House of Commons

Environmental Audit Committee

Heatwaves: adapting to climate change

Ninth Report of Session 2017–19

Report, together with formal minutes relating to the report

Ordered by the House of Commons to be printed 18 July 2018

HC 826
Published on 26 July 2018
by authority of the House of Commons

Environmental Audit Committee

The Environmental Audit Committee is appointed by the House of Commons to consider to what extent the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development; to audit their performance against such targets as may be set for them by Her Majesty's Ministers; and to report thereon to the House.

Current membership

Mary Creagh MP (*Labour, Wakefield*) (Chair)

Colin Clark MP (*Conservative, Gordon*)

Dr Thérèse Coffey MP (*Conservative, Suffolk Coastal*)

Geraint Davies MP (*Labour (Co-op), Swansea West*)

Mr Philip Dunne MP (*Conservative, Ludlow*)

Zac Goldsmith MP (*Conservative, Richmond Park*)

Mr Robert Goodwill MP (*Conservative, Scarborough and Whitby*)

James Gray MP (*Conservative, North Wiltshire*)

Caroline Lucas MP (*Green Party, Brighton, Pavilion*)

Kerry McCarthy MP (*Labour, Bristol East*)

Anna McMorrin MP (*Labour, Cardiff North*)

John McNally MP (*Scottish National Party, Falkirk*)

Dr Matthew Offord MP (*Conservative, Hendon*)

Dr Dan Poulter MP (*Conservative, Central Suffolk and North Ipswich*)

Joan Ryan MP (*Labour, Enfield North*)

Alex Sobel MP (*Labour (Co-op), Leeds North West*)

Powers

The constitution and powers are set out in House of Commons Standing Orders, principally in SO No 152A. These are available on the internet via www.parliament.uk.

Publications

Committee reports are published on the Committee's website at www.parliament.uk/eacom and in print by Order of the House.

Evidence relating to this report is published on the inquiry publications page of the Committee's website.

Committee staff

The current staff of the Committee are David Slater (Clerk), Nina Foster (Second Clerk), Nicholas Davies (Committee Specialist), Laura Grant (Committee Specialist), Jennifer Maddalena (Committee Researcher), Jonathan Wright (Senior Committee Assistant, Baris Tufekci (Committee Assistant), and Sean Kinsey (Media Officer).

Contacts

All correspondence should be addressed to the Clerk of the Environmental Audit Committee, House of Commons, London SW1A 0AA. The telephone number for general enquiries is 020 7219 5776; the Committee's email address is eacom@parliament.uk

Contents

Summary

Higher summer temperatures are regarded by many as a welcome change in the UK's climate, but heatwaves threaten health, wellbeing and productivity. In the August 2003 heatwave temperatures reached 38.5°C in England, and there were 2,193 heat-related deaths across the UK in just 10 days. The Met Office predicts there is a risk that heatwaves of a similar intensity will occur every other year by the 2040s.

The average number of heat-related deaths in the UK is expected to more than triple to 7,000 a year by the 2050s. Older people are particularly vulnerable and suffer increased fatalities from cardiac and respiratory disease during heatwaves. As the UK's population ages, there will be an increasing number of people at risk from heatwaves. The Adaptation Sub-Committee of the Committee on Climate Change has classified "risks to health, wellbeing and productivity from high temperatures" as a high-risk priority area that requires more action. Yet despite this recognition of the severity of the risk, the Government does not provide clear information for the public on the developing threat of heatwaves, and there is no commonly accepted definition of a heatwave in the UK. The Minister for Public Health and Primary Care recognised that the public tend to see heatwave alerts as "barbecue alerts."

Although heatwaves have become more frequent, our inquiry revealed the need for clear Government leadership and cross-departmental collaboration on preparation for heatwaves. Government Ministers were keen to stress the "huge role" of local authorities in adapting to heatwaves, however we only received evidence from one local authority. The Local Government Association stated that they "do not have a bespoke work programme on climate change adaption." Funding for programmes to support local authority climate change adaptation was withdrawn in 2015/16, leading to the closure of numerous regional climate change partnerships. A lack of monitoring of local authority capacity has allowed heatwave adaptation to slip to the bottom of the pile. For instance, although cities experience higher temperatures than rural areas due to the "urban heat island" effect, policies to address overheating are not generally included in local authority spatial plans. The Department for Environment, Food and Rural Affairs should fulfil its responsibility to ensure effective adaptation by monitoring local adaptation progress and providing additional support. The Government should introduce an urban green infrastructure target in the National Planning Policy Framework to ensure towns and cities are adapted to more frequent heatwaves in the future.

Although adaptation to heatwaves spans the remit of many Government departments, our inquiry found that there is a silo approach to policies for heatwave risk. Due to the significant health effects of heatwaves, the Ministry of Housing, Communities and Local Government should take steps to address the heat-health issues of overheating buildings. At current temperatures, one in five of the UK's homes overheat, but Government Ministers were unclear about whether building regulations should address the health aspects of overheating. The current lack of regulation to prevent overheating, means that new developments, including hospitals and care homes, which will be around for the next 70 years will add to the number of buildings that overheat. The Government

should recognise the importance of protecting public health by introducing building regulations to stop new buildings overheating, and make the use of a dynamic thermal-modelling test a regulatory requirement for new buildings.

The fragmented responsibilities of public health and healthcare leaders have led to uncertainties around heatwave resilience in health and social care systems. Public Health England produces recommendations for NHS organisations, but does not review uptake of them. Although excess deaths in nursing homes increased by 42% in some parts of the UK during the 2003 heatwave, homes are still not required to report against NHS England's core standards of Emergency Preparedness, Resilience and Response. NHS England should include overheating as part of Emergency Preparedness, Resilience and Response assurance, and ensure that all hospitals and NHS operated nursing homes are compliant. The Care Quality Commission should inspect for heatwave resilience, and ensure that overheating risk forms part of its inspection for safety and suitability of health and social care premises. NHS England should issue guidance on planning for summer pressures, to ensure that adequate steps are taken to prepare the healthcare system for more frequent heatwaves

Heatwaves can also have negative effects on critical national infrastructure such as transport, digital systems and water supply, leading to economic and public health consequences. High temperatures double the likelihood of service failure on railways. Buckling railways tracks are costly to repair, and, to avoid them, trains are often run at reduced speeds, leading to longer journey times, sometimes in uncomfortably hot carriages. Research on the economic consequences of heatwaves concluded that there was a more significant cost to the economy than benefit and that in 2010, approximately five million staff days were lost due to overheating above 26°C. Based on an average staff cost of £150 per day, this resulted in an economic loss of £770 million. The Department for Environment, Food and Rural Affairs should coordinate a study on heat-health risks on transport, and how this contributes to economic loss during heatwaves. The UK's water supply is expected to reduce by 4–7% and this will be exacerbated by the increasing demand for water during heatwaves, particularly in cities. However, the Government has weakened its water efficiency ambitions and continues to fail to introduce sustainable urban drainage systems, which bring multiple benefits.

1 The developing threat of heatwaves

1. As the climate change risks faced by the UK become clearer, adaptation is vital to reduce vulnerability to extreme and unpredictable weather events. We launched our inquiry in February 2018 to examine the risks heatwaves pose to health, wellbeing and productivity and to scrutinise the Government's preparation for the emerging threat of heatwaves and high temperatures. This inquiry forms part of our ongoing scrutiny of the Government's National Adaptation Programme and follows on from our predecessor's inquiry into *Flooding: Co-operation Across Government* and hearing on *Climate Change Adaptation*.[1] In future years we intend to look at other risks including invasive species, disease and food security. Since we launched our inquiry, the UK has experienced unseasonably hot weather in April, June and July 2018. We received 28 pieces of written evidence for this inquiry and conducted four hearings with climate change adaptation experts, meteorologists, experts on buildings, cities, water supply and infrastructure, national leaders for public health and healthcare, and Government Ministers. We also held a roundtable event with carers for the elderly, who are most vulnerable to heatwaves, to gain an understanding of frontline concerns. Additionally, we conducted a survey of teachers to understand how heatwaves affect the health and productivity of their students. We would like to thank all those who contributed to our inquiry.

What is a heatwave?

2. There is no official definition of what constitutes a heatwave in the UK, however they are generally understood to be periods of unusually hot weather, that place a toll on human health and activities.[2] The World Meteorological Organisation's definition is commonly used by meteorologists in the UK:

> When the daily maximum temperature of more than five consecutive days exceeds the average maximum temperature by 5 °C, the normal period being 1961–1990.[3]

3. Dr Peter Stott, Science Fellow in Attribution at the Met Office Hadley Centre for Climate Science and Services explained that only some periods of unusually hot weather are classed as heatwaves. When asked about April's period of hot weather, Dr Stott said:

> We are calling that a hot spell. We had, as you well know, some very warm—anomalously warm—temperatures… It was 29.1 degrees, I think, on 19 April at St James's Park. That was just below the all-time record for April temperatures, which was recorded at 29.4. These are extremely unusual temperatures for April, but when we think of heatwaves, then we are thinking of the hot season and we are thinking of temperatures, as I was referring to earlier, up in the 30s. So an extremely hot spell for April, but for the high summer, not what we use to trigger a heat watch system.[4]

1 *Flooding: Co-operation across Government*, Second report of session 2016–17, Environmental Audit Committee and Environmental Audit Committee, oral evidence, Climate Change Adaptation, Tuesday 14th March 2017, HC1023

2 Met Office (HTW0017) and *Heatwaves and health: guidance on warning-system development*, World Meteorological Organisation and World Health Organisation, 2015.

3 Met Office (HTW0017) and https://www.metoffice.gov.uk/learning/temperature/heatwave

4 Q4

4. The Met Office is commissioned by Public Health England to trigger heatwave alerts from June to September. Dr Stott explained how this time-limited commissioning agreement affects the definition of heatwaves:

> A heatwave is, in terms of the Heat Health Watch Service, only during the hot season, from 1 June to 15 September, and therefore it is only when you reach these triggers that I have talked about. The reason we are calling the April weather a hot spell is because it did not reach those triggers and it was not in the hot summer season, but for the time of year, it was very anomalously warm for April.[5]

5. The Met Office is developing a UK specific definition of a heatwave and it is anticipated that this will be available by summer 2018.[6] Dr Stott commented that the new definition would help the Met Office "communicate better to the general public when we have periods of warm weather and hot weather."[7]

A hidden risk: the increasing frequency of heatwaves

6. The threat of heatwaves is developing rapidly. The number of extreme heatwave events in Europe has risen since 1950, and their intensity is increasing.[8] Dr Stott's attribution research found that carbon emissions from human activities have doubled the likelihood of severe heat events.[9] He explained:

> I worked on the Intergovernmental Panel on Climate Change and we have seen very clearly the evidence that has led us to conclude that human influence on the climate system is clear. But within the UK we have seen the general warming of temperatures, and with that, we have seen a warming of extreme temperatures.[10]

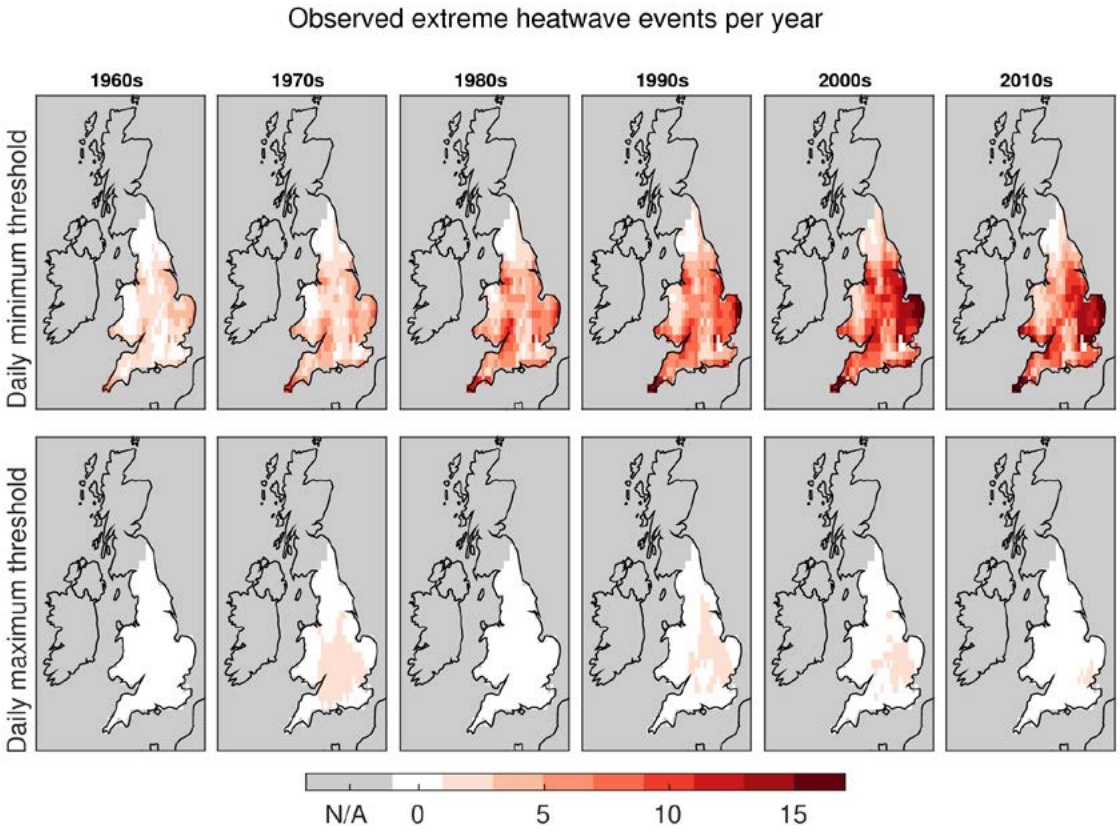
The 2014 Intergovernmental Panel on Climate Change Fifth Assessment Report concludes that "it is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in [greenhouse gas] concentrations and other anthropogenic forcings together."[11]

7. The most severe heatwave of the twentieth century in the UK was the European heatwave of August 2003. The 10-day period of extreme heat is thought to be the warmest for up to 500 years. The highest temperature ever in the UK was recorded in Faversham in Kent reported a high of 38.5°C. The heatwave led to over 20,000 heat-related deaths across Europe, including 15,000 in France alone and 2,193 in the UK. A similarly intense heatwave occurred in July 2006 and there have been periods of unusually hot weather or

5 Q6
6 Met Office (HTW0017)
7 Q2
8 Met Office (HTW0017)
9 P Stott et al, Attribution of extreme weather and climate-related events, *WIREs Climate Change*, Volume 7 (January/February 2016)
10 Q16
11 https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf The 2014 IPCC report also notes "Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions."

heatwaves in July 2013, July 2015, July 2016, August 2016, September 2016, June 2017, April 2018 and June 2018. The increasing frequency of heatwaves above the daily minimum threshold since the 1960s is visualised in figure 1.

Fig. 1: Average number of days above the minimum and maximum heat thresholds per year. Source: National Centre for Atmospheric Science at the University of Reading



8. Heatwaves are projected to become more frequent in the future. The Met Office note in its written evidence that extreme temperature events in Europe are now 10 times more likely than they were in the early 2000s. By the 2040s, heatwaves as severe as 2003 could occur every other year.[12] Heatwaves are also expected to intensify because of the contribution of human activities to the atmospheric concentration of greenhouse gases and other pollutants. Met Office research has estimated that human influence has at least doubled the risk of a heatwave exceeding the mean summer temperature threshold.[13]

9. However, despite strong evidence of the developing threat of heatwaves, there is a lack of public awareness of the risk. Kathryn Brown, Head of Adaptation at the Committee on Climate Change outlined the public misconception about heatwaves and rising temperatures:

> Some of the statistics we have collected from research that DEFRA has done, which was based on a study of public awareness of different types of weather events and whether they had changed over the course of the last 10, 15 years and whether they would change in the future [found that] only 10% of people thought temperatures had increased over the last 20 years, whereas

12 N, Chrsitidis et al, 'Dramatically increasing chance of extremely hot summers since the 2003 European heatwave', *Nature Climate Change* 5, 46 -50 (2015)

13 Q21 and Met Office (HTW0017)

> we know that they have, and only 29% thought that the climate was going to get warmer in the future. More people from that study thought it was going to get colder rather than hotter… we think that is fairly compelling evidence that this is a fairly hidden risk.[14]

Impact of heatwaves on human health

10. Heatwaves are associated with increased excess mortality. Excess mortality refers to deaths that otherwise would not have occurred under normal circumstances. In the 2003 heatwave excess mortality was 17% across England and Wales, and 40% in London.[15] Heat-related deaths begin to increase when temperatures go above 25°C.[16] Public Health England observed a linear relationship between temperature rises above 25°C and mortality, and that in England in 2006 there were "an estimated 75 extra deaths per week for each degree of increase in temperature."[17] The Director of Health Protection and Medical Director at Public Health England, Professor Cosford told us that there is a higher rate of heat-health illness and mortality in the first two or three days of a heatwave. Professor Cosford explained that this is partly due to acclimatisation and deaths tend to fall through the course of a heatwave.[18]

11. Climate Adapt Europe also note the importance of acclimatisation:

> Heatwaves, among the various health hazards imposed by climate change, strike particularly hard in regions where the population is neither accustomed to high temperatures nor does expect them.[19]

For instance, although the population in India is accustomed to a very warm climate, a slight increase in recent summer temperatures coupled with more frequent heatwaves has led to an increase in heat-related deaths. A similar number of people each year now die from heat in India as they do in the UK, demonstrating the health effects of only a small change in normal regional temperatures.[20]

12. In the 2003 heatwave, there were 2,193 excess deaths across the UK between the 4th - 13th August. The main causes of death during a heatwave are respiratory and cardiovascular disease. When air temperatures are high, the body keeps cool through sweating. This places strain on the heart, which can be fatal for those with underlying heart conditions. Those with thermoregulatory problems (the body's temperature control mechanism) are particularly vulnerable to overheating, meaning that women experiencing the menopause were most at risk. High temperatures are also linked with increased air pollution, as high levels of ozone are formed rapidly in strong sunlight and

14 Q9
15 R S Kovats et all, 'The impact of the 2003 heat wave on mortality and hospital admissions in England', *Health Statistics Quarterly* 29, Spring 2006, 6–8
16 Qq286–289
17 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/201150/Heatwave_plan_2013_-_Making_the_case_Accessible_updated.pdf
18 Q286, Q288, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/429572/Heatwave_plan_-Making_the_case_-_2015.pdf
19 https://climate-adapt.eea.europa.eu/metadata/case-studies/heatwave-plan-for-england
20 Mean temperatures across India have risen by more than 0.5°C between 1960 to 2009, leading to an increase in the probability of severe heat events that affect health. Heatwaves in India killed 1,300 people in 2010, 1,500 in 2013 and 2,500 in 2015. O Mazidiyasni et al, 'Increasing probability of mortality during Indian heat waves', *Science Advances*, Vol. 3, no.6 (June 2007)

there is an increased concentration of fine particles in hot, still air conditions. This poor air quality can exacerbate pre-existing or underlying respiratory conditions. There is also an emerging understanding of the impacts of heatwaves on mental health. Public Health England note that higher rates of suicide have been observed in previous UK heatwaves.[21]

13. Heatwaves also cause specific heat-related illnesses such as heat cramps, heat rash, heat oedema (swelling, usually in the ankles), heat syncope (dizziness and fainting due to dehydration), and heat exhaustion which can lead to potentially fatal heatstroke. Recognising the early signs of heatstroke can avoid unnecessary death.

Box 1: Spotting the signs of heatstroke

Heatstroke is caused when the body's thermoregulatory mechanism fails. Heatstroke can result in cell death, organ failure, brain damage or death. Initial symptoms indicate heat exhaustion, which usually gets better if addressed quickly. The symptoms are:

- Headache
- Dizziness and confusion
- Loss of appetite and feeling sick
- Excessive sweating and pale, clammy skin
- Cramps in the arms, legs and stomach
- Fast breathing or pulse
- Temperature of 38° or above
- Intense thirst

To help the person cool down you should move them to a cool place and get them to lie down and raise their feet slightly. You should get them to drink plenty of water and cool their skin by spraying or sponging them with cool water, fanning them and placing cold packs on their armpits or neck.

If their symptoms do not improve within 30 minutes or if their temperature has risen above 40°C, they are confused, unresponsive, lose consciousness or have a seizure they could have heatstroke. Seek emergency medical help by calling 999 immediately.

Source: https://www.nhs.uk/conditions/heat-exhaustion-heatstroke/ and https://assets.publishing.service.gov.uk government/uploads/system/uploads/attachment_data/file/201150/Heatwave_plan_2013_-_Making_the_case_Accessible_updated.pdf

14. Some people are particularly vulnerable to health effects of heat. During the 2003 heatwave, excess mortality in people over the age of 75 increased by 22%, a greater increase than any other age group. In London, 59% more people over 75 died during the heatwave.[22] Age UK notes that:

21 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/201150/Heatwave_plan_2013_-_Making_the_case_Accessible_updated.pdf

22 R S Kovats et al, 'Mortality in southern England during the 2003 heatwave by place of death', Health Statistics Quarterly 29, Spring 2006, 6–8

> While knowledge of the negative effects that exposure to cold weather has on older people is well known and communicated, the same cannot be said of the damaging effects of prolonged exposure to heat.[23]

Older people living in care or nursing homes are also at particular risk. A study of mortality in Southern England during the 2003 heatwave found that deaths in nursing homes increased by 42%. Around one quarter of all heat-related deaths occurred in care homes, although the study notes that this is likely to be an underestimate as some residents may have been admitted to hospital shortly before death.[24]

15. Social isolation is also a factor in heatwave mortality, so older people living alone and homeless people are at increased risk. Research has found that during the 2003 European heatwave, 92% of those who died in Paris lived alone.[25] Those with chronic illnesses such as diabetes, heart conditions or respiratory disease are also at risk, as well as people with disabilities, infants and those living in urban areas and overheated buildings. Women are also more likely to die from heat-related illness. The reasons for this are unclear, although research suggests that thermoregulatory problems related to the menopause could be partly to blame.[26] Children cannot control their body temperature as efficiently as adults during hot weather because they do not sweat as much and are therefore at an increased risk of ill health.

Heatwave Plan for England

16. To protect public health, Public Health England provides guidance on how to stay safe during a heatwave and issues advanced warning of heatwaves through a heat-health watch alert system. The Heatwave Plan for England was first published in 2004 as a response to the significant excess mortality during the 2003 European heatwave, and has been published annually ever since.[27] The Plan relates specifically to England and is intended to be a template for more focused local heatwave plans produced by Directors of Public Health. An independent review of the effectiveness of the Heatwave Plan for reducing heat related illness and mortality is currently underway, with findings expected in November 2018.

17. The Plan recommends a series of steps for NHS, local authorities, social care services, other public agencies and professionals working with vulnerable people to reduce the risks to health from prolonged exposure to heat. A series of accompanying guides for health and social care professionals, care home staff and teachers are also published. "Beat the Heat" leaflets and guidance also outline simple steps to keep cool and prevent buildings from overheating.[28]

---

23 Age UK (HTW0021)

24 R S Kovats et al, 'Mortality in southern England during the 2003 heatwave by place of death', *Health Statistics Quarterly* 29, Spring 2006, 6–8

25 Q10, M Poumadere et al, The 2003 Heat Wave in France: Dangerous Climate Change Here and Now, Risk Analysis: an international journal, Volume 25, issue 6, 1483–1494

26 S Hajat et al, Heat-related and cold-related deaths in England and Wales: who is at risk?, *Occup Environ Med* 64, 2007, 93–100

27 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/711503/Heatwave_plan_for_England_2018.pdf Public Health England took over operation and maintenance of the plan in 2014. The Plan is produced in partnership with NHS England, the Met Office and the Local Government Association.

28 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/615548/Beat_the_heat_leaflet_2017.pdf

18. The guidance provided to individuals and health and social professionals is clear and informative, however in the main part of the Plan and the accompanying guides there is no explanation of how the threat of heatwaves is developing.[29] This is concerning as general public opinion is that heatwaves have not increased over their lifetimes.[30] The Committee on Climate Change noted in its 2014 and 2015 Progress Reports to Parliament that there is low awareness amongst the general public about how risks from heat are changing, and that this could lead to a lack of motivation to introduce adaptation measures such as shading for buildings.[31] Written evidence from the Grantham Institute for Climate Change and the Environment states:

> … there is little evidence that the Government is increasing activities to communicate the rising risk of heatwaves, or to monitor public awareness. No government department or agency has lead responsibility to communicate to the public about climate change impacts on extreme weather.[32]

19. Dr Stott from the Met Office Hadley Centre for Climate Change was not able to point us in the direction of a list of previous UK heatwaves, citing the lack of a heatwave definition as an obstacle.[33] The Met Office has a webpage outlining in general terms what a heatwave is, why they happen and their impact, but there is no mention of the increasing frequency of extreme heat events or how the threat has developed due to climate change.[34] The Minister for Public Health and Primary Care, Steve Brine MP, recognised that the public do not currently take the public health threat of heatwaves seriously:

> The other thing that is important to say is that there is a public education exercise that I think we need to do here through Public Health England because, in terms of heatwave advice, heat alerts tend to be seen as barbecue alerts, as opposed to there being a risk. I think the public are quite well trained for cold weather alerts being about a risk, but of course there is also a great risk in heat alerts and public education is important there to look out for the person next door who is elderly and vulnerable and lives on their own.[35]

20. **Despite multiple science-based predictions of the increasing severity of heatwave risk in the UK, the Government does not provide clear information for the public on the developing threat of heatwaves. There is no commonly accepted definition of a heatwave in the UK. The Heatwave Plan does not make it clear that extreme heat events have become more frequent or that severe heatwaves are projected to be common by the 2040s. The Met Office webpage on heatwaves also does not mention that climate change will make extreme heat events more frequent and intense. There is a public misconception that heatwaves have become less frequent over recent years, which could**

29 "The Plan does not quantify the scale of the risk, nor does it indicate how this risk is changing in response to climate change." Grantham Research Institute on Climate Change and the Environment (HTW0028)

30 Q9 and Grantham Research Institute on Climate Change and the Environment (HTW0028)

31 https://www.theccc.org.uk/wp-content/uploads/2014/07/Final_ASC-2014_web-version-4.pdf and https://www.theccc.org.uk/wp-content/uploads/2015/06/6.736_CCC_ASC_Adaptation-Progress-Report_2015_FINAL_WEB_070715_RFS.pdf

32 Grantham Research Institute on Climate Change and the Environment (HTW0028)

33 Q8

34 The Met Office states in its written evidence that "extreme summer temperature events in Europe, similar to that endured in 2003, are now 10 times more likely than they were in the early 2000s": Met Office (HTW0017), https://www.metoffice.gov.uk/learning/temperature/heatwave

35 Q402

lead to lack of motivation to take the threat of heatwaves seriously. ***The Government should launch a Minister-led public information campaign on the developing threat of heatwaves and their significant impact on human health and activities. Public Health England should update the Heatwave Plan for England with evidence of the increasing frequency of heatwaves. The Met Office should detail this risk on its website.***

Heat-health watch alert system

21. To provide advanced warning of heatwaves, Public Health England operates a heat-health watch alert system as part of the Heatwave Plan for England, provided by the Met Office. The Met Office publishes the current alert status on its website, however it clarifies that is a "service is for health professionals, contingency planners and emergency responders" and alerts no longer appear as a banner on its website, making it more difficult for the public to find information about the current heatwave level.[36]

22. Public Health England commissions the Met Office to issue heatwave alerts from 1st June to 15th September each year. Heatwave alerts are issued when temperatures reach a certain set of thresholds. These thresholds vary across the country according to local weather conditions.[37] The alerts trigger a series of responses from local authorities, the NHS, Public Health England and government. The alerts are cascaded down through Public Health England and NHS networks. We heard frustration that the heat-health alert system only runs from June to September. An NHS Trust Resilience Manager commented:

> Can I ask why it starts on 1 June, though? We have experienced some really hot Aprils in the previous years and some very cold Julys? If we are working towards a co-ordinated response, then some trusts will invoke their plan earlier than 1 June, because they have to. To get those messages out earlier than Public Health England does, normally before 1 June, would possibly benefit going forward.[38]

23. The Director for Health Protection and Medical Director from Public Health England, Professor Cosford told us that higher levels of illness and health problems occur in the first heatwave of a season.[39] However, he assured us that a heatwave alert would still be triggered outside the heatwave season:

> We are concerned about a heatwave whenever it occurs. Although the routine system is in play between certain dates, as you suggest, that does not prevent the heatwave plan being implemented whenever it is required. We would still alert through our systems and NHS England would alert through its systems at whatever time of year.[40]

36 https://www.metoffice.gov.uk/public/weather/heat-health/#?tab=heatHealth

37 The summer period of June to September is known as Level 1 and individuals and organisations are encouraged to take preparation measures throughout this time. Level 2 is triggered as soon as there is a 60% chance of temperatures being high enough on two consecutive days to have an impact on health. Level 3 is triggered when a heatwave temperature threshold is met and level 4 is triggered when a heatwave is so severe that it is deemed a national emergency.

38 Q115

39 Q288

40 Q302

24. Professor Davies, Member of the Adaptation Sub-Committee, told us that the most deaths occur during warm periods not classed as heatwaves and that the greatest burden of heat-related mortality falls outside the heatwave period.[41] Professor Cosford also explained that heat-related deaths begin to occur before alert thresholds are reached:

> Although our thresholds for heatwave plans are roughly 30°C, it looks as if actually the mortality begins to increase when temperatures get into the late 20s.[42]

This is concerning given that during the unseasonably hot spell during April 2018, no heatwave alert was issued by the Met Office or Public Health England. Temperatures reached 24.1°C during the 2018 marathon, making it officially the hottest London marathon on record.

25. We heard that Public Health England plan to combine the Heatwave Plan and the corresponding Cold Weather Plan into one single adverse weather plan as part of the forthcoming National Adaptation Programme.[43] This should mean that the public can be alerted to unseasonable "heatwaves" in the same way as summer heatwaves.

26. **Most deaths occur during warm periods not classed as heatwaves and the greatest burden of heat-related mortality falls outside the official heatwave period. The time limited nature of the heat-health watch alert service means that the public are not necessarily alerted to unseasonal spells of very high temperatures. We only received an informal assurance that Public Health England would instruct the Met Office to issue a heat-health alert outside the usual June to September period. Furthermore, excess deaths start occurring at 25°C, but heatwave alert thresholds are roughly 30°C, meaning that the public are not alerted about some dangerous hot spells.** ***We support the Government's plan to create a single adverse weather plan and strongly recommend that alerting systems run throughout the year, especially targeted to those who are likely to suffer before heatwave temperature thresholds are reached.***

41 Q11

42 Q286 and Professor Davies from the Adaptation Sub-Committee of the Committee on Climate Change also expressed concern about excess mortality at lower temperatures (Q9).

43 Q49 and Q381

2 Responsibility for heatwave preparation

Departmental responsibility for adaptation

27. The Climate Change Act 2008 is the basis for the UK's approach to tackling and responding to climate change. Under the Act, the UK Government must produce a Climate Change Risk Assessment (CCRA) every five years. The Department for Environment, Food and Rural Affairs (DEFRA) published the first CCRA in 2012 and the second was published in January 2017. DEFRA is responsible for adaptation policy within Government, as outlined by the Parliamentary Under Secretary of State for Rural Affairs and Biosecurity, Lord Gardiner of Kimble:

> … my Department has responsibility for adaptation and, therefore, although we have ownership of certain policy responsibilities, our task is to co-ordinate and act as the host and co-ordinator across the piece. That means the production of the actual risk assessment, working with the Met Office on climate projections, the national adaptation programme, all of this and the co-ordination of reporting by infrastructure providers. Our task in DEFRA is to act as the conduit, in close collaboration with other Departments.[44]

28. DEFRA's production of the most recent CCRA was supported by an Evidence Report written by The Adaptation Sub-Committee of the Committee on Climate Change.[45] The Committee on Climate Change (CCC) was set up through the Climate Change Act 2008 to ensure emissions targets are set based on expert independent assessment of the evidence and to monitor the UK's progress towards meeting the targets. The Adaptation Sub-Committee within the CCC advises on the government's programme for adapting to climate change. The Adaptation Sub-Committee's Evidence report outlines the current and future climate risks and opportunity and advises on the priorities for the Government's policy. This identified six urgent priorities for action over the next five years, including "risks to health, wellbeing and productivity from high temperatures." The Government will outline what action will be taken on these risks in a National Adaptation Programme.

Box 2: The National Adaptation Programme

Under the Climate Change Act, the UK government is required to produce a National Adaptation Programme (NAP) every five years. The NAP sets out what government, business and society are doing to become more climate ready. The NAP covers England, while the devolved administrations produce their own programmes and policies. The first National Adaptation Programme was published in 2013. A new NAP is due in 2018, in response to the January 2017 Climate Change Risk Assessment.

The 2013 National Adaptation Programme set four main objectives:

(i) Increasing awareness

44 Q365

45 Adaptation Sub-Committee of the Committee on Climate Change, *UK Climate Change Risk Assessment Evidence Report,* January 2017

(ii) Increasing resilience to current extremes

(iii) Taking timely action for long lead time measures

(iv) Addressing major evidence gaps

29. For heatwaves more specifically, the Government's written evidence states that:

> The Department of Health and Social Care (DHSC) holds the overall policy lead for heatwaves but Government recognise it is important to have a comprehensive, co-ordinated response across a number of different departments, and between national, local and devolved governments. This approach will ensure our actions make a difference to addressing long-term vulnerability.[46]

However, we were concerned to hear that despite the significant health effects of overheating buildings and cities, the Minister for Public Health, Steve Brine MP, did not consider it his department's responsibility to take active steps to address the heat-health issues of overheating buildings and planning policy.[47]

30. Lord Deben, Chair of the Committee on Climate Change, expressed frustration at communicating with the Department for Health and Social Care on the health effects of climate change:

> We have very little connection with the Department of Health. It is a thing we are now trying to do. Climate change has a serious effect upon the future planning of the health service and the arrangements that we do there. Environmental health and the question of air pollution is a crucially important part of our planning for health—if you look at the effects of it—and yet the relationships there are, by their nature, distant. That is one thing that we have to put right. But it is partly because Government does not think of these things, except in a siloed way.[48]

31. DEFRA hosts a Domestic Adaptation Board with most government departments represented. A cross-government working group focused on overheating was set up in 2015 to consider the policy and climate risks relating to overheating in buildings. However, the Committee on Climate Change criticises the "complex governance arrangements, involving multiple partners" as a barrier to effective adaptation.[49] Actions relating to heatwaves in the National Adaptation Programme were split across at least four government departments, as well as the Environment Agency, Public Health England, the NHS and local government. However, we found the responsibility for coordinating action on heatwaves across departments remains ambiguous, allowing heat-health risks to fall between departmental cracks.

32. **The developing threat of heatwaves requires coordinated action across government departments, particularly to protect public health. There is ambiguity over the responsibilities of the Department for Environment, Food and Rural Affairs and the**

46 UK Government (HTW0004)

47 Q368

48 Environmental Audit Committee, Q67, oral evidence, Environmental Principles and Governance Consultation, 19th June 2018, HC1062

49 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-8-Cross-cutting-issues.pdf

Department of Health and Social Care. The Department of Health and Social Care is responsible for the health effects of heatwave, but is not responsible for ensuring that the health risks of overheating buildings and cities are accounted for in policy. We are concerned there is a lack of oversight of heat-health risks, and health risks from climate change more broadly. ***The Department for Health and Social Care should provide a Ministerial lead on responsibility for climate change related health risks. The Minister should work closely with DEFRA, and across government, to ensure there is a holistic and coordinated approach to adapting to the health risks of climate change, building on the advice of the Committee on Climate Change.***

Role of Local Authorities

33. Local government needs to play a key role in delivering climate change resilience in local areas, as outlined in the 2013 National Adaptation Programme:

> As providers of important services and as community leaders, local councils will play a pivotal role in leading, supporting and driving delivery of many actions highlighted throughout this report.[50]

34. The effects of heatwaves can vary depending on local circumstances. For instance, densely populated urban areas experience higher temperatures and worsening air pollution, areas with an ageing demographic will feel additional pressure on healthcare services and areas with low quality housing are at increased risk of overheating. DEFRA coordinates action at local government level through the Local Adaptation Advisory Panel (LAAP). The LAAP meets every two months. The LAAP did not submit evidence to our inquiry, despite its responsibility for a number of actions on heatwave risk in the 2013 National Adaptation Programme.

35. Local Resilience Forums enable local authorities to carry out their responsibilities as Category 1 emergency responders under the Civil Contingencies Act 2004.[51] Local resilience forums produce community risk registers. These forums bring together the Environment Agency, the NHS, local authorities and emergency services to plan and prepare for localised incidents and catastrophic emergencies. Stephen Groves, Head of Emergency Preparedness, Resilience and Response at NHS England explained how health concerns are addressed:

> So, at a local level, we have local health resilience partnerships, which essentially look at the same footprint as local resilience fora. It's a health-planning forum, and representative members of those groups will peer review each other's plans and provide some challenge of them, but also support organisations in enhancing plans.[52]

36. Professor Cosford, Medical Director and Director for Public Health at Public Health England emphasised the importance of the role of local authorities for protecting public health:

50 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/209866/pb13942-nap-20130701.pdf
51 https://www.legislation.gov.uk/ukpga/2004/36/contents
52 Q246

> It is clear to me that a heatwave is essentially a community resilience issue, and a community resilience response is needed. Local authorities are clearly responsible for all aspects of the wellbeing of their local communities, and the directors of public health that we talk to are clearly engaged in this process.[53]

37. Since the Health and Social Care Act 2012, local authorities must appoint a Director of Public Health.[54] The Minister for Public Health and Primary Care told us that Directors of Public Health are "responsible for improving and safeguarding public health in their areas. They play a huge role in this, and if they don't they should."[55] Yet despite this crucial role, we did not receive evidence from any Local Resilience Forums or Local Health Resilience Partnerships on what steps they take to protect public health and wellbeing during a heatwave. Local authorities are also responsible for drawing up local heatwave plans using the framework of Public Health England's Heatwave Plan for England. However, Professor Cosford told us that the local plans are not monitored and local authorities do not feedback to Public Health England about their plans.[56] It is therefore difficult to assess how prepared local areas are for heatwaves. The Greater London Authority recommended stronger assurance processes:

> Some form of mandatory reporting by local authorities about their understanding of the risks from heat (as well as other climate change impacts) to their communities, and their plans to address these, would be helpful.[57]

38. Local government used to report on their performance across a range of issues through the National Indicator Set. The 198 indicators included indicator 188 on adapting to climate change. In 2010, the Government ended central performance monitoring of local councils through the National Indicator Set. Polly Billington, Director of UK100, a network of local government leaders committed to transitioning to 100% clean energy by 2050, told us in our Green Finance inquiry that the removal of local performance monitoring has made adaptation less of a priority:

> Local authorities tend to be quite good at doing exactly what they are told and […] in the current financial climate, the risks are that they won't do anything above what they are absolutely obliged to do.[58]

Climate Local and Climate Ready

39. Local authorities' work on adaptation was previously supported by the Environment Agency's Climate Ready service which provided adaptation advice to local authorities and other organisations. Climate Ready supported the Local Government Association's (LGA's) Climate Local programme, which aimed to "drive, inspire and support council action on climate change."[59] Climate Ready and Climate Local were closed in 2015/16 as DEFRA ceased funding.

53 Q268
54 http://www.legislation.gov.uk/ukpga/2012/7/contents/enacted
55 Q379
56 Qq279–280
57 Greater London Authority (HTW0016)
58 Environmental Audit Committee, Q220, oral evidence, Green Finance, 6th February 2018, HC617
59 https://www.local.gov.uk/topics/environment-and-waste/climate-local

40. Ministers assured us that the resources produced by Climate Ready and Climate Local remain available for local councils and that local councils are engaged in adapting to climate change. Lord Gardiner explained:

> It is absolutely imperative that local authorities have all this information, which is readily available. The Climate Local website for the LGA has a lot of the material that was produced during the £6.5 million of investment by the EA in climate readiness. All of that, as far as I am aware, is available and current. I know that there has been concern about this programme stopping, but it was to produce material that is readily available for local authorities to use.[60]

41. However, the Climate Local website only has limited information for local government, and the guidance on overheating in buildings suggests that local authorities should look to Climate Ready and the Zero Carbon Hub for support, both of which have now been closed.[61] It is clear the website has not been updated since the closure of Climate Ready, as it still offers local councils the option of joining the now non-existent scheme. We did not receive evidence from any local councils on their work on adaptation and when we asked the LGA to submit written evidence to our inquiry, the Chair responded in a letter stating:

> We still do not feel that the LGA has sufficient information to make a helpful contribution to your inquiry. In particular, we do not have a bespoke work programme on climate change adaption.[62]

42. A survey by the Adaptation Sub-Committee of the Committee on Climate Change found that 90% of local authority staff felt that adaptation had been de-prioritised in their authority.[63] This raises concern that there is little work being done at a local government level to prepare for the risks posed by heatwaves, and other consequences of climate change such as flooding. Although the materials produced by Climate Local and Climate Ready are still available, they may now be out of date and there is no body with responsibility for updating the guidance. In its final Climate Local survey report, the LGA expressed concern about local council's ability to engage with adaptation issues:

> There is evidence that, for some councils, climate change adaptation is a peripheral interest, and possibly the main reason for that relates to resources. Since climate change adaptation is mostly discretionary, some councils felt it was not a priority. In addition, one officer remarked that "there is rarely a coherent 'invest to save' business case for climate change".[64]

43. The "discretionary" approach for local councils means that some local councils will be less prepared than others. The Adaptation Sub-Committee's *Evidence Report* found that "local authorities in the UK seem to be at very different stages of maturity in

60 Q374
61 https://www.local.gov.uk/topics/environment-and-waste/climate-local
62 Local Government Association (HTW0022)
63 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf
64 Climate Local Adaptation Survey Report 2016

developing approaches to adaptation."[65] The Adaptation-Sub Committee state that closure of adaptation projects, and a lack of monitoring of local authority capacity to prioritise adaptation, can lead to a loss of momentum.[66]

44. This loss of momentum is exemplified by the closure of regional climate change partnerships. The Environment Agency's Climate Ready previously provided funding for nine regional climate change partnerships.[67] Bob Ward, Policy and Communications Director at the Grantham Institute for Climate Change, told us:

> The Government has reduced funding for communication activities on climate change, leading, for example, to the loss of the regional partnerships that were supported through the Environment Agency. The London Climate Change Partnership, of which I am Deputy Chair, still continues as it has been able to secure support from the Greater London Authority following the loss of its funding from the Environment Agency.[68]

45. **Given the pivotal role of local authorities in delivering heatwave adaptation measures, we were disappointed to receive evidence from only one local authority. The Local Adaptation Advisory Panel, Local Resilience Forums and Local Health Resilience Partnerships did not submit evidence to this inquiry. When we asked the Local Government Association to tell us about their work in this area, they told us they do not have a work programme on climate change adaptation following the closure of Climate Local. It is therefore difficult to ascertain what proactive adaptation work is taking place at a local government level, but studies indicate focus on heatwave risk is very limited. The Government does not monitor local authority capacity to undertake adaptation work and support systems for local authorities are now closed.** ***We are concerned that essential heatwave adaptation measures are not being delivered. The Department for Environment, Food and Rural Affairs should fulfil its adaptation responsibility by monitoring the capacity of local authorities to prioritise adaptation, and require local authorities to report on how they are adapting to climate change. DEFRA should also ensure that adaptation guidance for local authorities is updated regularly. As the risks from climate change grow, funding for Regional Climate Change Partnerships should be reinstated.***

65 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-8-Cross-cutting-issues.pdf
66 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf
67 https://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2018–06-18/154662/
68 Grantham Research Institute on Climate Change and the Environment (HTW0028)

3 Protecting health and wellbeing

Healthcare system preparation

46. Heatwaves can cause acute increased demand for health and social care services. During the 2013 heatwave, approximately 1,166 GP consultations for heat illness took place, double the amount in a non-heatwave year.[69] A study of the 2003 heatwave found that hospital admissions for the over 75s in London were 16% above average.[70] A lack of preparedness for this risk could lead to inadequate or sub-standard care or, in extreme circumstances, service collapse or failure. The Adaptation Sub-Committee's Climate Change Risk Assessment *Evidence Report* explains:

> Heatwaves affect the functionality of hospitals and care homes. Health services will be vulnerable to an increase in the frequency and intensity of heatwaves. Care homes are at risk of overheating, and care management practices may not sufficiently address heat risks.[71]

47. In June 2018, the Prime Minister announced a new five-year funding settlement for the NHS of £20.5 billion. The Government stated that the funding will support a new ten year long-term plan and enable the NHS to "regain core performance and lay the foundations for service improvements."[72] Given that the effects of climate change, including heatwaves, have a serious impact upon the future planning of the health service, we hope the Government has considered this in the funding and planning of the NHS.[73]

48. The Adaptation Sub-Committee found that frontline staff felt unprepared for heatwaves. A study of hospital managers, nurses and healthcare assistants found that although hospital managers showed good awareness of the Heatwave Plan for England, this was lacking in frontline staff. A survey of GPs found that less than half were confident about their resilience to extreme events.[74]

49. The number of heat-related deaths in the UK is expected to rise from 2,000 to approximately 7,000 each year by the 2050s. Milder winters will only reduce cold-related deaths by 1,000, as outlined in figure 2.

69 A Elliot et al, 'Using real-time syndromic surveillance to assess the health impact of the 2013 heatwave in England', *Environmental research*, 135, 31–36 (2014).

70 R S Kovats et all, 'The impact of the 2003 heat wave on mortality and hospital admissions in England', *Health Statistics Quarterly* 29, Spring 2006, 6–8

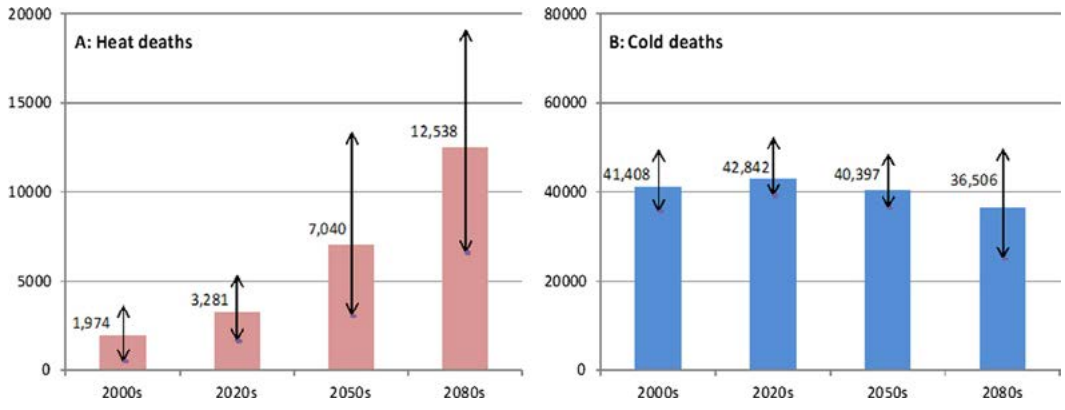
71 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf

72 https://www.gov.uk/government/news/prime-minister-sets-out-5-year-nhs-funding-plan

73 Environmental Audit Committee, Q67, oral evidence, Environmental Principles and Governance Consultation, 19th June 2018, HC1062

74 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf

Fig. 2: Heat-related (A) and cold-related (B) deaths in the UK per year for all ages based on an ensemble of nine climate model realisations. Source: Hajat S, et al. J Epidemiol Community Health 2014; 0:1–8.



This results in a net increase of 4,000 weather-related deaths each year, which will place additional pressure on healthcare services if they are unprepared. During the 2003 heatwave, deaths in hospitals in southern England for the over 75s increased by 36.5%.[75] Excess deaths occur during the first few days of a heatwave, so advance warning and preparedness are vital.[76]

50. However, we found that preparation for heatwaves in the healthcare system is much weaker than winter preparation. During the roundtable with hospital and care home staff for this inquiry, an NHS Trust Site Operations Manager explained:

> For cold weather, we know the warning's coming and we've got five days to get our services in place to cope with extra numbers of respiratory, cardiac, stroke presentations, but for heatwaves that is a lot quicker, in terms of our ability to ramp that up and bring in extra staff, because we know we get increased A&E attendances with respiratory, cardiac and sickle cells and dialysis patients … We are much better at having a cohort co-ordinated plan for winter … but summer is a real challenge. We have seen some of our busiest times at A&E in July.[77]

51. NHS England and NHS Improvement produce guidance on winter resilience, first issued by the National Urgent & Emergency Care Director in July 2017. The guidance notes that "pressures have been building on A&E departments for several years and can significantly increase over winter because of a rise in the number of people admitted to hospital."[78] Stephen Groves, Head of Emergency Preparedness, Resilience and Response suggested that winter plans could be used for heatwaves, but did not confirm that there were any plans to produce specific guidance on summer pressures. Although Public Health England includes guidance for healthcare professionals in its Heatwave Plan, the Medical Director outlined the barriers to ensuring it is implemented:

75 R S Kovats et al, 'Mortality in southern England during the 2003 heatwave by place of death', *Health Statistics Quarterly* 29, Spring 2006, 6–8

76 Q20 Q288, Heatwave Plan for England

77 Q107

78 https://www.england.nhs.uk/winter/

> We will do—and we do do—all that we can within the powers that we are given to ensure that the evidence around how to reduce harm from heatwaves is applied, whether in the NHS, local government, local planning decisions or industry, wherever it is. But we do not have the specific management levers into NHS hospitals; that is an NHS responsibility.[79]

52. **Heatwaves place pressure on healthcare services. The majority of heat-related deaths occur in the first few days of a heatwave, so it is essential that frontline staff are prepared. However, many frontline staff are unaware of the Heatwave Plan and fewer than half of GPs feel prepared for extreme events. *It is worrying that Public Health England makes recommendations it is unable to monitor and enforce. NHS England should issue guidance on planning for summer pressures, to ensure that adequate steps are taken to prepare the healthcare system for more frequent heatwaves. NHS organisations should submit annual heatwave plans to ensure they are prepared for the sudden onset of a heatwave. In their response to this report, the Government should set out how it has accounted for the risks from climate change in its recent NHS funding settlement and how this risk is being considered in the production of the new ten year NHS plan.***

Overheating in hospitals, care and nursing homes

53. There is also concern that hospitals and care homes are at risk of overheating. Data from the NHS Estates Return Information Collective found that there were 2,980 instances of overheating above 26°C in healthcare trusts in 2016–17.[80] Kathryn Brown, Head of Adaptation at the Committee on Climate Change told us that temperatures in hospitals "sometimes exceed 30 degrees when the outside temperature is about 22 degrees."[81] The Committee on Climate Change told us that there are "no requirements in place to ensure that hospitals and care homes do not overheat in high temperatures, and there are no building or other regulations to address heating risk."[82]

54. The risk of overheating in healthcare buildings is not being managed. Overheating does not form part of the Emergency Preparedness, Resilience and Response (EPRR) assurance sought by NHS England.[83] Responsibility for design of estates and facilitates lies with NHS Improvement, whereas preparation for an extreme event lies with NHS England and the response to climate change lies with the NHS Sustainable Development Unit. The Adaptation Sub-Committee express concern about this fragmented approach:

> Problems of organisational management and communication between different groups of health and social care personnel may make response to severe weather events less efficient. It is important to take a 'whole system' perspective when considering the impacts of climate risks on health and social care delivery.[84]

79 Q320
80 Q292. All NHS Trusts are required to submit an annual report on the costs of providing and maintaining the NHS Estate including buildings, maintaining and equipping hospitals, the provision of services e.g. laundry and food, and the costs and consumption of utilities.
81 Q51
82 Committee on Climate Change (HTW0013)
83 Q294
84 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf

55. There is a lack of robust evidence of overheating in care homes and nursing homes, however a study by Professor Rajat Gupta concluded that due to a perception that older people "feel the cold" there was a lack of recognition of the health risks of overheating in care homes. The study of four care homes found that the heating was left on 24 hours a day even during summer months. The study also found that while all care managers interviewed were aware of the Heatwave Plan for England, awareness among frontline staff was lower.[85] When we asked about responsibility for improving staff awareness, the Minister for Primary Care and Public Health set out a fragmented system:

> **Steve Brine:** It depends on who commissions the beds.
>
> **Chair:** If the council commissions the beds it is PHE and if the NHS commissions the beds it is NHS England?
>
> **Steve Brine:** Correct. You are probably thinking that seems a bit fragmented, Chair—
>
> **Chair:** You seem to be thinking it as well, Minister.
>
> **Steve Brine:** I put words in yours and my mouth at the same time, which is quite a new trick.[86]

56. The Government's written evidence confirms that "there is currently no central data set on care and nursing home preparedness against which to judge the risk of overheating during heatwaves and the impact of climate change on this risk." This is concerning given that during the 2003 heatwave, deaths in nursing homes in southern England increased by 42%. Stephen Groves, Head of EPRR at NHS England told that, us due to "capacity issues", NHS England has not yet been able to require nursing homes to demonstrate compliance with EPRR core standards.[87]

57. The Care Quality Commission (CQC) regulates all providers of regulated health and adult social care activities in England. The CQC's role is to provide assurance that the care given meets essential requirements of quality and safety, including 'safety and suitability of premises'. However, the CQC do not currently inspect for risk of overheating. Kathryn Brown, Head of Adaptation at the Committee on Climate Change told us about the barriers to inspecting for overheating:

> In our last report we had a recommendation on assessing and managing the risk [of overheating] in care homes. We did go to talk to the Care Quality Commission about what that might look like. Their feeling was at the moment they are not sure what they should be inspecting for.[88]

58. **Hospitals, care and nursing homes are vulnerable to overheating. In 2016/17 there were nearly 3,000 instances of overheating in healthcare trusts. However, overheating risk is not part of the NHS Emergency Preparedness, Resilience and Response (EPRR) approach and the Care Quality Commission do not inspect for it. Care and nursing homes are not required to demonstrate compliance with the core standards of EPRR.**

85 R Gupta et al, *Care provision fit for a future climate*, Joseph Rowntree Foundation https://www.jrf.org.uk/report/care-provision-fit-future-climate
86 Qq439–440
87 Qq250–255
88 Q53

NHS England should include overheating as part of EPRR assurance, and ensure that all hospitals and NHS operated nursing homes are compliant with it. The Department of Health and Social Care should provide guidance to the Care Quality Commission on how to inspect for overheating risk, and ensure that overheating risk forms part of its inspection for safety and suitability of health and social care premises.

Overheating buildings

Risks to health

59. The 2017 Climate Change Risk Assessment Evidence Report found that warming UK temperatures may lead to an increased risk of overheating. Overheating in buildings causes risks to health and well-being and links have been established with lower workplace productivity and worsened indoor air quality. There is no clear definition of overheating in buildings but discomfort temperatures have been established as guidelines, for example 26–28°C for bedrooms and living space.[89] There is no law for maximum working temperatures but employers must abide by health and safety law which includes keeping the temperature at a comfortable level.

60. Dr Anstasia Mylona, Research Manager at the Chartered Institution of Building Services Engineers (CIBSE) explained that some types of buildings are particularly vulnerable to overheating:

> At greatest risk are single-aspect flats, flats with communal corridors with uninsulated hot water pipes going through them, and properties that rely on natural ventilation, so people need to open windows, but they are in very highly polluted, high-noise areas, so actually people cannot open the windows. They have no other means of cooling the space, which means that temperatures increase.
>
> There are also buildings with very high internal gains, such as schools and hospitals. Those that are mechanically cooled can deal with that, but those that are not are at high risk. There is also top-floor flats, usually because of the heat traveling upward.[90]

Professor Gupta from the Oxford Institute for Sustainable Development told us that a mid-terrace tends to overheat before an end-terrace and a single-story flat will overheat before a two story terrace.[91] Kathryn Brown, Head of Adaptation at the Committee on Climate Change, suggested 1960s newer builds are more at risk than older Victorian buildings, which tend to be more resilient to heat.[92]

61. At current temperatures, one in five of the UK's homes overheats.[93] Overheating can be defined as prolonged high temperatures that affect health and wellbeing. This presents a risk to occupants, particularly those who are vulnerable to high temperatures such as older people, those with underlying cardiovascular or respiratory conditions, those with

89 https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q20000006obXh
90 Q133
91 Professor Rajat Gupta (HTW0005)
92 Q51
93 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf

disabilities and children. A survey of 135 school teachers conducted for this inquiry found that 90% of teachers had to take additional measures to make their classroom a 'bearable' temperature during periods of very hot weather. Many teachers responded that they had to personally purchase fans that they were not reimbursed for. Dr Mylona, CIBSE, told us that it should be the "responsibility of the building regulations or the regulatory framework to address health issues, including overheating."[94] Kathryn Brown, Head of Adaptation at the Committee on Climate Change expressed frustration at the Ministry of Housing, Communities and Local Government's view of the purpose of building regulations:

> [The Ministry] has been fairly emphatic with us that those regulations are not designed to protect health … They are not health regulations. We recommended that something was needed - we do not have a view whether that is in the building regulations or not - that looks at the health aspects of overheating.[95]

62. However, when we asked the Minister for Housing, Dominic Raab MP why building regulations are not designed to protect health, he responded:

> I don't think that is quite right because the 1983 Act gives the power to make building regulations for any purposes, "Securing the health, safety, welfare and convenience of persons in or about buildings." While the building regulations do not explicitly protect people's health with regard to high temperatures, the overarching enabling power clearly envisages that.[96]

63. Public Health England issues guidance on making buildings less vulnerable to overheating as part of its Heatwave Plan for England. However, their Medical Director and Director for Health Protection told us that it was not able to review uptake of its recommendations. CIBSE conclude:

> We would stress the need for a regulatory response for new and existing buildings in order to… protect building owners and occupants from the growing health impacts of overheating buildings.[97]

The Government needs to coordinate the regulatory response to overheating buildings and put the issue of public health front and centre. The Department of Health and Social Care should not overlook the health impacts of overheating simply because the solution may lie within another department's policy.

Building regulations

64. The Adaptation Sub-Committee of the Committee on Climate Change note that a survey of building professionals found that 45% recognised overheating as an issue after the completion of the building work. According to CIBSE "the treatment of overheating at design stage is fundamental in increasing the resilience of buildings in hot events, now and in the future".[98] Zero Carbon Hub's 2015 report on Overheating in Homes found that

94 Q126
95 Q61
96 Q448
97 Chartered Institution of Building Services Engineers (CIBSE) (HTW0007)
98 Chartered Institution of Building Services Engineers (CIBSE) (HTW0007)

overheating affected housing providers' reputations and led to costly remedial works. For instance, one housebuilder had to carry out £100,000 worth of retrofitting to bring a block of apartments within an acceptable temperature range.[99]

65. New buildings must conform to standards set in the Building Regulations Act 2010 (as amended). Building regulations are a set of performance-based legal requirements for design, construction and alterations to buildings. Building Regulation Part L focuses on conservation of fuel and power and requires that "reasonable provision shall be made for the conservation of fuel and power in buildings by limiting heat gains and losses."[100] This is the only reference to overheating in the building regulations, even though Part F relates to ventilation. The Adaptation Sub-Committee of the Committee on Climate Change set out in detail in its 2014, 2015 and 2017 reports to Parliament that there is a need for a legal requirement to minimise the risk to occupants from rising temperatures, however there remains no standard or regulation to prevent overheating in new buildings, other than a requirement to make 'reasonable provision' to limit heat gains for the purposes of fuel conservation. Thermal comfort is not addressed anywhere in the building regulations.[101]

66. Property developers can demonstrate compliance with the requirement to make reasonable provision to limit heat gains by following the guidance set out in the Government's Approved Documents. However, there is industry concern that the guidance does not identify overheating buildings and that homes with poor thermal comfort continue to be built.

Box 3: Approved Document L1A and Standard Assessment Procedure Appendix P

Approved Document L1A sets out how new dwellings can be made compliant with regulatory requirement relating to fuel conservation for "reasonable provision" to be made to limit heat gains:

(i) appropriate window size and orientation;

(ii) solar protection through shading;

(iii) other solar control measures;

(iv) ventilation (day and night);

(v) high thermal capacity.

To measure whether solar gains are excessive the Approved Document recommends the use of the Standard Assessment Procedure (SAP) Appendix P. Appendix P consists of a calculation for each month of June, July and August using average weather data for the month in question and produces a single predicted average internal temperature for the property for each month. Buildings are given a score of high, medium, slight or low risk of overheating. Only a 'high' score amounts to failure of the test

Source: https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l

99 http://www.zerocarbonhub.org/sites/default/files/resources/reports/ZCH-OverheatingInHomes-TheBigPicture-01.1.pdf

100 Part L, Building Regulations 2010 (as amended) http://www.legislation.gov.uk/uksi/2010/2214/schedule/1/made

101 Committee on Climate Change (HTW0013)

67. Dr Anastasia Mylona told us that a dynamic thermo-modelling test to identify overheating buildings was removed from the Approved Document guidance in 2010.[102] This test required the use of dynamic thermal modelling to assess overheating risk and introduce a more in-depth approach which considered solar gains, internal gains, fabric, occupancy profiles and hourly performance. CIBSE note that the removal of the test "was a downgrading of the treatment of overheating within the overall regulatory and guidance framework."[103]

68. When we asked the Minister for Housing, Dominic Raab MP, why the test was removed from the guidance he responded:

> Compliance can be achieved through dynamic thermal modelling tests if preferred; we have an illustrative list but it is not exhaustive. No one is saying that dynamic thermal modelling is not a legitimate way of addressing the regulation requirements.[104]

69. Zero Carbon Hub expressed concern that the current overheating assessment, Standard Assessment Procedure Appendix P, does not accurately identify overheating buildings.[105] CIBSE has produced guidance on a more robust methodology for identifying overheating buildings, which sets a maximum percentage of hours that a building can exceed temperature thresholds.[106] Approved Document L does not make reference to CIBSE's overheating tests, despite the Minister for Housing's praise of CIBSE's work in this area.[107] There is reference to CIBSE's test for solar gains however this is recommended only for designers who "want to exceed the requirements in the current Building Regulations to consider the impact of future global warming on the risks of higher internal temperatures occurring more often."[108]

70. **The risk of overheating is not adequately addressed in the building regulations and the wider regulatory framework. The health and future health of occupants should be a key priority of the building regulations, especially as severe heat events have become increasingly common since 1950 and are set to become more frequent. The Committee on Climate Change has repeatedly recommended a standard or building regulation to prevent overheating in new buildings, however thermal comfort is still not addressed in the building regulations.** ***As the 1983 Building Regulations Act was written with the protection of people's health in mind, the Government should use this enabling power to create a regulation to stop buildings being built which are prone to overheating. If the Government do not ensure that new buildings are designed to prevent overheating, housing providers or homeowners will have to pay for costly remedial works as heatwave risk intensifies.***

102 The 2006 in Approved Document L2A test looked at hourly summertime performance and how many hours the indoor temperature went above 28°C. If it reached that temperature for more than 1% of occupied hours, the building was deemed overheated. Q131 and Chartered Institution of Building Services Engineers (CIBSE) (HTW0033)

103 Chartered Institution of Building Services Engineers (CIBSE) (HTW0033)

104 Q451

105 http://www.zerocarbonhub.org/sites/default/files/resources/reports/ZCH-OverheatingInHomes-TheBigPicture-01.1.pdf

106 Chartered Institution of Building Services Engineers (CIBSE) (HTW0033). CIBSE outlines a series of key simplifications and assumptions made by SAP Appendix P which reduces its ability to identify overheating buildings.

107 CIBSE's guidance TM52 and TM59, Q370, Q401, Q448

108 HM Government, Approved Document L1A

71. **The Government has weakened consideration of overheating risk by removing guidance on a dynamic thermo-modelling test from Approved Documents for Building Regulation Part L. This loss of clarity is regrettable. The recommended alternatives, such as Standard Assessment Procedure Appendix P, are inadequate. *The Government should make the use of a dynamic thermo-modelling test, such as the Chartered Institution of Building Services Engineer's TM59 and TM52 guidance, a regulatory requirement for new buildings. Requiring the test would enable property developers to demonstrate compliance with the new overheating regulation to protect health. The Government should explore extending the Green Deal to cover heat-resilient measures.***

Overheating cities

72. Dense urban areas are often significantly warmer than the surrounding countryside, especially at night. The air temperature in the centre of a large city can be 5 - 10°C warmer than rural areas. This is known as the urban heat island effect (UHI). London has the strongest urban heat island in the UK, with the city centre about 10 degrees warmer than outer parts of London.[109]

73. Heat islands exist because the land surface in towns and cities, which is made of materials like tarmac and stone, absorbs and stores heat all day, and then emits heat at night. This causes night time temperatures to remain high. Paul Cosford, Medical Director and Director of Public Health at Public Health England, explained that temperatures remaining high at night affects physiological recovery from heat which is particularly important for health.[110] The 2003 heatwave brought a large short-term increase in excess mortality in London.[111] The Committee on Climate Change notes in its written evidence that the urban heat island effect is not included in current UK Climate Change Projections (UKCP09) due to difficulties in resolving city-scale detail in global models.[112] There is concern that "assessments of heat-related health effects which use these projections may underestimate the actual magnitude of future health impacts in areas with urbanisation."[113]

74. The Met Office explain that there is a socio-economic element to vulnerability to the urban heat island:

> … high UHI areas (linked to building density) coincide with poor housing quality (in terms of its potential to overheat), and poverty. Simple methods of cooling a building, such as opening windows at night, may not be options within high-crime areas that are also coincident with these areas. The poorer areas of the city are therefore most at risk from the effects of high-temperatures within a city.[114]

109 Q168
110 Q313
111 R S Kovats et all, 'The impact of the 2003 heat wave on mortality and hospital admissions in England', *Health Statistics Quarterly* 29, Spring 2006, 6–8
112 Met Office (HTW0017)
113 Committee on Climate Change (HTW0013)
114 Met Office (HTW0017)

75. The Town and Country Planning Association express concern that increasing development in urban areas, including the building of poor quality housing units, is resulting in adverse implications for people's health and wellbeing.[115] The Mineral Products Association criticises the Government's funding of "modular" housing:

> We note that the Government is now directly and indirectly supporting the use of factory produced housing, which is largely made from lightweight systems and materials of unproven durability. We would caution against this approach, not only on the grounds of robustness and longevity, but also because this type of housing is likely to offer poor resilience to the effects of future climate change, specifically overheating and flooding.[116]

According to a study on Modular Construction in UK Housing by Pinsent Masons, there are currently around 15,000 modular homes built in the UK each year by China National Building Material Company.[117]

76. Dr Mylona, from the Chartered Institution of Building Services Engineers outlined that homes are now also being built in areas of high noise and poor air quality, which makes it more difficult for occupants to open windows to ventilate their homes during a heatwave.[118] Dr Mylona suggested that this was due to a lack of guidance.

77. The urban heat island effect is exacerbated by the use of air conditioning, which emits waste heat into the environment. The Government's 2013 National Adaptation Programme noted that demand for domestic cooling could triple between 2010 and 2050.[119] The Greater London Authority sets out a comprehensive approach to mitigating this demand:

> The draft London Plan sets out policy to minimise the risk of new developments overheating and also to reduce their impact on the UHI through a cooling hierarchy that prioritises design, orientation, shading, and ventilation over mechanical cooling. It also requires planning assessments that consider overheating as well as energy efficiency.[120]

78. There are several ways that rising urban temperatures and demand for air conditioning could be addressed through local and national planning. Dr Mylona from CIBSE recommended a holistic approach to planning, that takes account of air and noise pollution issues as well:

> If we continue building the way we are at the moment, cooling will be inevitable, not just because of the techniques, the materials and the ways we are building and designing our buildings, but because there does not seem to be any mitigation of climate change and there is intense urbanisation.[121]

115 Town and Country Planning Association (HTW0025)
116 Mineral Products Association (HTW0009)
117 Pinsent Masons Research, Modular Construction in UK Housing: An Overview of the Market, the Players and the Issues, February 2017
118 Q137
119 The National Adaptation Programme: Making the country resilient to a changing climate
120 Greater London Authority (HTW0016)
121 Q145

Reducing urban temperatures

79. Professor Cosford, Public Health England, explained the public health benefits of a well-designed urban environment:

> For me, the most important issue is a real understanding of the importance of how we design the environment—the urban environment, hospital environment, and healthcare environment—for people's health and wellbeing. It is hugely under-represented and misunderstood—or not understood sufficiently. If you want a view on where the greatest gains in the public's health are to be found in the middle to long term, this area is among those at the top of that.[122]

80. The design of urban and rural environments is structured by a local development plan, which must meet the standards in the Ministry of Housing Communities and Local Government's (MHCLG) *National Planning Policy Framework*. Individual planning applications must be determined in accordance with the development plan, unless material considerations indicate otherwise. MHCLG states that local plans:

> … set out a vision and a framework for the future development of the area, addressing needs and opportunities in relation to housing, the economy, community facilities and infrastructure–as well as a basis for safeguarding the environment, adapting to climate change and securing good design.[123]

81. However, the Committee on Climate Change found that the majority of local plans do not address future overheating issues from climate change. The Town and Country Planning Association told us that "local plans in England have a very short time horizon of between 10 and 15 years".[124] A review by Land Use Consultants and JBA Consulting found that local plans focus on current, rather than future, climate risks.[125] Kathryn Brown, Head of Adaptation at the Committee on Climate Change commented:

> Flood risk tends to get talked about, but overheating, in almost all cases, does not have a lot of coverage … . A very firm message was coming back that they felt there was no scope to do much on adaptation.[126]

82. The Town and Country Planning Association suggest that this is due to a reduction in local authorities' budgets:

> The planning service has had budget cuts of up to 48% and will be cut further because of reduced funding to local authorities. These cuts impact upon the skills and experience of staff, reducing their ability to find time to attend training and development opportunities, and to deal with a complex public policy issues.[127]

122 Q321
123 https://www.gov.uk/guidance/local-plans--2
124 Town and Country Planning Association (HTW0025)
125 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf
126 Q65
127 Town and Country Planning Association (HTW0025)

83. The new revised *National Planning Policy Framework* (NPPF) outlines that local plans should take a proactive approach to mitigating and adapting to climate change, including the risk of overheating and rising temperatures. Kathryn Brown praised this change:

> The NPPF—the National Planning Policy Framework—consultation that is out at the moment does include raising the profile of overheating. It has gone from an appendix, where there was guidance, into the main discussion about what should be in local plans on climate change adaptation. That is positive.[128]

84. However, the Committee on Climate Change and other witnesses suggested that more guidance is still needed, particularly as there is no mention of the urban heat island effect in the NPPF.[129] Cassie Sutherland, Policy and Programmes Manager for Climate Change Adaptation at the Greater London Authority (GLA) said:

> From the GLA's perspective, we would like to see stronger references to mitigating overheating in the NPPF, and taking the approach that we are actually taking in the London plan—the existing one and the draft new London plan—that looks at minimising internal heat gain and then looks at minimising the impact of new development on the urban heat island effect. We think the cooling hierarchy in the London plan at the moment is one option or framework that could be used as an example of including that kind of more targeted focus on overheating.[130]

85. **Rising temperatures in towns and cities increase vulnerability to heat-health problems, however the urban heat island effect is not currently included in future assessments of the health risks from heatwaves. Modular homes are not resilient to heatwaves, and should not receive support from the Government. The Government does not make reference to the urban heat island effect in the National Planning Policy Framework and heatwaves are not outlined as a specific climate change risk in the accompanying guidance. Local plans therefore tend not to include measures to mitigate urban heat islands. *The Ministry of Housing, Communities and Local Government should make specific reference to the greater risk of overheating in urban areas and require local planning authorities with responsibility for dense urban areas to demonstrate how they have mitigated this in their local development plan, including the use of a well-enforced 'cooling hierarchy' to avoid the exacerbating impact of air conditioning. The Government should work with local authorities so that local plans take long term risks such as climate change into account. The Government should stop directing financial support to modular housing from its Home Building Fund.***

Green spaces and infrastructure

86. Green spaces and infrastructure are known to reduce the urban heat island effect, however urban green space in England has declined to 56% in 2016 from 63% in 2001.[131] The surface temperature in an urban green space may be 15–20°C lower than that of

128 Q65
129 Committee on Climate Change (HTW0013), Q160
130 Q128
131 Committee on Climate Change (HTW0013)

the surrounding streets, resulting in an air temperature 2–8°C cooler.[132] Kathryn Brown pointed to some research that demonstrated the impact of green space at reducing the urban heat island effect:

> There are a few studies we have included in the latest climate change risk assessment that looked at this. One of them, which was in Glasgow, looked at increasing green cover by 20%, which is obviously quite a big amount. The estimates for that suggested it could eliminate 30% to 50% of the expected extra urban heat island effect. It is not a temperature metric, but is the increase in the urban heat island by 2050. It was looking at reductions in surface temperature of around 2 degrees.[133]

87. Professor Mike Davies, a member of the Adaptation Sub-Committee of the Committee on Climate Change and a Professor at the UCL Institute for Environmental Design and Engineering, told us that parks can reduce temperatures at a very local level:

> There is some empirical evidence of parks locally reducing temperatures… there may be some value in having this [green space] distributed across a city such as London to prevent the full development of the potential maximum of the urban heat island.[134]

88. The Town and Country Planning Association note that urban green spaces and trees have wider benefits of improving mental health, increasing biodiversity, protecting against UV radiation and providing space for shade and rest during heatwaves. Public Health England supports these findings in its document *Spatial planning for health: an evidence resource for planning and designing healthier places*, however this is only guidance for local action and there is no monitoring on the provision of urban green space in local plans.[135] There is no explicit mention of the importance of shading streets and parks in the National Planning Policy Framework.

89. The new London Plan proposes a policy called the urban greening factor, which enables developers to quantify how much green space they should incorporate into their building plans, such as through green roofs and walls.[136] Lord Gardiner provided some examples of other local councils improving their provision of green spaces:

> Bristol City Council announced that they are looking to increase their tree canopy from 15% to 30% by 2050, precisely on the back of cooling shade. Greater Manchester is discussing being a city of trees—grassland trees, in fact, because that is a better way of cooling the city.[137]

90. However, the majority of local plans to do not contain any strategies to reduce the urban heat island effect.[138] The 25 Year Environment Plan outlines the Government's ambition to improve health and happiness through greening the England's towns and cities. Actions include planting one million trees in towns and cities by 2022, drawing up a national framework of green infrastructure standards, supporting local authorities

132 Town and Country Planning Association (HTW0025)
133 Q66
134 Q66
135 https://www.gov.uk/government/publications/spatial-planning-for-health-evidence-review
136 Q175
137 Q383
138 Committee on Climate Change (HTW0013)

to assess their provision of green space against these standards and exploring how green infrastructure commitments can be built into national planning guidance and policy. However, there is no mention of the benefits of green spaces for reducing the urban heat island effect, and protecting the population of towns and cities during heatwaves. There are no national targets to increase urban green space back up to 2001 levels.

91. **Green spaces have been proven to reduce the urban heat island effect, however urban green space has declined in England. The Government's commitments to green towns and cities are not measurable or target driven and do not link green spaces to urban heat island reduction. *The Government should introduce an urban green infrastructure target as part of the metrics for the 25 Year Environment Plan and in the National Planning Policy Framework to ensure towns and cities are adapted to more frequent heatwaves in the future. The Government should aim to increase urban green space to 2001 levels, and higher if possible. The importance of shaded spaces in urban areas should be included in the Framework's section on 'promoting healthy and safe communities', so that all local planning authorities have to demonstrate their provision of shaded spaces in the clearance process of their local plans.***

Water Supply

92. Future projections of hotter, drier summers are likely to result in low water flows and reduced water levels. Heatwaves also put extra pressure on the water supply by increasing demand. During the period of very hot weather in late June 2018, homes in Shropshire, Staffordshire and Derbyshire were temporarily without water as demand outstripped supply across the network. In Northern Ireland, a hosepipe ban was introduced.

93. It is predicted that there will be less water available per person in the future.[139] Paul Hickey, Head of Water Resources at the Environment Agency, told us that the reduction in public water supply due to climate change is between 4% and 7% across the UK.[140] In its 2016 roadmap *Creating a great place for living: Enabling resilience in the water sector* the Government acknowledged:

> By the 2050s, summer temperatures are likely to increase while summer rainfall decreases, leading to increased risks of short-duration droughts. The population in England is forecast to grow by over 10 million people over the same period, with a large part of this growth occurring in areas where water is already scarce.[141]

94. Waterwise's *Water Efficiency Strategy for the UK* outlines that a water-saving culture must be developed throughout the UK to manage demand:

> We know that most people take some actions to save water, but we also know that there is a lot more to do. Water efficiency needs to become the norm across all activities throughout everybody's lives–wasting water should be seen as going against the norm.[142]

139 UK Government (HTW0004)
140 Qq196–197
141 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716897/defra-strategy-160219.pdf (now withdrawn)
142 http://www.waterwise.org.uk/wp-content/uploads/2018/02/Waterwise-National-water-strategy-report.pdf

95. Anglian Water explained that the urban heat island effect increases demand even further:

> For water companies, the most demonstrable effect of the urban heat island effect is the increased water consumption that comes with the prolonged higher temperatures. In some places, water consumption can increase significantly and this will only exacerbate the situation in water-stressed areas. This makes it all the more important to embed water efficiency at the heart of planning policy and to ensure a minimum standard of resilience for the public water supply.[143]

96. Paul Hickey explained that households are more likely to undertake water efficiency measures if water companies are addressing their own leakage problems.[144] The National Infrastructure Commission found that, at present, 20% of the mains water supply is lost to leakage every day and recommended that the Government set a target for water companies to halve their leakage by 2050.[145] We support this recommendation, and urge the regulator, Ofwat, to use its powers to ensure this occurs and that the water network is more resilient.

97. Household behaviour can have a significant impact on the water supply. For example, showering for one minute less each day can save about 3,000 litres of water per year, saving £7 on energy and £12 on water bills. There is evidence that charging by volume leads to more efficient water use. Standard meters can reduce average consumption by 15% and smart meters by 17%. At present, water companies can only impose volume-based charges for new homes or occupiers where households use large quantities of water or in areas classified as seriously water stressed by the Environment Agency.

98. The Government has weakened its water efficiency ambitions. A leaked draft of the 25 Year Environment Plan indicates that the Government originally intended to introduce tighter water efficiency standards into the building regulations. Part G of the building regulations sets a water efficiency requirement for buildings of 125 litres per person per day. There is an optional tighter requirement of 110 litres per person per day. The optional requirement only applies where a condition has been imposed as part of the planning process. The original version of the 25 Year Environment Plan proposed making the lower option the default standard, but in the final Plan this ambition was revised to:

> We will work with industry to determine appropriate targets for personal water consumption and the measures needed to achieve them.[146]

Anglian Water told us they would support the application of more ambitious water efficiency targets, and they have made representations to the Government on this.[147]

99. **The urban heat island effect results in water stressed areas experiencing increased demand for water during heatwaves. It is expected that there will be less water available per person in the future. Regardless, the Government has weakened its water efficiency ambitions and has overlooked industry representations to make per capita**

143 Anglian Water Services (HTW0006)
144 Q241
145 https://www.nic.org.uk/publications/preparing-for-a-drier-future-englands-water-infrastructure-needs/
146 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf
147 Q231

consumption standards more efficient. ***A water-saving culture needs to be embedded to ensure that people understand the strain heatwaves place on the water supply and to make more water is available during a heatwave. The Government should adopt 110 litres per person per day as the mandatory standard in Part G of the building regulations for all new buildings.***

Sustainable Drainage Systems

100. Sustainable drainage systems (SuDS) can reduce the urban heat island effect, as well as providing a sustainable way to collect storm water to irrigate green infrastructure. Waterwise, a water efficiency charity, advocates for integrated water management systems that recognise the co benefits of water management solutions such as blue-green infrastructure and SuDS.[148]

Box 4: Sustainable Drainage Systems

Sustainable drainage systems (SuDS) are environmentally sustainable ways to manage surface water and run off, by mimicking natural drainage as closely as possible. SuDS allow water to infiltrate into the ground, which helps to maintain soil moisture, and provide collection of water for reuse in irrigation of green roofs or walls. The evapotranspiration (water evaporation) from SuDS provides a cooling effect, which can be beneficial to reducing the urban heat island effect.

SuDS are a regulatory requirement in all new developments in Scotland, Wales and Northern Ireland. The draft revised National Planning Policy Framework (NPPF) for England outlines that "major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate." The Chartered Institution of Water and Environmental Management's report *A Place for SuDS?* criticised the NPPF's weak wording as a barrier to widespread uptake of SuDS. The report is supported by over fifteen environmental organisations.[149]

Source: http://www.bgs.ac.uk/research/engineeringGeology/urbanGeoscience/suds/what.html

101. In the 2013 National Adaptation Programme, the government committed to implementing Schedule 3 of the Flood and Water Management Act 2010, which provides for increased uptake of SuDs in new developments, by April 2014. However Anglian Water told us that the government reversed this commitment.[150]

102. Waterwise and the Environment Agency suggest that local authorities should have a greater role in ensuring water efficiency than currently outlined in the Government's *Climate Change Risk Assessment (CCRA).*[151] Anglian Water suggest that SuDS should

148 Q235

149 A Place for SuDS? is supported by the Wildfowl and Wetlands Trust (WWT), Royal Town Planning Institute (RTPI), Royal Institute of British Architects (RIBA), Institution of Civil Engineers (ICE), Institution of Environmental Sciences (IES), Landscape Institute, University of Exeter Centre for Water Systems, Susdrain, Future Water Association, Association of Drainage Authorities (ADA), Cornwall Community Flood Forum, the Construction Industry Council Champion for Flood Mitigation and Resilience, Royal Society for the Protection of Birds (RSPB), WWF, the Angling Trust, Buglife and Salmon and Trout Conservation UK.

150 Anglian Water Services (HTW0006)

151 The Government's Climate Change Risk Assessment acknowledges "risks of shortages in the public water supply, and for agriculture energy generation and industry, with impacts on freshwater ecology" as an area where more action is needed. The actions to address the risk to the water supply focus on the role of water companies and there is no mention of the role of local authorities.

be a requirement in the NPPF, as this would make them a statutory requirement in all local plans. This would provide multiple benefits of reducing the urban heat island effect, providing irrigation for green infrastructure and retaining soil moisture, which we heard is crucial for reducing temperatures during a heatwave.[152] Paul Hickey emphasises the importance of building SuDs to a sufficient standard to ensure they are adopted and managed sustainably.[153] The Secretary of State for Environment Food and Rural Affairs, Rt Hon Michael Gove MP told us that the Government intends to make proposals on sustainable urban drainage "a little later this year."[154]

103. **Sustainable drainage systems (SuDS) provide multiple benefits of reducing the urban heat island effect through evapotranspiration, providing irrigation for green walls and roofs and retaining soil moisture. However, England is the only country in the UK that does not require SuDS for all new developments in its planning policy. In the 2013 National Adaptation Programme the Government promised to make SuDS a requirement by 2014, but this commitment was quietly dropped. This is disappointing especially as it is now over 10 years since the Pitt Review's recommendation to make SuDS compulsory. *As the population in dense urban areas grows, the Government should recognise the benefits of an integrated water management system for reducing the urban heat island effect. There is no need for further review of the benefits of SuDS. Before publication of the revised National Policy Planning Framework it should be updated to require SuDS in all new developments. Guidance on how to build SuDS to an adoptable standard should also be produced. This would ensure that all local authorities, particularly those with dense urban areas, manage water more responsibly as heatwaves become more frequent.***

152 Qq73–75
153 Q237
154 Environmental Audit Committee, Q67, oral evidence, Environmental Principles and Governance Consultation, 11th July 2018, HC1062, Q200-203

4 Productivity during heatwaves

Transport

Public Transport

104. The Adaptation Sub-Committee notes that all forms of transport are affected by high temperatures. In particular, railway tracks are vulnerable to buckling and road surfaces can soften, rut and even melt under high temperatures. Train carriages, underground carriages and buses are vulnerable to overheating. The 2013 *National Adaptation Programme* recognises "there are potential economic consequences from local transport failure with knock on implications for other sectors".[155]

105. Network Rail maintains and develops Britain's rail infrastructure. They outlined the effects of heatwaves in their written evidence:

> Hot weather and periods of prolonged high temperatures can have a significant potential impact on the performance and safety of the railway… The temperature of the steel rails in direct sunlight can be more than 20 degrees above ambient air temperature. This means that, during hot weather the rails can expand and the build-up of forces can cause the track to distort laterally or "buckle".[156]

106. Chief Track and Lineside Engineer at Network Rail, John Edgley told us that the number of service-affecting failures doubles during a period of hot weather.[157] Buckling can delay services as well as result in their failure. When temperatures are high, trains are often run at a restricted speed to lower the force on the track and reduce the risk of buckling. During the period of very warm weather in late June 2018, train services in Northern Ireland were restricted and track near Carlisle buckled. Buckling events due to hot weather are expected to be four to five times more frequent by the 2050s. The Adaptation Sub-Committee's state that during the 2003 heatwave "137 rail buckles cost £2.5 million in delays and repairs… By the 2080s, the annual cost of buckling and heat-related delays under a high climate change scenario could increase eightfold."[158]

107. Network Rail also outlined that electrical equipment can fail.[159] Sam Longman, Policy Manager for Environment at TfL explained the effects of this on the London Underground:

> … in transport, one of the things that concerns us is the interdependencies… One of the problems we see with transport is fluctuations in heat, so that when we get the first hot day, electronic equipment goes down, but what is the knock-on impact of that? Do you end up with signal failures, or people being trapped in tunnels, for example, and overheating as a result?[160]

155 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/209866/pb13942-nap-20130701.pdf
156 Network Rail (HTW0027)
157 Q323
158 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-4-Infrastructure.pdf
159 Q324
160 Q136

108. Network Rail told us they were not aware of any studies to quantify the economic consequences of significant transport disruption. However, they provided an example of the impact an extended period of line closure in the context of flooding had on the local economy. The closure of the Dawlish section of track in Devon between February and April 2014 was estimated to cost up to £1.2 billion to the local economy. Network Rail outlined the impact:

> Tourism spending over the Spring period was reportedly significantly down compared to the same period the previous year and the fishing industry experienced a significant reduction in sales during this period compared to the projected spend at that time of the year.[161]

Thermal comfort

109. The Tyndall Centre for Climate Change outlines that heatwaves cause thermal discomfort on the London Underground. Deep tube lines such as the Central and Bakerloo lined can be 10°C hotter than surface temperatures, with in-car conditions of around 30°C in summer.[162] Sam Longman from TfL explained that overheating on public transport can also result in increased demand for air conditioning. Mechanical cooling systems on buses put pressure on engines to work harder, therefore adding to air pollution and potentially exacerbating the urban heat island effect.[163]

110. Overheating bring risks to public health. During the 2015 heatwave, Public Health England advised employers to let their staff travel at less busy times. The Adaptation Sub-Committee also suggest that overheated transport could lead to a loss of work days as heat-vulnerable individuals, such as older people or pregnant women may not be able to travel.[164]

111. Kathryn Brown, Head of Adaptation at the Committee on Climate Change noted there is a lack of evidence about the heatwave resilience of public transport beyond London.[165] We did not receive any evidence from a local authority outside London on the resilience of their transport systems. Transport for London's 'Cooling the Tube' programme involves predicting future tunnel temperatures and installing effective mitigation measures such as mechanical cooling:

> At Transport for London, we have a cooling hierarchy. First, we try to recycle any wasted energy, through, say, regenerative braking, instead of letting that escape as heat. We try to make the whole system as efficient as possible, such as by introducing coasting instead of active braking. We try to recover wasted heat. We have an example in Bunhill where we try to export waste heat into a heat network.[166]

161 Network Rail (HTW0032)
162 Tyndall Centre for Climate Change Research (HTW0012)
163 Q146
164 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-5-People-and-the-built-environment.pdf
165 Q67
166 Q146

112. **There are a range of risks to public transport from heatwaves including, service disruption, health impacts and potential economic losses. Protecting health could lead to increased mechanical cooling which could in turn amplify the urban heat island effect. *The Government should coordinate a study of vulnerability to heat-health risks on transport and how this contributes to economic loss during heatwaves. The study should consider how the increased demand for mechanical cooling can be offset through recovering and utilising waste heat.***

Roads

113. Hot temperatures can cause road surfaces to soften, rut and even melt. In the 2006 heatwave, there was damage to road surfaces across the country, from Cornwall to Cumbria. A study of the 2003 heatwave found that road maintenance cost £40.6 million.[167] Certain types of road surface are more vulnerable to melting. Highways England, the government company responsible for the strategic road network, now surfaces roads with Thin Surfacing Course Systems which are resilient to high temperatures. However, hot rolled asphalt bituminous surfacing and concrete still make up approximately 50% of the strategic road network. These surfaces tend to rut under the action of traffic during very hot weather. Mike Wilson, Chief Highways Engineer at Highways England explained the impact of the 1995 heatwave on these surfaces:

> We had a very hot summer in 1995, where we saw a combination of very hot weather and a change in tyres in HGVs. They moved from double tyres on the back of trailers to what they call super-single tyres—a much greater concentration, and we saw an increase in the amount of rutting particularly on the strategic road network, particularly uphill.[168]

During the very warm period of late June 2018 some bitumen roads in Cumbria began to melt, leading the local council to grit surfaces. A section of the A543 in Conwy county, Wales was closed in both directions because the road surface melted.

114. Highways England's Climate Change Adaptation Strategy and Framework identifies extreme summer temperatures as of high importance to Highways England users.[169] Mike Wilson said that the issue of people being trapped in their vehicles due to congestion caused by heat was an area of consideration for Highways England:

> We have well-established incident management arrangements to help people avoid the back of the queue and to get people past the incident so that they can continue with their journey and provide for their own welfare. In extreme circumstances, we have capability through local resilience forums for them to provide welfare on to the network.[170]

115. We did not receive written evidence from any local authority or local government organisation regarding the heat resilience of local roads, despite the significant economic cost of heatwaves. The cost of repairs during the 2003 heatwave was estimated at £3.6m

167 Hunt, A 2007, 'Study on the economic effects of the 2003 heat wave on transport' Paper presented at Institute of Asphalt Technology National Conference, Telford, UK United Kingdom, 24/05/07

168 Q328

169 Highways England (HTW0024)

170 Q327

in Oxfordshire alone.[171] The 2013 National Adaptation Programme set an Action for the Environment Agency Climate Ready service to "support the Local Government Association's Climate Local initiative to signpost advice, tools and examples that help councils improve the resilience of local transport infrastructure."[172] However, in 2015/16 Climate Local and Climate Ready had their funding withdrawn. Lord Gardiner told us he would seek further clarification of local road resilience:

> One of the things I want to take back is this sort of information to say that local authorities that have a lot of minor roads that need to be resilient to extreme weather and heatwaves, is the information and new techniques used on the minor roads system and what are the cost implications? I am afraid I do not know about the cost implications of it, but clearly in terms of readiness and preparedness, we need to be ensuring that the road network and the rail network can function and accommodate increasing temperatures, whatever that degree will be.[173]

116. ***Only 50% of England's strategic road network is surfaced with the most heat resilient material. During the hot weather in June 2018, roads across the UK, from Cumbria to the south were at risk of melting, and the A543 in Wales had to be closed. Highways England should ensure that resurfacing of roads in at-risk areas is a priority, as heatwaves have become increasingly common. Very few car journeys start and end on the strategic road network, however the heat resilience of local roads is unclear, and support systems for local authorities no longer exist. Previous UK heatwaves led to very costly road repairs, the costs of which will fall on local authorities. The Department for Environment, Food and Rural Affairs should review the capacity of local authorities to undertake adaptation focused maintenance of local roads.***

Economic productivity

117. The Adaptation Sub-Committee's Climate Change Risk Assessment Evidence Report notes that heatwaves bring risks to productivity, but also some benefits for the economy. The main risks include decreased workplace productivity due to overheating, loss of work days due to transport failures, significant costs to the healthcare sector and high maintenance costs to roads and public transport. Heatwaves can bring some economic opportunities through increased tourism and greater demand for services near outdoor leisure centres and beaches. The Welsh Government has identified tourism as a key sector for growth potential due to warmer temperatures. However, Head of Adaptation, Kathryn Brown noted that any study of the economic consequences of heatwaves concluded that there was a more significant cost to the economy than benefit.[174] A study of the 2003 heatwave found that costs to the health sector were approximately £41 million.[175]

118. Heatwaves result in decreased workplace productivity. The Adaptation Sub-Committee suggest that overheating work environments can lead to heat stress, particularly for workers engaged in heavy outdoor manual labour or employees working in offices

171 https://www.metoffice.gov.uk/climate/uk/interesting/july2006
172 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/209866/pb13942-nap-20130701.pdf
173 Q475
174 Q68
175 Hunt, A 2007, 'Study on the economic effects of the 2003 heat wave on transport' Paper presented at Institute of Asphalt Technology National Conference, Telford, UK United Kingdom, 24/05/07,

built in the 1960s and 1970s as these tend to have poor ventilation systems. A study on the impact of overheating on employee productivity using data from the Inter-Departmental Business Register,[176] quantified that in 2010, approximately five million staff days were lost due to overheating above 26°C. Based on an average staff cost of £150 per day, this resulted in an economic loss of £770 million.[177] Given that extreme temperature events in Europe are now 10 times more likely than they were in the early 2000s, similar losses will occur more frequently. The Adaptation Sub-Committee recommend that businesses produce continuity plans to avoid significant economic losses during an extreme weather event. Although the National Adaptation Programme set an action for the Cabinet Office to create a 'business continuity for dummies guide', the Adaptation Sub-Committee found that significant number of businesses still do not have business continuity plans in place, and that they are often developed only after an organisation has been impacted by extreme weather.[178] Smaller businesses are less likely to have business continuity plans in place.

119. Employers must provide a "reasonable" workplace temperature under section 7 of the *Workplace (Health, Safety and Welfare) Regulations 1992*.[179] The Chartered Institute of Building Services Engineers (CIBSE) has established thermal comfort guidelines for workplaces. They note that indoor temperatures of over 28°C for long periods are likely to result in reduced productivity, and that steps such as relaxing the dress code and encouraging flexible working hours should be taken.[180] Those working in roles that involve heavy manual labour are particularly vulnerable. The Adaptation Sub-Committee found that the 2003 heatwave is estimated to have resulted in a loss of manufacturing output in the UK of £400 - £500 million.[181]

120. The Health and Safety Executive has issued an Approved Code of Practice on providing reasonable workplace temperatures. They suggest that the minimum temperature in a workplace should be 16°C, but note that a "meaningful figure cannot be given at the upper end of the scale."[182] In 2017, the Trades Union Congress called on employers to temporarily relax workplace dress codes to enable staff to work comfortably through the heatwave.[183] However, the design of office buildings can make it difficult to mitigate the high internal gains during a heatwave.

121. Productivity in schools is also affected by heatwaves. Schools are vulnerable during heatwaves. We note that heat health alerts notify, among others, school nurses about the risks of heatwaves, but in the last 8 years the number of school nurses has been cut by 700.[184] Children cannot control their body temperature as efficiently as adults during hot weather because they do not sweat as much and are therefore at an increased risk of ill health. A survey of 135 teachers conducted for this inquiry found that 100% of respondents felt high temperatures affected the productivity of students and 52% felt productivity was affected "significantly". However, only 7.4% of teachers had been able to send children home during

176 https://www.ons.gov.uk/aboutus/whatwedo/paidservices/interdepartmentalbusinessregisteridbr
177 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-6-Business-and-industry.pdf
178 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-6-Business-and-industry.pdf
179 http://www.legislation.gov.uk/uksi/1992/3004/regulation/7/made
180 https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q20000006obXh
181 https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Chapter-6-Business-and-industry.pdf
182 http://www.hse.gov.uk/temperature/law.htm
183 http://hrnews.co.uk/relax-workplace-dress-codes-weeks-heatwave-says-tuc/
184 https://www.mirror.co.uk/news/politics/tories-axe-nearly-700-essential-12578771

periods of uncomfortably hot weather. Many respondents called for more air conditioning in schools, and improved building design. We heard anecdotally that some schools were inflexible on their uniform policies and did not allow pupils to take their blazers off.

122. ***Heatwaves can result in overheating workplaces and lower employee productivity. In 2010, approximately five million staff days were lost due to overheating above 26°C resulting in economic losses of £770 million. Given that extreme temperature events in Europe are now 10 times more likely than they were in the early 2000s, similar losses will occur more frequently. However, some businesses, particularly smaller businesses, do not have business continuity plans in place. The Government should make businesses aware of the developing threat of heatwaves and the economic consequences. Public Health England should also issue formal guidance to employers to relax dress codes and allow flexible working when heatwave alerts are issued. The Government should consult on introducing maximum workplace temperatures, especially for work that involves significant physical effort. Procurement rules should be updated so that schools and the NHS do not spend public money on infrastructure which is not resilient to heatwaves. The Department for Education should issue guidance for head teachers about safe temperatures in schools and relaxing the school uniform policy as appropriate during hot weather.***

Conclusions and recommendations

The developing threat of heatwaves

1. Despite multiple science-based predictions of the increasing severity of heatwave risk in the UK, the Government does not provide clear information for the public on the developing threat of heatwaves. There is no commonly accepted definition of a heatwave in the UK. The Heatwave Plan does not make it clear that extreme heat events have become more frequent or that severe heatwaves are projected to be common by the 2040s. The Met Office webpage on heatwaves also does not mention that climate change will make extreme heat events more frequent and intense. There is a public misconception that heatwaves have become less frequent over recent years, which could lead to lack of motivation to take the threat of heatwaves seriously. *The Government should launch a Minister-led public information campaign on the developing threat of heatwaves and their significant impact on human health and activities. Public Health England should update the Heatwave Plan for England with evidence of the increasing frequency of heatwaves. The Met Office should detail this risk on its website*. (Paragraph 20)

2. Most deaths occur during warm periods not classed as heatwaves and the greatest burden of heat-related mortality falls outside the official heatwave period. The time limited nature of the heat-health watch alert service means that the public are not necessarily alerted to unseasonal spells of very high temperatures. We only received an informal assurance that Public Health England would instruct the Met Office to issue a heat-health alert outside the usual June to September period. Furthermore, excess deaths start occurring at 25°C, but heatwave alert thresholds are roughly 30°C, meaning that the public are not alerted about some dangerous hot spells. *We support the Government's plan to create a single adverse weather plan and strongly recommend that alerting systems run throughout the year, especially targeted to those who are likely to suffer before heatwave temperature thresholds are reached*. (Paragraph 26)

Responsibility for heatwave preparation

3. The developing threat of heatwaves requires coordinated action across government departments, particularly to protect public health. There is ambiguity over the responsibilities of the Department for Environment, Food and Rural Affairs and the Department of Health and Social Care. The Department of Health and Social Care is responsible for the health effects of heatwave, but is not responsible for ensuring that the health risks of overheating buildings and cities are accounted for in policy. We are concerned there is a lack of oversight of heat-health risks, and health risks from climate change more broadly. The Department for Health and Social Care should provide a Ministerial lead on responsibility for climate change related health risks. *The Department for Health and Social Care should provide a Ministerial lead on responsibility for climate change related health risks. The Minister should work closely with DEFRA, and across government, to ensure there is a holistic and coordinated approach to adapting to the health risks of climate change, building on the advice of the Committee on Climate Change*. (Paragraph 32)

4. Given the pivotal role of local authorities in delivering heatwave adaptation measures, we were disappointed to receive evidence from only one local authority. The Local Adaptation Advisory Panel, Local Resilience Forums and Local Health Resilience Partnerships did not submit evidence to this inquiry. When we asked the Local Government Association to tell us about their work in this area, they told us they do not have a work programme on climate change adaptation following the closure of Climate Local. It is therefore difficult to ascertain what proactive adaptation work is taking place at a local government level, but studies indicate focus on heatwave risk is very limited. The Government does not monitor local authority capacity to undertake adaptation work and support systems for local authorities are now closed. *We are concerned that essential heatwave adaptation measures are not being delivered. The Department for Environment, Food and Rural Affairs should fulfil its adaptation responsibility by monitoring the capacity of local authorities to prioritise adaptation, and require local authorities to report on how they are adapting to climate change. DEFRA should also ensure that adaptation guidance for local authorities is updated regularly. As the risks from climate change grow, funding for Regional Climate Change Partnerships should be reinstated.* (Paragraph 45)

Protecting health and wellbeing

5. Heatwaves place pressure on healthcare services. The majority of heat-related deaths occur in the first few days of a heatwave, so it is essential that frontline staff are prepared. However, many frontline staff are unaware of the Heatwave Plan and fewer than half of GPs feel prepared for extreme events. It is worrying that Public Health England makes recommendations it is unable to monitor and enforce. *It is worrying that Public Health England makes recommendations it is unable to monitor and enforce. NHS England should issue guidance on planning for summer pressures, to ensure that adequate steps are taken to prepare the healthcare system for more frequent heatwaves. NHS organisations should submit annual heatwave plans to ensure they are prepared for the sudden onset of a heatwave. In their response to this report, the Government should set out how it has accounted for the risks from climate change in its recent NHS funding settlement and how this risk is being considered in the production of the new ten year NHS plan.* (Paragraph 52)

6. Hospitals, care and nursing homes are vulnerable to overheating. In 2016/17 there were nearly 3,000 instances of overheating in healthcare trusts. However, overheating risk is not part of the NHS Emergency Preparedness, Resilience and Response (EPRR) approach and the Care Quality Commission do not inspect for it. Care and nursing homes are not required to demonstrate compliance with the core standards of EPRR. *NHS England should include overheating as part of EPRR assurance, and ensure that all hospitals and NHS operated nursing homes are compliant with it. The Department of Health and Social Care should provide guidance to the Care Quality Commission on how to inspect for overheating risk, and ensure that overheating risk forms part of its inspection for safety and suitability of health and social care premises.* (Paragraph 58)

7. The risk of overheating is not adequately addressed in the building regulations and the wider regulatory framework. The health and future health of occupants should be a key priority of the building regulations, especially as severe heat events have

become increasingly common since 1950 and are set to become more frequent. The Committee on Climate Change has repeatedly recommended a standard or building regulation to prevent overheating in new buildings, however thermal comfort is still not addressed in the building regulations. *As the 1983 Building Regulations Act was written with the protection of people's health in mind, the Government should use this enabling power to create a regulation to stop buildings being built which are prone to overheating. If the Government do not ensure that new buildings are designed to prevent overheating, housing providers or homeowners will have to pay for costly remedial works as heatwave risk intensifies.* (Paragraph 70)

8. The Government has weakened consideration of overheating risk by removing guidance on a dynamic thermo-modelling test from Approved Documents for Building Regulation Part L. This loss of clarity is regrettable. The recommended alternatives, such as Standard Assessment Procedure Appendix P, are inadequate. *The Government should make the use of a dynamic thermo-modelling test, such as the Chartered Institution of Building Services Engineer's TM59 and TM52 guidance, a regulatory requirement for new buildings. Requiring the test would enable property developers to demonstrate compliance with the new overheating regulation to protect health. The Government should explore extending the Green Deal to cover heat-resilient measures.* (Paragraph 71)

9. Rising temperatures in towns and cities increase vulnerability to heat-health problems, however the urban heat island effect is not currently included in future assessments of the health risks from heatwaves. Modular homes are not resilient to heatwaves, and should not receive support from the Government. The Government does not make reference to the urban heat island effect in the National Planning Policy Framework and heatwaves are not outlined as a specific climate change risk in the accompanying guidance. Local plans therefore tend not to include measures to mitigate urban heat islands. *The Ministry of Housing, Communities and Local Government should make specific reference to the greater risk of overheating in urban areas and require local planning authorities with responsibility for dense urban areas to demonstrate how they have mitigated this in their local development plan, including the use of a well-enforced 'cooling hierarchy' to avoid the exacerbating impact of air conditioning. The Government should work with local authorities so that local plans take long term risks such as climate change into account. The Government should stop directing financial support to modular housing from its Home Building Fund.* (Paragraph 85)

10. Green spaces have been proven to reduce the urban heat island effect, however urban green space has declined in England. The Government's commitments to green towns and cities are not measurable or target driven and do not link green spaces to urban heat island reduction. *The Government should introduce an urban green infrastructure target as part of the metrics for the 25 Year Environment Plan and in the National Planning Policy Framework to ensure towns and cities are adapted to more frequent heatwaves in the future. The Government should aim to increase urban green space to 2001 levels, and higher if possible. The importance of shaded spaces in urban areas should be included in the Framework's section on 'promoting healthy and safe communities', so that all local planning authorities have to demonstrate their provision of shaded spaces in the clearance process of their local plans.* (Paragraph 91)

11. The urban heat island effect results in water stressed areas experiencing increased demand for water during heatwaves. It is expected that there will be less water available per person in the future. Regardless, the Government has weakened its water efficiency ambitions and has overlooked industry representations to make per capita consumption standards more efficient. *A water-saving culture needs to be embedded to ensure that people understand the strain heatwaves place on the water supply and to make more water is available during a heatwave. The Government should adopt 110 litres per person per day as the mandatory standard in Part G of the building regulations for all new buildings.* (Paragraph 99)

12. Sustainable drainage systems (SuDS) provide multiple benefits of reducing the urban heat island effect through evapotranspiration, providing irrigation for green walls and roofs and retaining soil moisture. However, England is the only country in the UK that does not require SuDS for all new developments in its planning policy. In the 2013 National Adaptation Programme the Government promised to make SuDS a requirement by 2014, but this commitment was quietly dropped. This is disappointing especially as it is now over 10 years since the Pitt Review's recommendation to make SuDS compulsory. *As the population in dense urban areas grows, the Government should recognise the benefits of an integrated water management system for reducing the urban heat island effect. There is no need for further review of the benefits of SuDS. Before publication of the revised National Policy Planning Framework it should be updated to require SuDS in all new developments. Guidance on how to build SuDS to an adoptable standard should also be produced. This would ensure that all local authorities, particularly those with dense urban areas, manage water more responsibly as heatwaves become more frequent.* (Paragraph 103)

Productivity during heatwaves

13. There are a range of risks to public transport from heatwaves including, service disruption, health impacts and potential economic losses. Protecting health could lead to increased mechanical cooling which could in turn amplify the urban heat island effect. The Government should coordinate a study of vulnerability to heat-health risks on transport and how this contributes to economic loss during heatwaves. *The Government should coordinate a study of vulnerability to heat-health risks on transport and how this contributes to economic loss during heatwaves. The study should consider how the increased demand for mechanical cooling can be offset through recovering and utilising waste heat.* (Paragraph 112)

14. *Only 50% of England's strategic road network is surfaced with the most heat resilient material. During the hot weather in June 2018, roads across the UK, from Cumbria to the south were at risk of melting, and the A543 in Wales had to be closed. Highways England should ensure that resurfacing of roads in at-risk areas is a priority, as heatwaves have become increasingly common. Very few car journeys start and end on the strategic road network, however the heat resilience of local roads is unclear, and support systems for local authorities no longer exist. Previous UK heatwaves led to very costly road repairs, the costs of which will fall on local authorities. The Department for Environment, Food and Rural Affairs should review the capacity of local authorities to undertake adaptation focused maintenance of local roads.* (Paragraph 116)

15. *Heatwaves can result in overheating workplaces and lower employee productivity. In 2010, approximately five million staff days were lost due to overheating above 26°C resulting in economic losses of £770 million. Given that extreme temperature events in Europe are now 10 times more likely than they were in the early 2000s, similar losses will occur more frequently. However, some businesses, particularly smaller businesses, do not have business continuity plans in place. The Government should make businesses aware of the developing threat of heatwaves and the economic consequences. Public Health England should also issue formal guidance to employers to relax dress codes and allow flexible working when heatwave alerts are issued. The Government should consult on introducing maximum workplace temperatures, especially for work that involves significant physical effort. Procurement rules should be updated so that schools and the NHS do not spend public money on infrastructure which is not resilient to heatwaves. The Department for Education should issue guidance for head teachers about safe temperatures in schools and relaxing the school uniform policy as appropriate during hot weather.* (Paragraph 122)

Formal minutes

Wednesday 18 July 2018

Members present.

Mary Creagh, in the Chair:

Geraint Davies	Kerry McCarthy
Mr Phillip Dunne	Anna McMorrin
James Gray	John McNally
Caroline Lucas	

Draft Report (*Heatwaves: adapting to climate change*), proposed by the Chair, brought up and read.

Paragraphs 1 to 122 read and agreed to.

Summary agreed to.

Resolved, That the Report be the Ninth Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

[The Committee adjourned]

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the inquiry publications page of the Committee's website.

	Question number
Tuesday 24 April 2018	
Kathryn Brown, Head of Adaptation, Committee on Climate Change; **Professor Michael Davies**, Member of Adaptation Sub-Committee, Committee on Climate Change; and **Dr Peter Stott**, Science Fellow in Attribution, The Met Office Hadley Centre for Climate Science and Services	Q1–78
Tuesday 1 May 2018	
Care Home Manager A, **Care Home Manager B**, **Care Home Manager C**, **Care Home Manager D**, **An NHS Trust Site Operations Manager**, **An NHS Trust Resilience Manager**, and **Jane Vass**, Director of Policy and Research, Age UK	Q79–124
Tuesday 15 May 2018	
Dr Anastasia Mylona, Research Manager, Chartered Institution of Building Services Engineers, **Cassie Sutherland**, Policy and Programmes Manager for Climate Change Adaptation, Greater London Authority, **Emma Fryer**, Associate Director, techUK, and **Sam Longman**, Policy Manager for Environment (City Planning), Transport for London	Q125–190
Aaron Burton, Director of Policy and Innovation, Waterwise, **Alex Plant**, Regulation Director, Anglian Water, and **Paul Hickey**, Deputy Director for Water Resources, Environment Agency	Q191–241
Wednesday 23 May 2018	
Professor Paul Cosford, CB, Director for Health Protection and Medical Director, Public Health England, and **Stephen Groves**, National Head of Emergency Preparedness, Resilience and Response, NHS England	Q242–321
John Edgley, Chief Track and Lineside Engineer, Network Rail, and **Mike Wilson**, Chief Engineer, Highways England	Q322–363
Wednesday 6 June 2018	
Steve Brine MP, Parliamentary Under-Secretary of State for Public Health and Primary Care, Department of Health and Social Care, **Dominic Raab MP**, Minister of State for Housing, Ministry of Housing, Communities and Local Government, and **Lord Gardiner of Kimble**, Parliamentary Under-Secretary of State for Rural Affairs and Biosecurity, Department for Environment, Food and Rural Affairs	Q364–479

Published written evidence

The following written evidence was received and can be viewed on the inquiry publications page of the Committee's website.

HTW numbers are generated by the evidence processing system and so may not be complete.

1 Age UK (HTW0021)
2 Anglian Water Services (HTW0006)
3 Chartered Institution of Building Services Engineers (CIBSE) (HTW0007)
4 Chartered Institution of Building Services Engineers (CIBSE) (HTW0033)
5 Committee on Climate Change (HTW0013)
6 Dr Niamh Murtagh (HTW0002)
7 Environment Agency (HTW0001)
8 Grantham Research Institute on Climate Change and the Environment (HTW0028)
9 Greater London Authority (HTW0016)
10 Green House Think Tank (HTW0010)
11 Highways England (HTW0024)
12 Local Government Association (HTW0022)
13 Met Office (HTW0017)
14 Mineral Products Association (HTW0009)
15 Mineral Products Association (HTW0026)
16 Ministry of Housing, Communities and Local Government (HTW0031)
17 Natural Environment Research Council (HTW0011)
18 Network Rail (HTW0027)
19 Network Rail (HTW0032)
20 Professor Andrew Pullin (HTW0018)
21 Professor Rajat Gupta (HTW0005)
22 Professor Wandi Bruine de Bruin (HTW0015)
23 Soil Association (HTW0019)
24 techUK (HTW0003)
25 The Woodland Trust (HTW0014)
26 Town and Country Planning Association (HTW0025)
27 Transport for London (HTW0023)
28 Trees and Design Action Group (HTW0030)
29 Tyndall Centre for Climate Change Research (HTW0012)
30 UK Government (HTW0004)
31 Waterwise (HTW0008)

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the publications page of the Committee's website. The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

Session 2017–19

First Report	Plastic bottles: Turning Back the Plastic Tide	HC 339
Second Report	Disposable Packaging: Coffee Cups	HC 657
Third Report	The Ministry of Justice: Environmental Sustainability	HC 545
Fourth Report	Improving air quality	HC 433
Fifth Report	UK Progress on Reducing F-gas Emissions	HC 469
Sixth Report	Green finance: mobilising investment in clean energy and sustainable development	HC 671
Seventh Report	Greening Finance: embedding sustainability in financial decision making	HC 1063
Eighth Report	The Government's 25 Year Plan for the Environment	HC 803
First Special Report	The Future of Chemicals Regulation after the EU Referendum: Government Response to the Committee's Eleventh Report of Session 2016–17	HC 313
Second Special Report	Marine Protected Areas Revisited: Government Response to the Committee's Tenth Report of Session 2016–17	HC 314
Third Special Report	Sustainable Development Goals in the UK: Government Response to the Committee's Ninth Report of Session 2016–17	HC 616
Fourth Special Report	Plastic bottles: Turning Back the Plastic Tide: Government Response to the Committee's First Report	HC 841
Fifth Special Report	Disposable Packaging: Coffee Cups: Government's Response to the Committee's Second Report	HC 867
Sixth Special Report	The Ministry of Justice: Environmental Sustainability: Government's Response to the Committee's Third Report	HC 982
Seventh Special Report	Improving air quality: Government Response to the Committee's Fourth Report	HC 1149
Eighth Special Report	UK Progress on reducing F-gas Emissions: Government's Response to the Committee's Fifth Report Eighth	HC 1406