departments and with local authorities to ensure a coordinated approach is taken to heat resilience?**

In addition to cross-Government co-ordination work referenced earlier in this submission, the Met Office provides advice across departments and local authorities during periods of extreme heat and to support future climate resilience.

Below are further examples of specific Met Office processes that support a cross-Government approach to heat resilience.

5.1. Coordination with the civil contingency community

Ahead of, and during periods of, high temperatures, a team of 22 Met Office Civil Contingencies Advisors distributed across England, Scotland, Wales and Northern Ireland integrate with national resilience partners and Local Resilience Groups to provide virtual and face-to-face briefings and advice on weather related risks. They also provide input to local risk assessments and support to partners to develop and exercise local severe weather plans. The advisor service is also supported by 'Hazard Manager', a dedicated web portal providing a one-stop shop for weather and weather-related hazard information. In 2022, Responders reported satisfaction levels of 92% with the Met Office Advisors.

5.2. Met Office Health Consultancy Team

The Met Office also has a specific Health Consultancy Team to translate weather and climate research for environmental public health to inform and support interventions, prevention, adaptation and mitigation action by the health sector.

The Team supports Government priorities, by focusing on those of the Department of Health and Social Care, the devolved health departments in Wales, Scotland and Northern Ireland and Cabinet Office. The Team's work includes the management and processing of large UK health datasets, the provision of climate observations and bespoke statistics to the UK Health Security Agency (via their Environmental Public Health Surveillance System) and supporting UK and international research on extreme heat-related health impacts.

6. **Does the UK need a dedicated Heat Resilience Strategy? What lessons can be learned from other nations when it comes to national strategies for heat resilience?**

There are many lessons to be learned from working with other countries on heat resilience that can inform the UK's approach. The Met Office works extensively with international meteorological services and other partners, largely funded through the UK Government. Working in partnership with other national meteorological services not only boosts heat resilience and climate adaptation global capability but also offers the opportunity to increase the UK's expertise in responding to varying types of climate-related heat health concerns, some of which are projected to affect the UK in the future. Further collaboration on this could inform the UK's future national

resilience considerations and support international cooperation on heat resilience. This work also supports the UK's climate commitments under the Paris Agreement to enhance global climate resilience and adaptation.

6.1. Supporting UK Government during extreme heat events abroad

The Met Office supports UK Government and UK nationals overseas in the event of extreme weather through a routine daily bulletin. Where required, we support event-specific Cabinet Office efforts, such as during the recent European heatwave and Cabinet Office-coordinated meetings on wildfires in Rhodes. Working in partnership, the Met Office, the Overseas Development Institute (ODI), and the Foreign, Commonwealth and Development Office (FCDO) have published a series of Regional Climate Risk Reports[27], to support adaptation and resilience planning. The reports outline climate risk, including due to extreme heat, and how this interacts with exposure and vulnerability of people and nature around the world. They aim to provide FCDO with accessible and authoritative evidence on climate risk relevant to development programming in support of adaptation and resilience planning within FCDO and the UK Government.

6.2. Building international heat resilience capacity

The Met Office support other nations in building capacity to adapt and respond to extreme temperatures through the FCDO's Weather and Climate Information Service (WISER) programme[28]. Part of the programme works to develop impact-based forecasting with partner agencies, to ensure that more people have access to new and improved weather and climate information services which increasingly looks at aspects of heat health and extreme cold.

On behalf of the UK, the Met Office is actively engaged in contributing expertise to and providing leadership of the World Meteorological Organisation's (WMO) Service Commission's work to further develop and improve the delivery of weather, climate, hydrological, marine and related environmental services of its 193 Members. Based largely on the development of global standards, supporting guidance materials and the exchange of national best practices, the heat related scope of the WMO Service Commission's muti-national work includes agriculture, health, urban, energy and transport impacts as well as improvements to warning and advisory services for wildfire, tropical cyclones, flooding, drought and air quality.

Through the Weather and Climate Science for Services South Africa programme, the Met Office is working with South African Government agencies and partner organisations to develop heat-health metrics. These new data can be mapped to South African municipalities with the aim, potentially, to include them in their Green Book[29].

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[27]Further information on Regional Climate Risk Reports https://www.metoffice.gov.uk/services/government/international-development/climate-risk-reports
[28] Further information on the WISER programme https://www.metoffice.gov.uk/about-us/what/working-with-other-organisations/international/projects/wiser
[29] South Africa Government's Green Book https://greenbook.co.za