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Environmental Audit Committee

Heat resilience and sustainable cooling

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minutes relating to the report*

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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 His Majesty's Ministers; and to report thereon to the House.

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Committee Staff

Dawn Amey (Committee Specialist), Martyn Atkins (Clerk), Alexander Farnsworth (Committee Specialist), Laura Fatah (Committee Specialist), Chloe Jago (Senior Media and Communications Officer), Rebecca Lees (Second Clerk), Gary O'Key (Committee Specialist), Ben Smith (Committee Operations Officer) and Jonathan Wright (Committee Operations Manager).

During the course of the Committee's inquiry Nicholas Davies was the Senior Committee Specialist Mahika Dixit was a POST Fellow, Kerry Stewart was a POST fellow, and Emma Wilding was a Committee Specialist.

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 8890; the Committee's email address is eacom@parliament.uk.

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Summary

In July 2022 the UK Health Security Agency (UKHSA) issued its first ever Level 4 heat-health alert as temperature records were broken and 40°C was recorded in the UK for the first time. As temperature trends continue to rise, heatwaves are predicted to become more frequent and severe. According to the Met Office, the chances of a summer matching the current hottest on record in this country could be greater than 50% by mid-century. This is against a backdrop of increasingly extreme heat being experienced across the world, with 2023 confirmed as the hottest year ever recorded globally by a significant margin.

This has serious consequences for health, wellbeing and productivity. Exposure to heat raises a human's blood pressure and heart rate, impacting the circulatory, nervous, respiratory and renal systems. This can lead to a number of effects which increase the risk of illness or death, including dehydration, heat exhaustion and heatstroke. UK heat-related deaths are believed to have exceeded 4,500 in 2022, and this could rise to 10,000 annually without concerted action to adapt to the warming climate. Those most at risk include the over 65s and those with existing health conditions. Hot weather also impacts mental health by exacerbating the symptoms of psychiatric illnesses, worsening the side effects of medication and increasing suicide risk. It has broader wellbeing effects on the population at large, including sleep deprivation. The economic costs are believed to run into the billions.

Humidity is an important factor in how the body experiences heat, yet this does not currently feature prominently in weather-related communications. We therefore recommend that the Met Office and the UKHSA begin to incorporate explicit messaging and/or metrics regarding the effects of humidity levels as well as temperature into weather forecasts and heat health alerts. We also suggest the Met Office trial a naming system for heatwaves (as is currently the case with major storms) in order to help communicate the threat heat can pose, and reiterate the call from our predecessor committee's report on *Heatwaves: adapting to climate change*, issued in 2018, for a Minister-led public information campaign on the dangers associated with heat.

As the climate warms, demand for cooling technologies will rise. The International Energy Agency says that record-breaking temperatures feed the demand for air conditioning which in turn results in surges in demand for electricity—risking a vicious cycle of increased greenhouse gas emissions that in turn make the world even hotter. Although the UK has not yet experienced blackouts due to peak energy demand related to cooling in the summer, such peaks have occurred and have led to coal-fired power stations being brought into service, thereby increasing the carbon content of the UK's energy mix. It is essential, therefore, that as well as continuing action to decarbonise the grid, Ministers adopt an approach to heat resilience adaptation which prioritises passive cooling—that is, the use of measures which do not require energy consumption. Establishment of minimum energy performance standards (MEPS) and continuation of work to reduce the use of fluorinated gases ('F-gases') used in cooling equipment—some of which have global warming potentials thousands of times greater than carbon dioxide—are vital to achieving a sustainable approach to cooling.

One of the most important ways in which passive cooling can be achieved is through nature-based solutions, such as parks, trees, water bodies and green infrastructure such as green roofs. These measures have not only been shown to have significant cooling effects, but also a multitude of co-benefits—for example, for health, wellbeing, air quality, flood resilience and biodiversity. We therefore recommend that the Government adopt a range of measures to protect and expand green spaces, particularly in urban areas where the ‘urban heat island’ effect (a consequence of reduced natural landscapes, urban geometry, a prevalence of man-made materials, and heat generated from human activities) typically raises temperatures in cities beyond those in rural areas. Such measures must prioritise disadvantaged areas currently underserved by access to green space.

Another core issue is the heat resilience of homes. The population spends on average 90% of its time indoors, yet the UK housing stock is not designed to cope with excessive heat, and millions of UK homes experience summertime overheating. While the introduction of Part O of the building regulations, which covers the overheating mitigation requirements of new residential buildings, is a positive step, this does not currently apply widely enough. We therefore recommend that Part O be expanded to cover refurbishments of existing properties as well as material changes of use to residential. Post-occupancy evaluation should also be brought in to ascertain the real-world performance of mitigation measures taken under Part O, within the first year of installation.

Four out of five homes that will exist in 2050 are already built, meaning that the scale of retrofitting required for existing homes to protect them from overheating is vast. We consider that there are opportunities to combine existing initiatives on insulation and energy efficiency into a much more ambitious and comprehensive housing retrofit programme which also addresses the risks of overheating. Such an approach, if well designed and delivered, can minimise both cost and disruption while ensuring homes are energy efficient and remain comfortable to live in. We recommend a locally-led approach delivered via local authorities—which know their areas and communities best—backed with adequate long-term funding, and prioritising passive measures, and then fans, over ‘active’ cooling measures. Private finance will also be a key component in achieving retrofit on such a vast scale; we therefore call on the Government urgently to bring forward proposals to encourage access to low-cost finance for householders following the consultation it carried out three years ago.

The Government’s third National Adaptation Programme (NAP3), published in July 2023, details its response to the risks and opportunities identified in the latest statutory Climate Change Risk Assessment, dating from 2022. Whilst NAP3 is an improvement on previous iterations, and identifies the right areas where action is required, it is mainly a compilation of existing policy and initiatives and does not demonstrate sufficient urgency or ambition with regards to heat resilience measures.

Effective joint working is essential if the impacts of heat are to be tackled in a coordinated, holistic and cost-effective way. The Climate Resilience Board set out in NAP3 is potentially an important development, as long as it includes representation from all relevant Government departments, agencies and other organisations, and meets sufficiently frequently. We recommend that the Government appoint a lead Minister for heat resilience to act as a focal point and drive forward coordinated action in this area.

Ultimately, we consider that a comprehensive national heat resilience strategy is required to draw together all of the recommendations outlined in our report and ensure coordinated action on all fronts. We were pleased to see the UK sign up to the Global Cooling Pledge initiative at COP28 and, with it, the commitment to produce a national cooling action plan: if sufficiently ambitious, that plan could embody the heat resilience strategy which is clearly required. We stand ready to continue to work constructively with all relevant Government departments to make this a reality.

About this inquiry

1. In February 2023 the Environmental Audit Committee (EAC) held an event to mark the 25th anniversary of its inaugural meeting. This event, hosted by Imperial College London, was an opportunity not only to celebrate the committee’s achievements over the quarter-century since its establishment, but also to consider future challenges. As part of this, we conducted a ‘My EAC Inquiry’ exercise—loosely based on similar past initiatives carried out by the former Science & Technology Committee¹—whereby leading academics were invited to pitch ideas for future scrutiny to a panel of committee members. The aim was twofold: first, to identify possible subjects for future inquiries; and second, to build engagement with the academic community working in areas covered by our remit.

2. The winning entry, chosen from three shortlisted pitches, came from Oxford University academics Associate Professor Radhika Khosla and Doctor Nicole Miranda. They highlighted what they saw as a blind spot in Government policy regarding resilience to, and cooling from, the increasing levels of heat being experienced in the UK. We subsequently engaged Professor Khosla and Dr Miranda as specialist advisors to help shape the terms of reference for our inquiry—building on the inquiry into heatwaves conducted by the committee in the 2017 Parliament²—and to provide advice and assistance as required.³ The Committee would like to put on record its sincere thanks to Professor Khosla and Dr Miranda for their valuable insight and constructive input over the course of the inquiry.

3. A total of 63 submissions were received in response to our call for evidence, around a quarter of which were from academics (either on their own, or in partnership with other academics, researchers or organisations).⁴

4. We held two oral evidence sessions, during which we heard from the Met Office; the UK Health Security Agency (UKHSA); the International Energy Agency (IEA); representatives of the heating, ventilation and air conditioning (HVAC) industry; the Royal Institute of British Architects (RIBA) and the Local Government Association (LGA); as well as prominent researchers and practitioners both from within the UK and globally, including UN representatives.⁵

5. Subsequent to this, we also held an oral evidence session with Rt Hon Graham Stuart MP, Minister for Energy Security and Net Zero at the Department for Energy Security and Net Zero (DESNZ) (“the Minister”), in his capacity as Ministerial Head of Delegation for the UK at the 28th Conference of the Parties to the UN Framework Convention on Climate Change (COP28), on 8th November 2023.⁶ This was a wide-ranging session exploring a variety of aspects in relation to the UK’s preparations for COP28 but included a short section of questions directly relevant to this inquiry, which were followed up in

1 Science and Technology Committee, *My Science Inquiry*, September 2022

2 Environmental Audit Committee, Ninth Report of Session 2017–2019, *Heatwaves: adapting to climate change*, HC 826, July 2018

3 Professor Khosla and Dr Miranda had no relevant interests to declare on appointment.

4 The written evidence received is listed on pages [47–49]

5 The oral evidence taken is listed on page 46.

6 Oral evidence taken before the Environmental Audit Committee, *Prospects for UNFCCC COP28*, HC 185, 8 November 2023

correspondence.⁷ We have also taken into account testimony received from the Chair of the Climate Change Committee's Adaptation Committee, Baroness Brown of Cambridge DBE, during an oral evidence session on that Committee's 2023 progress reports to Parliament held on 19 July 2023.⁸

7 Environmental Audit Committee, [*Correspondence between the Chair and the Minister for Energy Security and Net Zero in relation to the 8 November 2023 oral evidence session on Prospects for UNFCCC COP28*](#)

8 Oral evidence taken before the Environmental Audit Committee, [*Mapping the path to net zero*](#), HC104, 19 July 2023. The relevant Climate Change Committee reports are [*Progress in adapting to climate change: 2023 Report to Parliament*](#), March 2023, and [*Progress in reducing UK emissions: 2023 Report to Parliament*](#), June 2023

1 Adapting to a warming planet

6. In July 2022, the UK Health Security Agency issued its first ever Level 4 heat-health alert⁹ as temperature records were broken and temperatures of over 40°C were recorded in the UK for the first time.¹⁰ As temperature trends continue to rise, heatwaves are predicted to become more frequent and severe, phenomena generally attributed to the effects of anthropogenic climate change. Professor Jason Lowe OBE, Head of Climate Services at the Met Office Hadley Centre, told us that, under a high emissions scenario, the chances of a future summer mirroring the current hottest on record in the UK would be between 50% and 62% by mid-century, meaning what is “still quite a rare event becomes, on average, every other summer”. He went on to say that “later in the century, that type of event becomes a cool summer”.¹¹

7. This is against a backdrop of increasingly extreme heatwaves being experienced across the world in 2023, in southern Europe, North Africa, China and the United States. Data from the EU’s Copernicus Climate Change Service released in January 2024¹² confirmed 2023 as the hottest year ever recorded by a significant margin, with global mean temperatures 1.48°C above pre-industrial levels—adding to what the World Meteorological Organization (WMO) calls “a deafening cacophony of broken records”.¹³ The Met Office believes 2024 may be even hotter, suggesting that average global temperatures in the coming year may break through the 1.5°C barrier for the first time in modern history.¹⁴ Although this would not amount to breaching the Paris Agreement temperature limit—which would ensue if temperatures exceeded the 1.5°C benchmark when averaged over a longer period of time—and the naturally occurring El Niño phenomenon is likely to be a contributory factor in 2024 temperature patterns, if this significant global benchmark is breached it will nonetheless be a very concerning development. Scientists from World Weather Attribution have indicated that the warming trends observed over the globe during 2023 would have been virtually impossible without the contribution of human-induced climate change.¹⁵

8. This has significant implications for demand for cooling technologies and, in turn, for energy consumption. In 2018 the International Energy Agency (IEA) published the Future of Cooling report, in which it estimated global cooling needs in the coming decades.¹⁶ In this report the IEA projected that ten new air conditioners (ACs) would be sold globally per second until 2050. This would triple the global AC stock: the IEA estimated that new electricity capacity equivalent to that of the United States, the EU and Japan combined (in

9 UK Health Security Agency, Press release, [Heat-health advice issues for all regions of England](#), 15 July 2022

10 The highest daily maximum temperature recorded in the UK to date is a reading of 40.3°C taken at Coningsby, Lincolnshire on 19 July 2022: “UK climate extremes”, Met Office, accessed 12 January 2024. A reading of 40.2°C had been taken at Heathrow Airport earlier in the day: “UK reaches hottest ever temperature as 40.2°C recorded at Heathrow”, *The Guardian*, 19 July 2022.

11 [Q6](#)

12 Copernicus Climate Change Service, Press release, [Copernicus: 2023 is the hottest year on record, with global temperatures close to the 1.5C limit](#), 9 January 2024

13 Reuters, [World to hit 1.4C of warming in record hot 2023](#), 30 November 2023

14 Independent, [Next year’s average global temperature may rise higher than 1.5C, warns Met Office](#), 8 December 2023

15 World Weather Attribution, [Extreme heat in North America, Europe and China in July 2023 made much more likely by climate change](#), 25 July 2023

16 International Energy Agency, [The Future of Cooling](#), May 2018

2018) would be required to meet this demand.¹⁷ In a July 2023 article the IEA reiterated that record-breaking temperatures were feeding demand for air conditioning and driving surges in demand for electricity: such demands can result in a vicious cycle of increased greenhouse gas emissions that in turn risk making the world even hotter.¹⁸

9. Whilst the UK has not yet experienced blackouts due to peak summer cooling demand, such demand has implications for the carbon content of the UK's energy mix. National Grid Electricity System Operator (ESO) confirmed to us that coal-fired power stations were brought into service in both 2022 and 2023 to balance the electricity system during summer demand peaks.¹⁹ Coal is the most carbon-intensive fuel used in energy generation and so is only used when other forms of generation are insufficient to meet demand: its regular use in UK power generation is due to be phased out entirely by October 2024.²⁰

10. In July 2023 academics from Oxford University published research indicating that the UK and Ireland (together with Switzerland and Norway) would experience the largest relative increase in cooling needs—30%—if the lower target of the Paris agreement—1.5°C of warming—were overshoot, and instead the world reached 2°C.²¹ The latest analysis by Climate Action Tracker (from December 2023) suggests that the world is on course for 2.7°C of warming by 2100 based on current policies and action. Even if all countries meet all their existing climate pledges and targets, this only decreases to 2.1°C.²²

The impacts of heat

“The silent killer”

11. Exposure to heat raises the blood pressure and heart rate as the body has to work harder to maintain its core temperature at around 37°C. This impacts the circulatory, nervous, respiratory and renal systems²³ and can lead to a number of effects which increase the risk of illness or death, including dehydration, heat exhaustion and heatstroke.²⁴ World Weather Attribution describe heatwaves as being “among the deadliest natural hazards”, causing thousands of deaths each year²⁵—yet due to the fact that heat is something of an invisible threat when compared to other climate impacts such as flooding²⁶, it has been labelled “the silent killer”.²⁷

17 International Energy Agency, [Air conditioning use emerges as one of the key drivers of global electricity-demand growth](#), 15 May 2018

18 International Energy Agency, [Keeping cool in a hotter world is using more energy, making efficiency more important than ever](#), 21 July 2023

19 Electricity System Operator ([HRSC0066](#)) pp 1–2

20 Electricity System Operator ([HRSC0066](#)) p 1

21 Miranda et al, [“Change in cooling degree days with global mean temperature rise increasing from 1.5C to 2.0C”](#), *Nature Sustainability*, 13 July 2023

22 Climate Action Tracker, Press release, [Projected warming almost unchanged for two years as governments push false solutions over climate action](#), 5 December 2023

23 Khosla et al, [“Health risks of extreme heat”](#), *British Medical Journal*, 7 October 2021

24 NHS England, [Heatwave: how to cope in hot weather](#), accessed 10 January 2024

25 World Weather Attribution, [Extreme heat in North America, Europe and China in July 2023 made much more likely by climate change](#), 25 July 2023

26 [Q32](#)

27 [Q111](#)

12. According to a joint analysis from the Office for National Statistics (ONS) and UKHSA,²⁸ over the five heat-periods²⁹ in the UK between June and August 2022 there were 3,271 excess deaths—6.2% above the five-year average—of which 2,803 were in the most vulnerable age group of over 65. Further experimental statistics released by the ONS in September 2023³⁰ suggest the total number of UK heat-related deaths across the whole of 2022 exceeded 4,500. Further afield, over 70,000 people are believed to have died due to extreme heat in Europe in 2022.³¹ This figure is expected to be surpassed when data for 2023 becomes available. Since the full impact of heatwaves is rarely known until months afterwards, and robust record-keeping is lacking in some countries, reported global heat-induced mortality figures are likely to be an underestimate.³²

13. In its December 2023 report on Health Effects of Climate Change,³³ the UKHSA say that, under a high-warming scenario without adaptation, there could be up to 10,000 deaths per year in this country due to extreme heat by the 2050s. ‘Adaptation’ refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change.³⁴ The report also details how a warming climate heightens the risk of a multitude of additional health threats, such as drought, wildfires, air quality degradation and infectious diseases.

14. The UKHSA told us that everyone is at risk from the health consequences of hot weather but some groups—generally those least able to regulate their own body temperature—face an elevated risk. This includes people over 65, young children, pregnant women, those with existing long-term illnesses or disabilities, homeless people, those with a drug and/or alcohol addiction and people with low income or in deprivation.³⁵ We heard, too, about the elevated risks for outdoor workers such as those in construction, agriculture and the gig economy.³⁶

Mental health, wellbeing and productivity

15. The impacts of heat are not limited to physical health. We heard from Dr Laurence Wainwright, of the Smith School of Enterprise and the Environment at the University of Oxford, about the concerning effects of hot weather on mental health and wellbeing, particularly on the 16% of people in the UK who live with a psychiatric illness. This can include exacerbation of symptoms, worsening of the side-effects of prescribed medication, and significant increases in suicide risk, which he said was twice as high in the UK when the temperature was 32°C rather than 22°C.³⁷ Rates of work-related injuries are believed

28 Office for National Statistics, [Excess mortality during heat-periods: 1 June to 31 August 2022](#), 7 October 2022

29 A ‘heat period’ is defined by the ONS as “day(s) on which a Level 3 Heat Health Alert is issued and/or day(s) when the mean Central England Temperature is greater than 20°C”

30 Office for National Statistics, [Climate-related mortality, England and Wales: 1988 to 2022](#), 22 September 2023. The ONS states in this release that: “These are Experimental Statistics. The methods are under development, which means estimates may change. We advise caution when using the data.”

31 Forbes, [Extreme heat killed over 70,000 in Europe last year, study finds. This year is on track to be even worse](#), 21 November 2023

32 World Weather Attribution, [Extreme heat in North America, Europe and China in July 2023 made much more likely by climate change](#), 25 July 2023

33 UKHSA, [Health Effects of Climate Change \(HECC\) in the UK](#), December 2023

34 UN Framework Convention on Climate Change, [Introduction to adaptation and resilience](#), accessed 12 January 2024

35 UKHSA ([HRSC0043](#)), p3

36 [Q129](#)

37 [Q23](#)

to rise as temperatures increase,³⁸ while there is also a correlation between increased heat and increased rates of domestic violence.³⁹ Furthermore, Dr Wainwright cited evidence that dehydration, poor sleep and a decline in cognitive function were strongly linked to heat, not just in those with existing mental health problems but also in the general population.⁴⁰

16. This has serious consequences for productivity; Dr Wainwright told us that inadequate or interrupted sleep patterns—which correlates with high temperatures—can cost the UK economy £60bn a year, the equivalent of 1.5% to 2% of GDP.⁴¹ This is on top of the economic costs of heat-related mortality, estimated to be £6.4bn per year according to a report on the Monetary Value of Risks and Opportunities prepared as part of the CCC’s advice to Government on the 3rd UK Climate Change Risk Assessment.⁴² The same report highlights that many early adaptation investments deliver high value for money, with heat alert and heatwave planning generating returns above 10:1 (i.e. every £1 invested in adaptation delivers £10 in net economic benefits).⁴³ The Climate Change Committee (CCC) reports that adaptation action is expected to generate benefits from avoided damages for almost every climate risk they assessed.⁴⁴

17. We have received compelling evidence that heat is having serious and widespread impacts on health, wellbeing and economic productivity. This is already costing the UK thousands of lives and billions of pounds annually, a situation which is set to get worse without concerted action. The social and economic case for accelerating heat adaptation measures in the UK is clear-cut.

Humidity

18. Various stakeholders including the Institution of Mechanical Engineers,⁴⁵ the Institution of Occupational Safety and Health,⁴⁶ Imperial College London⁴⁷ and Dr Eric Peterson of Leeds University,⁴⁸ highlighted to us the significant contribution of humidity—a measure of the amount of water vapour in the air—to heat-health impacts. Sweating is vital to regulating body temperature, through the cooling effect perspiration generates as it evaporates, yet sweating is typically limited by humidity. Consequently, a lower ‘headline’ temperature coupled with high humidity can actually be more dangerous than a higher temperature in less humid conditions. As Omar Abdelaziz, Assistant Professor at the American University in Cairo and lead author of the UN Environment Programme Global Cooling Watch 2023 Report, told us: “Heat is not only temperature; heat is temperature and humidity”.⁴⁹

38 [Q125](#)

39 Dr Laurence Wainwright ([HRSC0064](#))

40 Dr Laurence Wainwright ([HRSC0044](#)), pp 3–4

41 [Q23](#)

42 Paul Watkiss Associates, *Report to the Climate Change Committee as part of the UK Climate Change Risk Assessment 3, Monetary Valuation of Risks and Opportunities in CCRA3*, May 2021, Table 42

43 Paul Watkiss Associates, *Report to the Climate Change Committee as part of the UK Climate Change Risk Assessment 3, Monetary Valuation of Risks and Opportunities in CCRA3*, May 2021, p17

44 Climate Change Committee, *Independent Assessment of UK Climate Risk*, June 2021, p88

45 Institution of Mechanical Engineers ([HRSC0039](#)), p1

46 Institution of Occupational Safety and Health ([HRSC0049](#)), p1

47 Imperial College London ([HRSC0036](#)), p1; p3; p5

48 Dr Eric Laurentius Peterson ([HRSC0002](#)), p1–4

49 [Q129](#)

19. While metrics which incorporate the effect of humidity, such as wet bulb temperatures, are well established,⁵⁰ and are part of heatwave guidance and alerts in countries such as Japan,⁵¹ they are not yet commonly used in this country. Professor Lea Berrang Ford, Head of UKHSA's Centre for Climate and Health Security, told us that “the value of using humidity as well as temperature in our alerts is unclear”.⁵² Expanding on this, she said: “Physiologically there is evidence that humidity matters in moderating heat impact on the body [but] In our data in the UK we are not seeing it coming out as important as a predictor of mortality. That does not mean that we will not see and consider that in the future in our health alerts.”⁵³ Omar Abdelaziz told us that “in some areas, especially around the coastal areas in the UK, humidity can get really high”.⁵⁴

20. *We recommend that the Met Office and UKHSA incorporate explicit messaging and/or metrics regarding the effects of humidity levels as well as temperature into weather forecasts and heat-health alerts.*

Government action

21. Under the Climate Change Act 2008, the UK Government has a statutory obligation to produce a national Climate Change Risk Assessment (CCRA) every five years. The most recent of these (CCRA3) was published in 2022.⁵⁵ The National Adaptation Programme (NAP)—led by the Department for Environment, Food and Rural Affairs (DEFRA)—sets out actions that the UK will take to adapt to climate change. The latest iteration (NAP3) was published in July 2023 and details the Government's response to the risks and opportunities identified in CCRA3.⁵⁶ It covers the period to 2028.

22. Speaking to the committee at an oral evidence session on *Mapping the path to net zero* on 19 July 2023, CCC Adaptation Committee Chair Baroness Brown called NAP3 “the best one we have had so far”, but said that “overall, it really lacks ambition” and that it was mainly a compilation of existing policy and initiatives.⁵⁷ Commenting specifically on heat resilience measures, Baroness Brown said that NAP3 contained “no additional high-value initiatives” and therefore did not have “the urgency to deal with the problem that we can see is around us now”.⁵⁸ This view was echoed by other stakeholders including Francis Heil, Principal Consultant at engineering and technical services consultancy AtkinsRealis and member of the London Climate Change Partnership, who told us that NAP3 “underplays the significance and the urgency of heat-related issues”.⁵⁹

50 [Q17](#)

51 Japanese Ministry of the Environment, [Heat Illness Prevention Information: All about Wet Bulb Globe Temperature](#), accessed 10 January 2024

52 [Q20](#)

53 [Q22](#)

54 [Q129](#)

55 HM Government, [UK Climate Change Risk Assessment 2022](#), 17 January 2022

56 HM Government, [The Third National Adaptation Programme \(NAP3\) and the Fourth Strategy for Climate Adaptation Reporting](#), 18 July 2023

57 Oral evidence taken before the Environmental Audit Committee, [Mapping the path to net zero](#), HC104, 19 July 2023, [Q427](#)

58 *Ibid.*

59 [Q72](#)

23. UKHSA—an executive agency of the Department of Health and Social Care (DHSC)—is responsible for the Adverse Weather and Health Plan (AWHP).⁶⁰ This sets out guidance and emergency response measures for public sector, voluntary sector, health and social care organisations and local communities in relation to extreme weather events. The AWHP which was published in April 2023 was a deliverable arising from NAP2. It combines the previous plans for heatwaves and cold weather into one—an approach this committee endorsed in its 2018 Heatwaves report.⁶¹ The AWHP sets out a new risk-based alerting methodology using a traffic light system—meaning it is now consistent with the Met Office’s severe weather warnings⁶²—and incorporates factors such as vulnerability and likely impacts on health and social care services. Professor Berrang Ford told us that, in her view: “[t]he Adverse Weather and Health Plan and the weather heat alerts are the best in the world at the moment”.⁶³

24. The *Cooling in the UK* report⁶⁴ commissioned by the then Department for Business, Energy and Industrial Strategy (BEIS) in 2021, examines possible future energy consumption for cooling under three scenarios:

- **no intervention:** in which the market determines the uptake of different measures;
- **passive first:** whereby Government intervenes to prioritise passive cooling measures, and
- **efficient technologies:** where the market determines the uptake of measures, but Government requires technologies to be highly efficient.

The report’s main finding was that the total cumulative capital costs associated with ‘no intervention’ or ‘efficient technologies’ could be £60–70bn by 2050, compared to around £20–30bn in the ‘passive first’ scenario.⁶⁵ It also states that the modelled national peak demand for cooling during a heatwave event can be approximately twice as high as that in an average summer week, and between 20 and 65 times the annual average weekly consumption.⁶⁶ The Government confirmed to us that it advocates a ‘passive first’ approach.⁶⁷

25. At the UNFCCC COP28, held in the United Arab Emirates in December 2023, the UK was one of over 60 countries⁶⁸ to sign up to the Global Cooling Pledge (GCP).⁶⁹ This commits countries to a series of actions based on the findings of the Global Cooling Watch report produced by the UN Environment Programme-led Cool Coalition. The headline aims of the pledge are:

- to reduce cooling related emissions by 68% by 2050;

60 UKHSA, [Adverse Weather and Health Plan](#), April 2023

61 Environmental Audit Committee, Ninth Report of Session 2017–2019, [Heatwaves: adapting to climate change](#), HC 826, July 2018, para 26

62 [Q28](#)

63 [Q39](#)

64 Department for Business, Energy and Industrial Strategy, [Cooling in the UK](#), August 2021

65 *Ibid.*, p7

66 *Ibid.*, p6

67 DESNZ ([HRSC0029](#)), p4

68 UN Environment Programme, [Global Cooling Pledge](#), 6 December 2023

69 UNFCCC, [Global Cooling Pledge sees participants commit to reduce cooling-related emissions across all sectors by at least 68 percent globally](#), 5 December 2023

- to significantly increase access to sustainable cooling by 2030; and
- to increase the global average efficiency of new air conditioners by 50%.⁷⁰

The Department for Energy Security and Net Zero provided us with a tabulated list of GCP commitments and how these are, or are to be, met in the UK through Government actions and policies.⁷¹

70 UN Environment Programme, [Global Cooling Watch report: Keeping it Chill: How to meet cooling demands while cutting emissions](#), 5 December 2023

71 The table, which was produced at the Committee's request, is appended to this report and is also published as [HRSC0072](#). See Environmental Audit Committee, [Letter from the Chair to DESNZ Minister, Rt Hon Graham Stuart MP, regarding the UK's priorities for COP28](#), 16 November 2023

2 The urban heat island effect and nature-based solutions

Urban heat islands

26. There are a number of geographical factors which have an impact on climate. Among these are: distance from the sea (coastal areas are typically cooler and wetter than inland); altitude (the higher above sea level, the colder it will be); and latitude (the closer to the equator, the hotter it will be).⁷² The cumulative impact of these factors means that the south east of England is typically the hottest area of the UK.

27. Urban areas in the UK are typically hotter than rural ones due to the urban heat island (UHI) effect⁷³. Heat islands form as a result of several factors including reduced natural landscapes; urban geometry; a prevalence of man-made materials such as concrete which absorb more of the sun's heat than natural surfaces like trees or vegetation; and heat generated from human activities including vehicles, industrial facilities and ACs. Professor Lowe told us this can lead to large cities like London being up to 8°C warmer than surrounding rural areas,⁷⁴ while the UCL Institute for Environmental Design and Engineering cites an academic paper suggesting that UHI could have accounted for around 50% of the total heat-related mortality linked to the 2003 heatwave.⁷⁵

Nature-based solutions

Impact and access

28. We heard there are a variety of actions that can be taken to mitigate the UHI effect. These mostly involve rebalancing the urban landscape by the introduction of more natural features and the harnessing of their evaporative cooling and shading effects. They include tree planting, provision of green infrastructure (such as green roofs and walls), and the installation of green spaces and/or water bodies. The UN Environment Programme's November 2021 publication *Beating the Heat: A Sustainable Cooling Handbook for Cities* sets out various measures which can be taken to cool cities, along with case studies.⁷⁶

29. Contributors to our inquiry cited numerous studies which sought to quantify the effects of such measures. The Nature-based Solutions Initiative at the University of Oxford, RSPB and WWF, for example, told us of a systematic review of evidence on green walls which found that they could reduce the UHI effect by up to 5°C;⁷⁷ while the Green Roof Organisation Ltd referred to an initiative in Toronto where making just 5% of the city's area green roofs lowered city-wide temperature by an estimated 1.5–2°C, with a greater temperature reduction in high-density areas and with a direct 4–5°C roof surface cooling effect.⁷⁸

72 UK Environmental Change Network, [Factors affecting climate](#), accessed 10 January 2024

73 US Environmental Protection Agency, [Learn About Heat Islands](#), accessed 10 January 2024

74 [Q10](#)

75 Institute for Environmental Design and Engineering ([HRSC0041](#)), p1

76 UN Environment Programme, [Beating the Heat: A Sustainable Cooling Handbook for Cities](#), 3 November 2021

77 Nature-based Solutions Initiative at the University of Oxford, the Royal Society for the Protection of Birds (RSPB) and the Worldwide Fund for Nature (WWF) ([HRSC0021](#)), p7

78 Green Roof Organisation Ltd ([HRSC0016](#)), p1

30. It is also well-evidenced that the amount of, and proximity to, green and blue spaces in cities correlates with lower temperatures. Academics from Liverpool John Moores and Sheffield Hallam Universities highlighted two studies; one which found that neighbourhoods within a 10-minute walk of a park were as much as 3°C cooler than areas outside that range, and another which found that areas with high proportions of trees and water cover corresponded to cooler temperatures, by up to 12°C in some places.⁷⁹ A recent paper in *The Lancet* reported a finding that a 20% increase in green space had been demonstrated to lower heat-related mortality by 9%.⁸⁰

31. Green infrastructure offers a multitude of co-benefits; as Francis Heil told us, it can alleviate flooding by reducing surface water run-off, can help tackle air quality and can enhance biodiversity in addition to reducing overheating, making it “an obvious win”.⁸¹ This echoes the UKHSA view that nature-based solutions were a ‘win-win’ strategy.⁸² It is a view which appears to be shared by the DEFRA Secretary of State Rt Hon Steve Barclay MP, who said in November 2023 that: “The value of trees to people and nature has never been clearer. They are vital for our health and security. We can’t do without them... I will continue to make the case for investment in this area.”⁸³

32. However, we heard how access to greenery is very unequal; according to Natural England’s Green Infrastructure Mapping Database,⁸⁴ in the 200 most disadvantaged urban Lower Super Output Areas (those with the lowest levels of accessible green space combined with the highest levels of deprivation), only 3% of people have access to green space within a 15-minute walk. In terms of their cooling effect, Dr Peterson stressed that “all green spaces are not equal” and cited studies concluding that shade trees are most effective.⁸⁵

Natural England Green Infrastructure Framework

33. The Natural England Green Infrastructure Framework (GIF),⁸⁶ published in February 2023 (and referenced in NAP3), provides evidence-based advice on how to design and implement green infrastructure at the national level to reduce risks from extreme heat. It sets out standards for 40% of residential developments to have green infrastructure (via the ‘Urban Greening Factor’⁸⁷), when adopted by a local planning authority. Adrian Dobson, Executive Director for Professional Knowledge and Standards at RIBA, told us this was “excellent” but he stressed it was “just guidance” and needed “more teeth”.⁸⁸

79 Dr Neil Simcock (Liverpool John Moores University) and Professor Aimee Ambrose (Sheffield Hallam University) ([HRSC0042](#)), p3

80 Choi et al, “[Effect modification of greenness on the association between heat and mortality: A multi-city multi-country study](#)”, *The Lancet*, 8 September 2022

81 [Q78](#)

82 UK Health Security Agency, [Health Effects of Climate Change \(HECC\) in the UK](#), December 2023, p10

83 DEFRA, [New forest for the nation to improve access to green space](#), 27 November 2023

84 Natural England, [Green Infrastructure Mapping Database and Analyses - Version 1.2](#), accessed 10 January 2024

85 Dr Eric Laurentius Peterson ([HRSC0069](#)), p1

86 Natural England, [Green Infrastructure Framework](#), 2 February 2023

87 The [Urban Greening Factor](#) is a planning tool to improve the provision of green infrastructure, particularly in urban areas. It is one of five headline standards within the GIF

88 [Q79](#)

34. The LGA told us there were only “a few examples” of local authorities adopting the GIF, such as Herefordshire. They told us that a further 27 councils were working with Natural England to help embed the GIF into local plans.⁸⁹ The CCC, in its 2023 Adaptation Progress Report, also pointed out that the GIF only applied to new developments⁹⁰ and that the proportion of urban green and blue space was decreasing.⁹¹ The CCC highlighted the fact that there was no clear legal requirement to protect and enhance public green and blue space, and that there was a lack of funding and incentives to encourage green infrastructure such as green roofs.⁹²

35. Nature-based solutions to climate change, such as parks, trees, water bodies and green infrastructure, have significant cooling effects as well as multiple co-benefits (for example, for health, wellbeing, air quality, flood resilience and biodiversity). Increasing the amount of green space is one of the most important tools in tackling the impacts of heat, especially in urban areas. Natural England’s Green Infrastructure Framework, incorporating the Urban Greening Factor, is therefore a significant and welcome step forward in setting out how green infrastructure can be best designed and implemented; however, the framework only applies to new developments, and evidence suggests that it is not yet being put into practice at scale by local authorities.

36. We recommend that the Government take action to expand urban green space, particularly in disadvantaged areas. At a minimum these actions ought to include: (i) introducing a statutory requirement on local authorities to protect green space; (ii) mandating local authorities in urban areas to use the Green Infrastructure Framework; and (iii) introducing measures to incentivise the installation of green roofs as new build or retrofit on appropriate residential or business premises.

89 Local Government Association (HRSC0070)

90 Climate Change Committee, [Progress in adapting to climate change: 2023 Report to Parliament](#), March 2023, p220

91 *Ibid.*, p207

92 *Ibid.*, p220

3 The built environment

The need for action

37. The heat resilience of homes was a core issue raised repeatedly throughout our inquiry. We spend on average 90% of our time indoors,⁹³ yet as Professor Berrang Ford told us, “the UK housing stock is not designed for heat”.⁹⁴ According to research from Loughborough University in 2021, over 4.6 million English homes experience summertime overheating,⁹⁵ while a report from engineering and sustainability consultants Arup for the CCC in 2022 warns that around 90% of existing homes will overheat under a 2°C global warming scenario.⁹⁶ CCRA3 identifies ‘risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings’ as one of eight priority risks.⁹⁷

38. DESNZ told us that targeted research is to be conducted into which building types, tenures and groups are most at risk and most likely to be impacted by climate related risks, looking to “close evidence gaps by identifying the buildings most vulnerable to extreme heat and where these are located, as well as appropriate adaptation solutions”.⁹⁸ The CCC’s March 2023 Adaptation report—published prior to NAP3—already sets much of this out. It identifies the key contextual risk factors for buildings as:

- **building type:** flats tend to be higher risk, especially those which are single-aspect, with high levels of glazing, limited shading and no access to outdoor space;
- **tenure and occupancy:** people in rented accommodation are more likely to be in fuel poverty and lack resources for adaptation, and those living alone tend to be at higher risk;
- **proportion of people working from home;**
- **income and vulnerability,** and
- **other social and health inequalities.**⁹⁹

39. The report of the 2021 Energy Follow Up Survey on thermal comfort, damp and ventilation produced by the Department for Business, Energy and Industrial Strategy contained similar findings, additionally citing social housing and dwellings in the London region as having a higher prevalence of overheating.¹⁰⁰ Adrian Dobson told us that, while further research would be worthwhile, there was a risk of “analysis paralysis” and “action is now needed quite urgently”.¹⁰¹

93 Royal Institute of British Architects ([HRSC0048](#)), p1

94 [Q38](#)

95 University of Loughborough press release, [Over 4.6 million English homes experience summertime overheating, new study finds](#), 22 July 2021

96 Arup, [Addressing overheating risk in existing UK homes](#), 2022

97 HM Government, [UK Climate Change Risk Assessment 2022](#), 17 January 2022, p33

98 DESNZ ([HRSC0029](#)), p1

99 Climate Change Committee, [Progress in adapting to climate change - 2023 Report to Parliament](#), March 2023, p238

100 BEIS, [Energy Follow Up Survey: thermal comfort, damp and ventilation: final report](#), 2021, p20

101 [Q75](#)

Spectrum of solutions and cooling hierarchy

40. Various measures are available to adapt unmodified domestic properties to cope better with heat. These can generally be divided into ‘passive’ solutions (those which do not involve expending energy, such as natural ventilation, shading, green infrastructure or cool roofs) and ‘active’ ones (those which require power to operate, such as the use of ACs and reversible heat pumps).

‘Fabric-first’ approach and passive cooling

41. Ventilation and insulation are the most important considerations in the thermal performance of buildings: for these reasons, RIBA advocates a ‘fabric-first’ approach focusing on these elements before considering additional cooling needs.¹⁰² Insulation measures can help reduce risks of overheating, if correctly installed and with adequate ventilation.¹⁰³

42. Window opening is the most straightforward way of achieving natural ventilation; however, the UCL Institute for Environmental Design and Engineering stressed that there were a number of reasons why this was not a straightforward solution: the suitability of window opening depended on the nature of the property and addressing concerns over air quality, noise, safety and security.¹⁰⁴ Also, as the Cooling in the UK report highlights, window ventilation can increase the temperature inside a building when outdoor temperatures are higher.¹⁰⁵

43. Passive measures, such as the use of shading and shutters, were highlighted in several written evidence submissions as being very effective in providing cooling while also being comparatively cheap and simple to fit. Some can also be moveable (and therefore maximise shade in the summer without limiting solar gains in the winter) and/or be motorised.¹⁰⁶ The Met Office Academic Partnership¹⁰⁷ referred to a modelling study of the residential housing stock in the West Midlands which estimated that external shutters could reduce the risk of heat mortality by around 40%—similar to that of air conditioning.¹⁰⁸

44. Cool roofs (roofs made from, or coated in, light-coloured materials which reflect more solar energy—known as the albedo effect) can have a significant effect on reducing internal temperatures. UKHSA cites a simulation study in the West Midlands which estimated that the introduction of cool roofs could potentially offset 25% of UHI-related mortality during heatwaves;¹⁰⁹ the Environmental Investigation Agency, an environmental charity, said that they were almost universally suitable and could cool a building by 1–2°C (reducing annual energy use from air-conditioning by 10–20%);¹¹⁰ and academics from Liverpool

102 [Q90](#)

103 See, for example, DESNZ ([HRSC0029](#)), p4

104 UCL Institute for Environmental Design and Engineering ([HRSC0041](#)), p3

105 Department for Business, Energy and Industrial Strategy, [Cooling in the UK](#), August 2021, p124

106 British Blind and Shutter Association ([HRSC0040](#))

107 Met Office Academic Partnership ([HRSC0027](#)), p6

108 MDPI, [Estimating the Influence of Housing Energy Efficiency and Overheating Adaptations on Heat-Related Mortality in the West Midlands, UK](#), Taylor et al, 16 May 2018

109 UKHSA ([HRSC0043](#)), p7

110 Environmental Investigation Agency ([HRSC0032](#)), p3

John Moores and Sheffield Hallam Universities told us of the Cool Roofs initiative in New York City, where coating the roofs of buildings with a highly reflective white paint had been found to reduce indoor temperatures by up to 30%.¹¹¹

45. In its Global Cooling Watch 2023 Report the UN Environment Programme estimated that passive measures alone could reduce cooling loads by 24%, leading to savings in investment costs, energy costs and greenhouse gas emissions.¹¹²

Fans

46. Electric fans can be very effective in reducing the need for AC. Fans can cool by both convective heat transfer (whereby faster moving air displaces the warmer air which is in contact with the skin) and by accelerating the evaporation of sweat: they can be free-standing or ceiling mounted. Though not technically passive cooling, as they require electricity to run, fans use considerably less energy than ACs. Green Alliance¹¹³ and Chris Twinn (a Chartered Engineer and Fellow of both RIBA and the Chartered Institute of Building Services Engineers) both advocated ceiling fans: Mr Twinn stated that they could deliver around 3°C of cooling for about 10% of the energy use, 5% of the embodied carbon and 15% of the cost of AC.¹¹⁴

47. Mr Twinn highlighted a number of barriers which currently stand in the way of large-scale adoption of ceiling fans, including the omission of locally controlled air movement in the comfort definition in Part L of the building regulations¹¹⁵ and a lack of design guidance. He concludes that “allowing ceiling fans may well be the largest influence for providing heat resilience for us in the context of most UK buildings not currently needing AC”.¹¹⁶

48. ***We recommend that the Government evaluate the case for amending Part L of the Building Regulations to encourage the use of ceiling fans (for example, by including locally controlled air movement in the definition of comfort).***

Active cooling

49. The most commonly used active cooling technology used to cool buildings is the AC unit, which uses the vapour-compression cycle to transfer heat from a hotter place (i.e. the room to be cooled down) to the ‘cold side’ of the cycle (i.e. outside) by way of a refrigerant circulating through the system. The refrigerant changes phase between liquid and vapour during the cycle as it absorbs and releases heat.¹¹⁷

111 Dr Neil Simcock (Liverpool John Moores University) and Professor Aimee Ambrose (Sheffield Hallam University) (HRSC0042), p2

112 UN Environment Programme, [Global Cooling Watch report: Keeping it Chill: How to meet cooling demands while cutting emissions](#), 5 December 2023, p12

113 Green Alliance (HRSC0051), p2

114 Mr Chris Twinn (HRSC0038), p2

115 HM Government, [The Building Regulations 2010; Approved Document L: Conservation of fuel and power, 2021 edition incorporating 2023 amendments](#)

116 Mr Chris Twinn (HRSC0038), p1

117 UK Parliament POST Note number 642, [Sustainable Cooling](#), April 2021, p3

50. Heat pumps, which are primarily used as an energy-efficient way of providing heat to a building, can also in many cases work like an AC to provide cooling if able to run in reverse,¹¹⁸ though this can require the installation of an additional distribution system in the home which can be both costly and disruptive. We heard about the potential for ambient temperature networks to provide cooling without running the heat pump's compressor, thereby reducing the operating cost and carbon impact¹¹⁹—though also bearing significant infrastructure cost implications.

Cooling hierarchy

51. All of the above factors can be taken into account via a cooling hierarchy, such as that set out in the Mayor of London's June 2022 Energy Assessment Guidance.¹²⁰ This states that measures to reduce the demand for cooling should be implemented in the following order of priority:

- Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure;
- Minimise internal heat generation through energy efficient design;
- Manage the heat within the building through exposed internal thermal mass and high ceilings;
- Provide passive ventilation;
- Provide mechanical ventilation;
- Provide active cooling systems.

New build

Building Regulations Part O

52. The Future Homes Standard (FHS) aims to ensure that homes built from 2025 will produce 75–80% less carbon emissions than those built under the current building regulations. It is due to become mandatory from 2025.¹²¹ To shape the FHS, two consultations (2019¹²² and 2021¹²³) were carried out by the Department for Levelling Up, Housing & Communities (DLUHC). This led to the introduction of new statutory guidance in the form of Approved Document O (Part O of the Building Regulations),¹²⁴ which came

118 UK Parliament, POST Note Number 699, [Heat Pumps](#), 14 July 2023, p2

119 [Q44](#); [Q63](#)

120 Mayor of London, [Energy Assessment Guidance: Greater London Authority guidance on preparing energy assessments as part of planning guidance](#), June 2022, p22

121 CBRE, [What is the 2025 Future Homes Standard and how will it impact residential real estate?](#), 1 February 2023

122 Ministry of Housing, Communities and Local Government, [The Future Homes Standard: 2019 Consultation on changes to Part L \(conservation of fuel and power\) and Part F \(ventilation\) of the Building Regulations for new dwellings, Summary of responses received and Government response](#), January 2021

123 Department for Levelling Up, Housing & Communities, [The Future Buildings Standard: 2021 Consultation on changes to Part L \(conservation of fuel and power\) and Part F \(ventilation\) of the Building Regulations for non-domestic buildings and dwellings; and overheating in new residential buildings, Summary of responses received and Government response](#), December 2021

124 Department for Levelling Up, Housing & Communities, [Overheating: Approved Document O](#), 15 June 2022

into effect on 15 June 2022 and covers the overheating mitigation requirements of new residential buildings. Contributors to the inquiry have been generally positive about this development: Dr Eric Peterson of Leeds University called it “world leading”.¹²⁵ A number of stakeholders pointed out that it only applies to new build homes and therefore does not address existing and non-domestic buildings.

53. A further Government consultation on the FHS launched in December 2023 asks a specific question regarding expanding Part O to apply to conversions of non-residential buildings to residential, but does not mention refurbishments.¹²⁶ In its supplementary written evidence outlining how the requirements of the Global Cooling Pledge are to be met, DESNZ suggests that Part O is the Government’s response to the requirement to “establish national model building codes that incorporate market appropriate passive cooling measures and energy efficiency strategies by 2030 for **new and refurbished buildings** [our emphasis]” (Commitment M5).¹²⁷

54. **We support the extension of Part O of the Building Regulations not only to cover material changes of use to residential, but also for refurbishments of existing properties. We recommend that the Government clarify whether it is intended that Part O of the Building Regulations be expanded to refurbishments. If that is indeed the case, we recommend that Ministers, in their response to this report, set out when, and by what mechanism, this is to be achieved. If it is not the case, we recommend that Ministers explain how the UK is to achieve Commitment M5 of the Global Cooling Pledge.**

Post-occupancy evaluation

55. We heard suggestions that there is currently little post-occupancy evaluation (POE) of new build homes, meaning the real-world effectiveness of meeting regulations ‘on paper’ is seldom ascertained. RIBA recommended that the Government require POE as a condition of procurement for building projects using public funding,¹²⁸ while Shade the UK advocated POE exercises during the first year of occupancy to evaluate installed measures, share best practice and improve methods.¹²⁹ The Government’s December 2023 FHS consultation has sought stakeholder views on the merits of asking all domestic developers to carry out post occupancy performance testing on the houses they build and to make the results publicly available; however, the Government does not envisage making this a mandatory requirement.¹³⁰

56. **We recommend that measures taken under Part O should be subject to post-occupancy evaluation within the first year of their installation.**

125 [Q44](#)

126 Department for Levelling Up, Housing & Communities, [The Future Homes and Buildings Standards: 2023 consultation](#), 13 December 2023, Para. 15

127 DESNZ ([HRSC0072](#)), p1, Commitment M5

128 Royal Institute of British Architects ([HRSC0048](#)), p1

129 Shade the UK ([HRSC0020](#)), pp13–14

130 Department for Levelling Up, Housing and Communities, [The Future Homes and Buildings Standards: 2023 consultation](#), 13 December 2023, para 8.2

Retrofitting

57. As the UK Green Building Council points out, 80% of homes that will exist in 2050 are already built,¹³¹ meaning retrofitting of existing homes will be needed on a vast scale to protect them from overheating. A number of respondents to our call for written evidence cite the need for a well-funded national retrofit strategy, including the Building Research Establishment,¹³² the Local Government Association¹³³ and RIBA—who say there are around 19 million homes that need retrofitting.¹³⁴

58. Since many existing properties will also need to be retrofitted with energy efficiency measures in order to deliver the Government’s net zero strategy goals, there are opportunities to combine works to minimise both disruption and cost. Adrian Dobson envisaged “something that ties together what at the moment is quite a lot of piecemeal action—boiler replacement schemes, Great British insulation [scheme]... in a more integrated programme”.¹³⁵ This is reflected in the recommendations of the CCC, in their 2022¹³⁶ and 2023¹³⁷ Progress in Reducing Emissions reports, suggesting that when an energy efficiency retrofit is carried out, overheating is considered and mitigated against if necessary. However, as the Cooling in the UK report notes, installation of reversible air-to-air heat pumps which can also provide cooling may incentivise the unnecessary use of active cooling equipment, thereby significantly increasing energy use and (before such time as the grid is fully decarbonised) emissions.¹³⁸ NAP3¹³⁹ mentions that a whole house approach to retrofit projects is required under Publicly Available Specification PAS 2035/2030, which is a condition of Trustmark accreditation (a requirement for installers operating under Government schemes)¹⁴⁰—though it puts the focus on avoiding mould and condensation rather than overheating.

Finance and area-based approach

59. Adequate financing and delivery mechanisms are integral to the practical viability of any such retrofit programme. The Government’s record on this is mixed, as both our 2021 Energy Efficiency of Existing Homes¹⁴¹ and 2023 Financial Sector and the UK’s Net Zero Transition¹⁴² reports, and the Government’s own figures,¹⁴³ illustrate—though the recently-announced increase in the funding allocated to the Boiler Upgrade Scheme through to 2028 represents a welcome step in the right direction.¹⁴⁴

131 UK Green Building Council, [Climate Change Mitigation landing page](#), accessed 16 January 2024

132 Building Research Establishment ([HRSC0046](#)), p2

133 LGA ([HRSC0052](#)), p5

134 RIBA ([HRSC0048](#)), p2

135 [Q73](#)

136 Climate Change Committee, [Progress in reducing emissions: 2022 report to Parliament](#), p198

137 *Ibid.*, p245

138 Department for Business, Energy and Industrial Strategy, [Cooling in the UK](#), August 2021, p123

139 HM Government, [The Third National Adaptation Programme \(NAP3\) and the Fourth Strategy for Climate Adaptation Reporting](#), 18 July 2023, p73

140 Department for Business, Energy & Industrial Strategy / BSI, [PAS 2035 and PAS 2030](#), 29 February 2020, p8

141 Environmental Audit Committee, Fourth Report of Session 2019–2021, [Energy Efficiency of Existing Homes](#), HC 346, para 69

142 Environmental Audit Committee, First Report of Session 2013–2024, [The financial sector and the UK’s net zero transition](#), HC 277, para 54

143 Politico, [Insulating Britain’s drafty homes will take over a century on current plans](#), 5 December 2023

144 HM Government, [Press release: Families, businesses and industry to get energy efficiency support](#), 18 December 2023

60. Research from Innovate UK in 2022 indicated that locally-led climate action could result in the achievement of net zero targets by 2050 while saving £137 billion and returning an additional £431 billion in wider co-benefits, in comparison to a national approach.¹⁴⁵ Councillor Linda Taylor, Vice Chair of the Local Government Association’s Local Infrastructure and Net Zero Board, told us that “local authorities are best placed to understand their community. They have a lot of information; they have a lot of data. With secure funding, they are able to deliver the programmes we need”. We heard how this approach could also boost local businesses and employment.¹⁴⁶

61. However, the LGA told us that local government currently receives no core funding for climate action¹⁴⁷ and instead has to deal with “a complex and uncertain funding landscape of small pots that come and go over time”—often involving resource-intensive bidding processes whereby authorities must compete against each other with no guarantee of success.¹⁴⁸ A November 2023 report from the National Audit Office raised similar criticisms,¹⁴⁹ while increasing numbers of councils are reported to be struggling so badly with their finances that they are facing bankruptcy.¹⁵⁰ We note that, in October 2023 the LGA, District Councils Network, County Councils Network and London Councils wrote a joint letter to the DESNZ Secretary of State with a plea for more support on climate action;¹⁵¹ an issue we have raised previously in our Energy Efficiency of Existing Homes report.¹⁵²

62. Councillor Taylor suggested that the Apprenticeship Levy¹⁵³—which she said was not always fully spent—could be among the potential sources of funding, as well as the Social Housing Decarbonisation Fund (SHDF).¹⁵⁴ The 2019 Conservative Party manifesto committed to spend £3.8 billion on the SHDF over a ten-year period from 2020/21 with the aim of upgrading ‘significant’ amounts of social housing stock to EPC band C or higher. The Demonstrator round of the scheme allocated £61 million and Wave 1 offered £179 million to 69 successful projects. Wave 2.1 will provide up to £800 million in funding over the years 2022/23 to 2024/25. Wave 2.2 opened for applications in November 2023 and is due to provide £80 million of funding in 2024/25.¹⁵⁵ The Government has announced that this scheme will receive a further £1.25 billion in the three years from 2025/26 to 2027/28, as part of a £6bn energy efficiency support package.¹⁵⁶ The latest statistics on the scheme are for Wave 1 only. Up to September 2023 18,100 measures had been installed in 10,000 homes.¹⁵⁷

145 Innovate UK, [Accelerating Net Zero Delivery](#), March 2022, p13

146 [Q93](#)

147 LGA ([HRSC0052](#)), p8

148 [Q94](#); [Q95](#)

149 National Audit Office, [Levelling up funding to local government](#), HC 191, 17 November 2023, p7

150 BBC, [Councils in England warn of growing financial crisis](#), 6 December 2023

151 Localgov.uk, [Councils ‘held back’ on net zero](#), 24 October 2023

152 Environmental Audit Committee, Fourth Report of Session 2019–2021, [Energy Efficiency of Existing Homes](#), HC 346, para 51

153 [Q89](#)

154 [Q92](#)

155 House of Commons Library, [Research briefing: Energy efficiency of UK homes](#), CBP 9889, 20 December 2023, p28

156 HM Government, [Press release: Families, businesses and industry to get energy efficiency support](#), 18 December 2023

157 House of Commons Library, [Research briefing: Energy efficiency of UK homes](#), CBP 9889, 20 December 2023, p28

63. The CCC's 2023 Adaptation report states that most of the investment in adaptation measures for the building stock will be private and "therefore low-cost finance, which enables households and businesses to install adaptation measures, is needed".¹⁵⁸ Public polling from the British Red Cross indicates that cost is the most significant barrier to people making adaptations to their homes to cope with heat.¹⁵⁹

64. The CCC suggests finance can be accessed through instruments such as green mortgages and property-linked finance¹⁶⁰—suggestions we have previously also made in our 2021 Energy Efficiency of Existing Homes report.¹⁶¹ The Government launched a consultation on improving home energy performance through lenders in November 2020; however, despite closing in February 2021, the Government appears still not to have responded to this consultation.¹⁶² Additionally, the Energy Efficiency Taskforce, part of whose role was to work with the private sector to increase the availability of green finance linked to installation standards and quality, was disbanded by the Government in September 2023¹⁶³. Omar Abdelaziz suggested ESCO (Energy Service Company) contract models could be "a good fit in the UK",¹⁶⁴ though Eleni Myrivili told us these do not work particularly well for solutions such as urban greening as "it is very difficult to figure out a return on investment" and "This is why we need the public sector, especially at city level, to help finance the solutions that we need".¹⁶⁵ Local Climate Bonds, advocated by the Green Finance Institute, are another potential solution.¹⁶⁶

65. We were pleased to note that the recent extension of the Boiler Upgrade Scheme announced by the Prime Minister in September 2023 has now been backed by additional funding for grants. The funded extension of the scheme represents a welcome move towards the long-term programme of retrofitting the existing housing stock which we have advocated in previous reports.

66. We consider that there are further opportunities to combine existing initiatives on insulation and energy efficiency into a more ambitious and comprehensive housing retrofit programme which addresses the risks of overheating in existing properties. Such an approach, if well designed and delivered, can minimise both cost and disruption while ensuring homes are energy efficient and remain comfortable to live in.

67. We therefore recommend that the Government establish a comprehensive national retrofit programme to adapt the UK's housing stock for both net zero and thermal comfort. The programme should include the following elements to maximise its impact and minimise costs:

158 Climate Change Committee, [Progress in adapting to climate change: 2023 Report to Parliament](#), March 2023, p235

159 British Red Cross ([HRSC0033](#)), p1

160 Climate Change Committee, [Progress in adapting to climate change: 2023 Report to Parliament](#), March 2023, p235

161 Environmental Audit Committee, Fourth Report of Session 2019–2021, [Energy Efficiency of Existing Homes](#), HC 346, paras 133–134

162 DESNZ and BEIS, [Consultation: Improving home energy performance through lenders](#), 18 November 2020

163 HM Government, [Energy Efficiency Taskforce](#) [page withdrawn 25 September 2023]

164 [Q133](#)

165 [Q133](#)

166 Green Finance Institute, [Local Climate Bonds](#), accessed 16 January 2024

- *Local delivery via local authorities, underpinned by adequate long-term funding;*
- *Prioritisation of vulnerable households;*
- *A fabric-first approach focusing on insulation and ventilation;*
- *Adoption of a cooling hierarchy prioritising passive measures, and then fans, above active cooling mechanisms;*
- *Consideration of the benefits and drawbacks of installing reversible heat pumps, bearing in mind such factors as: (i) whether or not active cooling is likely to be required following installation of passive measures and (if appropriate) fans; (ii) the vulnerability of the building occupant(s); and (iii) progress on decarbonising the national grid at the time of installation*

68. *We urge the Government to respond as soon as possible to its consultation on improving home energy performance through lenders which closed in February 2021. Ministers must rapidly bring forward proposals to encourage access to low-cost finance for householders to invest in home improvements which can increase energy efficiency and heat resilience.*

69. *We further recommend that the Government publish any interim or draft recommendations made by the Energy Efficiency Taskforce before it was disbanded.*

Jobs and skills

70. As well as issues around finance, we heard concerns regarding a lack of skills to deliver heat adaptation measures at scale. For example, RIBA suggested that the recruitment of skilled retrofitters must triple to meet net zero targets by 2050 and said that this presented an opportunity to create more jobs to meet “the huge green skills gap”.¹⁶⁷ We have previously raised similar concerns in our 2021 reports on Energy Efficiency of Existing Homes¹⁶⁸ and Green Jobs.¹⁶⁹ In NAP3, the Government says it is “working to grow the supply chain of skilled, competent retrofit installers by investing in skills and training”.¹⁷⁰ According to a study by the international home improvement company Kingfisher and the Centre for Economics and Business Research in October 2023, Britain is heading for a net zero tradespeople crisis with a shortfall of 250,000 predicted by 2030. It specifically cites a lack of trained plumbers, carpenters, electricians and heating engineers, and says this will cost an estimated £98bn in missed economic growth.¹⁷¹

71. *We urge the Government to set out, in its response to this report, the targets (if any) which Ministers have set for growth in the supply chain of competent retrofit installers, and the progress made against these targets to date. If no targets have yet been set, we recommend that Ministers seek to set ambitious targets for supply chain growth.*

167 RIBA ([HRSC0048](#)), p2

168 Environmental Audit Committee, Fourth Report of Session 2019–2021, [Energy Efficiency of Existing Homes](#), HC 346, paras 100–102

169 Environmental Audit Committee, Third Report of Session 2021–2022, [Green Jobs](#), HC 75, para 67

170 HM Government, [The Third National Adaptation Programme \(NAP3\) and the Fourth Strategy for Climate Adaptation Reporting](#), 18th July 2023, p76

171 Kingfisher, [UK to lose out on £98bn of growth by 2030 due to shortage of tradespeople](#), 19 October 2023

4 Communication and engagement

Information and guidance

72. Our predecessor committee, in its 2018 Heatwaves report, expressed concern over public misconceptions around the frequency and severity of heatwaves and recommended a Minister-led public information campaign on the developing threat of heatwaves and their effect on health.¹⁷² The findings in a 2020 research report commissioned from the consultants AECOM by the Climate Change Committee indicated that 40% of respondents to a survey did not know where to go for information on coping with extreme heat.¹⁷³ In a 2023 policy brief produced by the Grantham Research Institute at the London School of Economics (LSE) the authors cite ‘attitudes and behaviours’ as a key barrier to responding effectively to heatwaves.¹⁷⁴

73. UKHSA acknowledges that effective engagement with the public, and in particular those with increased vulnerabilities, is vital to help people take precautions and address the risks from extreme heat.¹⁷⁵ The Met Office Academic Partnership also told us that reducing misinformation could save lives, citing the 2022 UK heatwave as a clear example of this.¹⁷⁶ Dr Wainwright stressed that: “We need to be clear with public messaging that this is not doom-and-gloom [...]. This is just telling people that there is a risk”.¹⁷⁷ Professor Elizabeth Robinson, Director of the Grantham Research Institute at LSE, cited lessons from France, where 15,000 lives were lost in the 2003 heatwave but 1,500 in 2019, telling us that “some of the learning was that messaging needs to focus on solutions and actions that people can take.” She also highlighted the need to change social norms so as to create a “culture of heat” whereby people became more aware of the risks and the mitigations available.¹⁷⁸

74. UKHSA published comprehensive guidance on staying safe in hot weather on their Beat the heat webpage in May 2023.¹⁷⁹ This sets out actions people can take, such as keeping out of the sun during the hottest time of day (between 11am and 3pm), seeking shade, keeping hydrated and scheduling any physical exercise for cooler times of day. It also has a section of advice on staying cool at home including closing curtains, blinds, shutters or shades in rooms facing the sun; using fans; moving to cooler parts of the property, particularly for sleeping; and (when the air temperature outside is cooler than inside) maximising ventilation.

75. While sources of accurate, reliable and helpful guidance on dealing with extreme heat do exist, this information does not appear always to be reaching everyone who needs it, leading to avoidable health harms. Our predecessors raised this issue in their 2018 Heatwaves report but little progress appears to have been made. We reiterate the recommendation from our predecessor committee’s 2018 Heatwaves report that

172 Environmental Audit Committee, Ninth Report of Session 2017–2019, [Heatwaves: adapting to climate change](#), HC 826, para 20

173 AECOM, [Understanding how behaviours can influence climate change risks](#), 23 April 2020, p14

174 LSE Grantham Research Institute on Climate Change and the Environment, [Policy brief: The 2022 heatwaves: England’s response and future preparedness for heat risk](#), p4

175 UKHSA (HRSC0043), p8

176 Met Office Academic Partnership (HRSC0027), p4

177 [Q32](#)

178 [Q134](#)

179 UKHSA, [Guidance: Beat the heat: staying safe in hot weather](#), 10 May 2023

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. This could be based on the information on the UKHSA’s Beat the Heat webpage. It should have a particular focus on vulnerable groups.

Naming of heatwaves

76. One idea that has been discussed recently when it comes to communicating heat risk to the public is that of naming heatwaves in the same way as names are given to major storms or hurricanes. This issue came to prominence in July 2023 when the name Cerberus—unofficially given to the European heatwave by a private Italian weather service—quickly went viral. Eleni Myrivili spoke of the potential benefits of naming and categorisation¹⁸⁰ while Omar Abdelaziz suggested cultural factors, such as whether or not the naming of extreme weather events was already commonplace, may dictate where such an approach would be more likely to succeed.¹⁸¹

77. When asked about this issue, Professor Berrang Ford stated that: “At the moment there is insufficient evidence that it is effective” and confirmed that the UKHSA currently endorsed the WMO position on this issue—namely that it has no immediate plans to introduce heatwave naming but is “considering the advantages and disadvantages”.¹⁸² The Met Office introduced a practice of naming major storms in 2015 and says this assists with communication and helps keep the public safe.¹⁸³

78. The naming of heatwaves could assist in helping the public to recognise such extreme weather events as a threat to health and wellbeing in the same way as named storms. We recommend that the Met Office trial the naming of heatwaves for 2024 with a view to making this permanent if the trial is deemed successful.

180 [Qq111–114](#)

181 [Q115](#)

182 World Meteorological Organization, Press release, [WMO has no immediate plans to name heatwaves](#), 19 July 2022

183 Met Office, [UK Storm Centre webpage](#), accessed 17 January 2024

5 Protecting the vulnerable

79. One of the principal messages delivered in the UKHSA Health Effects of Climate Change report is that the health risks of climate change are not distributed equally.¹⁸⁴ As we note above, those particularly vulnerable to heat impacts include the elderly and those with pre-existing medical conditions, as well as people affected by particular social circumstances such as homelessness, a drug and/or alcohol addiction and deprivation. One of the most shocking statistics cited in the course of the oral evidence we took was that 83% of the people who died from heat in Athens were older people who lived alone.¹⁸⁵

80. The LGA confirmed that local authorities have lists and maps via which they are able to identify vulnerable people, drawing on information from the Department for Work and Pensions (DWP) and the voluntary and community sector as well as other sources.¹⁸⁶ Many stakeholders have called for these vulnerable populations to be prioritised in the Government's strategy for heat resilience. We heard a number of ways in which this is done in other countries. Dr Peterson told us that subsidised ACs were being installed in New York City, Chicago and other US cities.¹⁸⁷ A similar approach has been taken in Geelong, in the Australian state of Victoria, whereby a local community group is working with (and funded by) the state government to retrofit a single room in the homes of vulnerable people with facilities to remain comfortable during extreme weather in summer and winter.¹⁸⁸

81. A further aspect of heat resilience in some cities is a cooling centre. Cooling centres are cool (often air-conditioned) spaces temporarily set up by local authorities to offer the public respite from an ongoing heatwave. Facilities typically provided include shade, water, resting areas and potentially medical assistance and guidance on staying cool. Such centres are increasingly common in major cities and provinces across the US and Canada, including New York City, Boston, and cities in Ontario.¹⁸⁹ The Greater London Authority (GLA) has on its website a map of cool spaces where people can find opportunities to shelter from the sun, cool down and rest to take respite on hot days; however, the GLA points out that the spaces included on the map are not designed to support vulnerable individuals during hot days and are not a substitute for medical care.¹⁹⁰

82. While many of the respondents to our call for evidence endorsed the concept of cooling centres, drawing parallels with the 'warm spaces' initiatives run by many local authorities in the winter,¹⁹¹ we heard that they have implications for people's privacy and productivity.¹⁹² Professor Berrang Ford also highlighted a risk, in that vulnerable people could put themselves in more danger by walking to a cooling centre in the heat of the day, though she confirmed cooling centres were "something that [UKHSA] are looking at and [...] something that would be relevant in the future".¹⁹³

184 UKHSA, [Health Effects of Climate Change \(HECC\) in the UK](#), December 2023, p14

185 [Q122](#)

186 LGA ([HRSC0070](#))

187 [Q55](#)

188 The Climate Safe Rooms project undertaken by Geelong Sustainability: further information about the project is available at <https://www.geelongsustainability.org.au/project/climate-safe-rooms/>

189 ITV News, [What are cooling centres and could they soon pop up in the UK?](#), 19 July 2022

190 Mayor of London, [Cool Spaces webpage](#), accessed 17 January 2024

191 A directory of 'warm spaces' can be found at: <https://warmspaces.org/>

192 [Q103](#)

193 [Q14](#)

83. While there is potential for cooling centres to be an important part of future resilience measures for those most vulnerable to heat impacts, evidence of their effectiveness is not clear cut at present. *We recommend that UKHSA evaluate the potential use of cooling centre initiatives as a policy response to excessive heat, with a view to developing and publishing advice to central government and local authorities on a suite of practical initiatives which can be taken to support populations which are particularly vulnerable to extreme heat.*

6 Energy consumption and efficiency

Consideration of cooling demand in future scenario planning

84. National Grid ESO—soon to transition into the Future System Operator (FSO)¹⁹⁴—acknowledges that cooling demand is growing and projected to continue to do so.¹⁹⁵ The organisation is nevertheless “confident there will be sufficient supply to meet electricity demands over the summer”—in part because of a corresponding growth in solar generation capacity and heat flexibility.¹⁹⁶ National Grid ESO told us that cooling demand played a part in long-term demand planning and that the range of expected growth in demand was sufficient to accommodate the IEA’s predictions around future cooling.¹⁹⁷ We note that there is no explicit reference to cooling in their July 2023 Future Energy Scenarios report.¹⁹⁸

85. In the Cooling in the UK report, prepared for the Department for Business, Energy and Industrial Strategy by AECOM and others, researchers reported that annual UK energy consumption attributable to cooling could be between 6.3TWh and 12.0TWh by 2100, depending on future emissions, but that this could be significantly reduced by Government intervention.¹⁹⁹ Dr Chiara Delmastro of the IEA told us that the current impact of cooling peaks in the UK was estimated at 14% but this would inevitably grow “unless serious measures are taken into consideration”.²⁰⁰

86. *We recommend that the Future System Operator make specific provision for the likely future demand for electricity for cooling purposes in all its future scenario planning.*

Minimum energy performance standards

87. The concept of Minimum Energy Performance Standards (MEPS) is central to International Energy Agency recommendations on reducing the energy consumption associated with future cooling needs. Citing the latest market data, the IEA states that, in every region in the world, the typical air conditioner sold is less than half as efficient as the highest-performing product on the market. The IEA concludes that implementing MEPS and labelling showing the energy efficiency of appliances has proved to be “very effective” and describe such an approach as a “relatively quick and straightforward fix”.²⁰¹ The authors of the UN Global Cooling Watch 2023 Report, meanwhile, conclude that “best efficiency measures are essential to avoid a tripling of electricity consumption from increased cooling demand”.²⁰² DESNZ confirmed to us that the Government is “working towards” establishing MEPS by 2030, having initially committed to this at COP26 in 2021.²⁰³

194 National Grid Electricity System Operator, [Becoming the Future System Operator \(FSO\)](#), accessed 17 January 2024

195 National Grid Electricity System Operator ([HRSC0066](#)), p1

196 *Ibid.*, p4

197 *Ibid.* ([HRSC0066](#)), p3

198 National Grid Electricity System Operator, [Future Energy Scenarios](#), July 2023

199 Department for Business, Energy & Industrial Strategy, [Cooling in the UK](#), August 2021, p6

200 [Q45](#)

201 IEA, [Keeping cool in a hotter world is using more energy, making efficiency more important than ever](#), 21 July 2023

202 UN Environment Programme, [Global Cooling Watch report: Keeping it Chill: How to meet cooling demands while cutting emissions](#), 5th December 2023, p14

203 DESNZ ([HRSC0072](#)), p2, Commitment M7

88. Omar Abdelaziz told us that it was currently possible to buy ACs on the market which are “two to three times more efficient than an average unit in the UK” and recommended that the UK should continue to follow the eco-design and energy efficiency processes which apply in the EU.²⁰⁴

89. Another policy innovation highlighted by the IEA was an example from India, where in October 2019 the government mandated a 24C default cooling temperature for all new ACs. Whilst consumers still had the option to adjust the settings, many kept them at the default, leading to significant energy savings.²⁰⁵

90. ***We recommend that in its response to this report the Government set out what progress it has made on establishing Minimum Energy Performance Standards in relation to cooling equipment since COP26; what the future trajectory for establishing such standards is; and how the Government plans to meet the 2030 deadline specified in the Global Cooling Pledge.***

204 [Q118](#)

205 [IEA, Can efficient cooling help manage fast rising electricity demand in India and achieve thermal comfort for all?](#), November 2023

7 F-gases

91. Many active cooling systems contain fluorinated gases ('F-gases') which can be very potent greenhouse gases if they leak as many have global warming potentials (GWPs) thousands of times greater than carbon dioxide. The main types of F-gases are hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6). The Kigali amendment to the Montréal protocol,²⁰⁶ which the UK has ratified, commits developed nations to reducing HFCs by 85% between 2019 and 2036.

92. There are natural refrigerants available—such as ammonia, propane, butane and carbon dioxide—which have ultra-low or zero GWPs. However, while these have suitable thermal properties, the Institute of Refrigeration²⁰⁷ told us that their flammability is a risk factor. Heating, ventilation and air conditioning manufacturer Daikin also told us that low GWP refrigerants are generally less thermally efficient and therefore use more energy.²⁰⁸ Daikin referred to a whole-product lifecycle approach which assesses four factors when choosing the 'best' refrigerant for a particular application—safety, environmental impact, energy efficiency and cost-effectiveness.²⁰⁹ Omar Abdelaziz told us that the UK is “well ahead of the world when it comes to F-gas regulations and the transition to lower GWP refrigerants”.²¹⁰

93. The London Climate Change Partnership²¹¹ and Institution of Mechanical Engineers²¹² highlighted to us the importance of robust maintenance and disposal practices in minimising the potential impacts of F-gas leakage. In relation to the recycling, reclaiming and recovering of refrigerants, some countries such as Denmark, France and the Netherlands had adopted 'takeback' schemes²¹³ which both reduce leakage and promote a more circular economy. No Government-run schemes are in operation in the UK, though Daikin UK promotes its own scheme.²¹⁴

94. *We recommend that the Government evaluate the merits of introducing a takeback scheme in England to improve disposal practices regarding cooling equipment, thereby helping to minimise F-gas leakage, with a view to introducing a pilot takeback scheme in England and promoting its merits to the administrations in Scotland, Wales and Northern Ireland.*

206 UN Environment Programme, [About the Montreal Protocol](#), accessed 17 January 2024

207 Institute of Refrigeration ([HRSC0024](#)), p9

208 Daikin UK ([HRSC0059](#)), p4

209 Daikin UK ([HRSC0059](#)), p4

210 [Q118](#)

211 London Climate Change Partnership ([HRSC0031](#)), p10

212 Institution of Mechanical Engineers ([HRSC0039](#)), p10

213 DEFRA, Scottish Government and Welsh Government, [F gas regulation in Great Britain: assessment report](#), December 2022, p51

214 [Q68](#)

8 Coordinated joint working

95. One common theme emerging from the evidence we received has been the need for effective joint working on heat resilience, since the issue cuts across the responsibilities of a great many UK Government departments, including DESNZ, DLUHC, DHSC and DEFRA, as well as those of Government agencies such as the Met Office and UKHSA. This is something our predecessors highlighted in their 2018 Heatwaves report.²¹⁵

96. Professor Robinson told us that “joined-up thinking is going to [be...] much more cost effective and have much more impact in terms of reducing the negative impacts of heat”.²¹⁶ The AWHP acknowledges this and references seven ‘delivery groups’—national delivery, regional delivery, local delivery, other governmental departments, academia, third sector and private sector²¹⁷—while NAP3 refers to a “whole-government approach to climate adaptation.”²¹⁸ However, we note that, of all the Departments engaged by this inquiry’s Terms of Reference,²¹⁹ only DESNZ responded to our call for evidence. This is despite DEFRA being the lead Department for climate adaptation and thus having ownership over the NAP. This does not suggest an adequately joined-up approach at present.

97. The most notable new initiative in NAP3 is a new Climate Resilience Board, to be established by the Cabinet Office and DEFRA, working with HM Treasury, to oversee strategic, cross-cutting climate adaptation and resilience issues and drive further government action to increase UK resilience to climate change.²²⁰

98. At the local level we heard about the work of the London Climate Change Partnership—an independent partnership comprising public, private and community sector organisations that play a role in preparing London for extreme weather and climate change today and in the future. The Partnership facilitates collaboration on research, delivery programmes, awareness and knowledge transfer on climate adaptation and resilience across London.²²¹ It is, however, a voluntary initiative with no dedicated funding of its own and seems to be very much the exception rather than the rule.²²² Eleni Myrivili also told us about her role as Chief Heat Officer, first in Athens and now in a global role for UN-Habitat, and explained how this can help provide a focal point for governance and coordination of policies and strategies aimed at increasing heat resilience.²²³

99. Effective joint working is not just desirable but essential if the impacts of heat are to be tackled in a coordinated, holistic and cost-effective way. This does not seem to be happening to a sufficient degree at present in the UK. The establishment of a Climate Resilience Board, under the auspices of the Cabinet Office and DEFRA, is potentially an important development as long as it includes representation from all relevant Government departments, agencies and other organisations, and meets

215 Environmental Audit Committee, Ninth Report of Session 2017–2019, [Heatwaves: adapting to climate change](#), HC 826, paras 32 and 45

216 [Q107](#)

217 UKHSA, [Adverse Weather and Health Plan](#), April 2023, p28–43

218 HM Government, [The Third National Adaptation Programme \(NAP3\) and the Fourth Strategy for Climate Adaptation Reporting](#), 18 July 2023, p17

219 Environmental Audit Committee, [Call for evidence: Heat resilience and sustainable cooling](#), 3 July 2023

220 HM Government, [The Third National Adaptation Programme \(NAP3\) and the Fourth Strategy for Climate Adaptation Reporting](#), 18 July 2023, p24

221 London Climate Change Partnership ([HRSC0031](#)), p1

222 London Climate Change Partnership ([HRSC0071](#))

223 [Q109](#); [Q128](#)

sufficiently frequently. *The Government should set out, in its response to this report, details of the membership of the Climate Resilience Board; how often it has met since being established; and its expected meeting schedule in 2024.*

100. *We recommend that the Government appoint a lead Minister for Heat Resilience to act as a focal point and drive forward coordinated action across government departments, local government, community sector stakeholders and the private sector in this area.*

9 A heat resilience strategy

101. The vast majority of the 63 respondents to our call for written evidence favoured the establishment of a dedicated UK heat resilience strategy to bring together various aspects which currently sit under different departments and enable a more long-term, strategic focus on planning and actions with appropriately coordinated resourcing. We were very pleased to see therefore that the UK was one of over 60 nations to sign up to the Global Cooling Pledge²²⁴ at COP28 and, with it, the commitment to publish a national cooling action plan or equivalent strategy. DESNZ has told us that it will lead the development of a UK cooling outlook document with input from all relevant departments,²²⁵ as well as “a cooling page on .gov.uk where all relevant research and policies can be linked to”.²²⁶

102. We commend the UK Government on being among the first signatories of the Global Cooling Pledge, which represents a significant step forward in terms of heat resilience and sustainable cooling, and is a welcome demonstration of international leadership in this area. In particular we note the commitment under the GCP to produce a national cooling action plan. We hope our inquiry and the findings set out in this report assist in shaping what this looks like and we remain keen to continue to work constructively with all relevant Departments on this topic. *In response to this report, we expect the Government to set out a clear and achievable timetable for the introduction of a UK national cooling action plan as required by the Global Cooling Pledge.*

224 UN Environment Programme Cool Coalition, [Global Cooling Pledge for COP28](#), 6 December 2023

225 DESNZ ([HRSC0072](#)), p1, Commitment M4

226 DESNZ ([HRSC0072](#)), p3, Commitment M13

Conclusions and recommendations

Adapting to a warming planet

1. We have received compelling evidence that heat is having serious and widespread impacts on health, wellbeing and economic productivity. This is already costing the UK thousands of lives and billions of pounds annually, a situation which is set to get worse without concerted action. The social and economic case for accelerating heat adaptation measures in the UK is clear-cut. (Paragraph 17)
2. *We recommend that the Met Office and UKHSA incorporate explicit messaging and/or metrics regarding the effects of humidity levels as well as temperature into weather forecasts and heat-health alerts.* (Paragraph 20)

The urban heat island effect and nature-based solutions

3. Nature-based solutions to climate change, such as parks, trees, water bodies and green infrastructure, have significant cooling effects as well as multiple co-benefits (for example, for health, wellbeing, air quality, flood resilience and biodiversity). Increasing the amount of green space is one of the most important tools in tackling the impacts of heat, especially in urban areas. Natural England's Green Infrastructure Framework, incorporating the Urban Greening Factor, is therefore a significant and welcome step forward in setting out how green infrastructure can be best designed and implemented; however, the framework only applies to new developments, and evidence suggests that it is not yet being put into practice at scale by local authorities. (Paragraph 35)
4. *We recommend that the Government take action to expand urban green space, particularly in disadvantaged areas. At a minimum these actions ought to include: (i) introducing a statutory requirement on local authorities to protect green space; (ii) mandating local authorities in urban areas to use the Green Infrastructure Framework; and (iii) introducing measures to incentivise the installation of green roofs as new build or retrofit on appropriate residential or business premises.* (Paragraph 36)

The built environment

5. We recommend that the Government evaluate the case for amending Part L of the Building Regulations to encourage the use of ceiling fans (for example, by including locally controlled air movement in the definition of comfort). (Paragraph 48)
6. We support the extension of Part O of the Building Regulations not only to cover material changes of use to residential, but also for refurbishments of existing properties. *We recommend that the Government clarify whether it is intended that Part O of the Building Regulations be expanded to refurbishments. If that is indeed the case, we recommend that Ministers, in their response to this report, set out when, and by what mechanism, this is to be achieved. If it is not the case, we recommend that Ministers explain how the UK is to achieve Commitment M5 of the Global Cooling Pledge.* (Paragraph 54)

7. *We recommend that measures taken under Part O should be subject to post-occupancy evaluation within the first year of their installation. (Paragraph 56)*
8. *We were pleased to note that the recent extension of the Boiler Upgrade Scheme announced by the Prime Minister in September 2023 has now been backed by additional funding for grants. The funded extension of the scheme represents a welcome move towards the long-term programme of retrofitting the existing housing stock which we have advocated in previous reports. (Paragraph 65)*
9. *We consider that there are further opportunities to combine existing initiatives on insulation and energy efficiency into a more ambitious and comprehensive housing retrofit programme which addresses the risks of overheating in existing properties. Such an approach, if well designed and delivered, can minimise both cost and disruption while ensuring homes are energy efficient and remain comfortable to live in. (Paragraph 66)*
10. *We therefore recommend that the Government establish a comprehensive national retrofit programme to adapt the UK's housing stock for both net zero and thermal comfort. The programme should include the following elements to maximise its impact and minimise costs:*
 - *Local delivery via local authorities, underpinned by adequate long-term funding;*
 - *Prioritisation of vulnerable households;*
 - *A fabric-first approach focusing on insulation and ventilation;*
 - *Adoption of a cooling hierarchy prioritising passive measures, and then fans, above active cooling mechanisms;*
 - *Consideration of the benefits and drawbacks of installing reversible heat pumps, bearing in mind such factors as: (i) whether or not active cooling is likely to be required following installation of passive measures and (if appropriate) fans; (ii) the vulnerability of the building occupant(s); and (iii) progress on decarbonising the national grid at the time of installation (Paragraph 67)*
11. *We urge the Government to respond as soon as possible to its consultation on improving home energy performance through lenders which closed in February 2021. Ministers must rapidly bring forward proposals to encourage access to low-cost finance for householders to invest in home improvements which can increase energy efficiency and heat resilience. (Paragraph 68)*
12. *We further recommend that the Government publishes any interim or draft recommendations made by the Energy Efficiency Taskforce before it was disbanded. (Paragraph 69)*
13. *We urge the Government to set out, in its response to this report, the targets (if any) which Ministers have set for growth in the supply chain of competent retrofit installers, and the progress made against these targets to date. If no targets have yet been set, we recommend that Ministers seek to set ambitious targets for supply chain growth. (Paragraph 71)*

Communication and engagement

14. While sources of accurate, reliable and helpful guidance on dealing with extreme heat do exist, this information does not appear always to be reaching everyone who needs it, leading to avoidable health harms. We raised this issue in our 2018 Heatwaves report but little progress appears to have been made. *We reiterate the recommendation from our predecessor committee's 2018 Heatwaves report that 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. This could be based on the information on the UKHSA's Beat the Heat webpage. It should have a particular focus on vulnerable groups.* (Paragraph 75)
15. *The naming of heatwaves could assist in helping the public to recognise such extreme weather events as a threat to health and wellbeing in the same way as named storms. We recommend that the Met Office trial the naming of heatwaves for 2024 with a view to making this permanent if the trial is deemed successful.* (Paragraph 78)

Protecting the vulnerable

16. While there is potential for cooling centres to be an important part of future resilience measures for those most vulnerable to heat impacts, evidence of their effectiveness is not clear cut at present. *We recommend that UKHSA evaluate the potential use of cooling centre initiatives as a policy response to excessive heat, with a view to developing and publishing advice to central government and local authorities on a suite of practical initiatives which can be taken to support populations which are particularly vulnerable to extreme heat.* (Paragraph 83)

Energy consumption and efficiency

17. *We recommend that the Future System Operator make specific provision for the likely future demand for electricity for cooling purposes in all its future scenario planning.* (Paragraph 86)
18. *We recommend that in its response to this report the Government set out what progress it has made on establishing Minimum Energy Performance Standards in relation to cooling equipment since COP26; what the future trajectory for establishing such standards is; and how the Government plans to meet the 2030 deadline specified in the Global Cooling Pledge.* (Paragraph 90)

F-gases

19. *We recommend that the Government evaluate the merits of introducing a takeback scheme in England to improve disposal practices regarding cooling equipment, thereby helping to minimise F-gas leakage, with a view to introducing a pilot takeback scheme in England and promoting its merits to the administrations in Scotland, Wales and Northern Ireland.* (Paragraph 94)

Coordinated joint working

20. Effective joint working is not just desirable but essential if the impacts of heat are to be tackled in a coordinated, holistic and cost-effective way. This does not seem to be happening to a sufficient degree at present in the UK. The establishment of a Climate Resilience Board, under the auspices of the Cabinet Office and DEFRA, is potentially an important development as long as it includes representation from all relevant Government departments, agencies and other organisations, and meets sufficiently frequently. *The Government should set out, in its response to this report, details of the membership of the Climate Resilience Board; how often it has met since being established; and its expected meeting schedule in 2024.* (Paragraph 99)
21. *We recommend that the Government appoint a lead Minister for Heat Resilience to act as a focal point and drive forward coordinated action across government departments, local government, community sector stakeholders and the private sector in this area.* (Paragraph 100)

A heat resilience strategy

22. We commend the UK Government on being among the first signatories of the Global Cooling Pledge, which represents a significant step forward in terms of heat resilience and sustainable cooling, and is a welcome demonstration of international leadership in this area. In particular we note the commitment under the GCP to produce a national cooling action plan. We hope our inquiry and the findings set out in this report assist in shaping what this looks like and we remain keen to continue to work constructively with all relevant Departments on this topic. *In response to this report, we expect the Government to set out a clear and achievable timetable for the introduction of a UK national cooling action plan as required by the Global Cooling Pledge.* (Paragraph 102)

Appendix: UK Government delivery of the Global Cooling Pledge

The following information was submitted to us at our request from the Department for Energy Security and Net Zero. It summarises the 16 mandatory commitments of the Global Cooling Pledge and provides an assessment of Government action which has been and/or is to be taken in order to meet each commitment.

Ref	Commitment	Lead Department(s)	UK Commitment
M1	Commit to work together with the aim of reducing cooling-related emissions across all sectors by at least 68 percent globally relative to 2022 levels by 2050, consistent with limiting global average temperature rise to 1.5°C and in line with net-zero emissions targets with significant progress and expansion of access to sustainable cooling by 2030. This aim will be advanced through individual countries' domestic actions as consistent with their domestic plans and priorities, and international collaboration;	DESNZ / DEFRA	UK is committed to working internationally and is committed to delivering Net Zero by 2050 which is consistent with the aim of this reduction of emissions from cooling by 68%.
M2	Commit to ratify the Kigali Amendment by 2024 for those countries that have not already done so;	DEFRA - F Gas Team	UK ratified this in 2017.
M3	Commit to support robust action through the Montreal Protocol Multilateral Fund for early action to reduce HFC consumption and to promote improved energy efficiency for the HCFC phase-out and HFC phase-down.	DEFRA - International team	UK already supports this.
M4	Commit to publishing a national cooling action plan, considering cooling when publishing a national action plan, or publishing a regulation or equivalent strategy by 2026 and to reflect relevant efforts in designing nationally determined contributions* under the Paris Agreement and HFC phase-down plans. * as far as individual signatories of this pledge will prepare an NDC and not operate under an umbrella NDC.	DESNZ with input from others xHMG	DESNZ to lead the development of a UK cooling outlook document with input from all relevant departments.
M5	Commit to establish national model building energy codes that incorporate market appropriate passive cooling measures and energy efficiency strategies by 2030 for new and refurbished buildings as appropriate for those countries with jurisdiction of national building codes, or for those countries that do not have jurisdiction, support adoption of building energy codes at the sub-national level.	DLUHC	UK has already incorporated this in Building Regulations with Approved Document O from July 2022.

Ref	Commitment	Lead Department(s)	UK Commitment
M6	Commit to work together to support increased market penetration of highly-efficient air conditioning equipment and innovative technologies, to collectively increase the global average efficiency rating of new air conditioning equipment sold by 50% by 2030 from global 2022 installed baseline.	DESNZ / DLUHC	UK committed to this at COP26 and are working towards this.
M7	Commit to establish Minimum Energy Performance Standards (MEPS) by 2030 and aim to routinely raise ambition and progress consistent with respective national laws with a view to achieve net-zero emissions by 2050 and noting best available technology and available model regulation guidelines.	DESNZ	UK committed to this at COP26 and are working towards this.
M8	Commit to establish or update public procurement policies and guidance for low-GWP and high efficiency cooling technologies and innovative solutions where feasible or ensure broader arrangements are in place to drive such approaches in public procurement by 2030.	DESNZ / DEFRA	The UK meets this commitment through broader means with the F-Gas Regulations and MEPS which are applicable to all public procurement.
M9	Commit to support collaborative research, innovation, and deployment activities at the local and international level such as renewable energy-based cooling solutions in rural, remote, off-grid locations or research and development of cooling systems applying refrigerants with GWP less than 150;	FCDO, DEFRA, DESNZ	The UK already supports international research and innovation through IEA TCPs (Technology Collaboration Platforms) and Mission Innovation.
M10	Commit to support existing international cooling emission reduction and cooling access initiatives, such as those of the United Nations Environment Programme-led Cool Coalition, to advance global cooperation and domestic actions.	DEFRA, FCDO, DESNZ, DESNZ	UK is already a formal partner of the Cool Coalition.
M11	Commit to pursue the life cycle management of fluorocarbons in particular addressing HFCs banks, if feasible, such as through the Initiative on Fluorocarbons Life Cycle Management;	DEFRA	The F-gas Regulation 2014 contains provisions on leakage avoidance and mitigation (Article 3) and end-of-life recovery for the purpose of recycling, reclamation or destruction (Article 8).
M12	Commit to review progress towards the target of the Global Cooling Pledge on an annual basis until 2030 and have a dedicated high-level meeting at the UN Climate Change Conference;	UK COP Team, xHMG	We will comply with the reporting having already input to the Global Cooling Stocktake this year.

Ref	Commitment	Lead Department(s)	UK Commitment
M13	Commit to maintaining up-to-date, transparent, and publicly available information on our policies and commitments to inform the progress reviews and relevant reports such as the UNEP Global Cooling Stocktake;	DESNZ with input from others xHMG	We plan a cooling page on .gov.uk where all relevant research and policies can be linked to.
M14	Commit to use as appropriate the national action agenda to make further progress towards the ambition of the Global Cooling Pledge and consider new commitments in the GCP on an annual basis until 2030 as appropriate;	xHMG	No specific policy action required to meet this commitment. The National Action Agenda will include suggested high-ambition optional actions that countries can adhere to. The commitment does not commit the UK to any future new commitments that it doesn't agree to.
M15	Call on subnational governments and non-state actors including the private sector, financial institutions, and philanthropies to help support the implementation of the Global Cooling Pledge;	FCDO, DEFRA, DESNZ, DESNZ	The UK meets this through our International Climate Finance portfolio working with MDBs, The MI "Innovation Community for heating and cooling", The Sustainable Cooling and Cold Chain Solutions programme including ACES (African Centre of Excellence in Sustainable Cooling). The Clean Energy Innovation Facility (CEIF) Sustainable Cooling Innovation Fund.

Ref	Commitment	Lead Department(s)	UK Commitment
M16	Call on other states and actors to join the Global Cooling Pledge.	xHMG	No specific policy action required to meet this commitment. FCDO to communicate the pledge to Posts, so that our international engagement is aligned and Posts can campaign and push the pledge across their relevant networks and within relevant Government Ministries.

Formal minutes

Wednesday 24 January 2024

Members present

Philip Dunne, in the Chair

Chris Grayling

Clive Lewis

Caroline Lucas

Cherilyn Mackrory

Dr Matthew Offord

[...]

The Committee deliberated.

Draft Report (*Heat resilience and sustainable cooling*), proposed by the Chair, brought up and read.

Paragraphs 1 to 102 read and agreed to.

Summary agreed to.

A paper was appended to the report.

Resolved, That the Report be the Fifth 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.

[...]

Adjournment

Adjourned till Wednesday 31 January 2024 at 2.00 pm.

Witnesses

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

Monday 18 September 2023

Professor Jason Lowe OBE, Head of Climate Services, Met Office Hadley Centre; **Professor Lea Berrang Ford**, Deputy Director and Head, Centre for Climate and Health Security, UK Health Security Agency; **Dr Laurence Wainwright**, Departmental Lecturer, The Smith School of Enterprise and the Environment, University of Oxford

[Q1–39](#)

Dr Eric Laurentius Peterson, Visiting Research Fellow, University of Leeds; **Martin Passingham**, Head of Product and Training, Daikin UK; **David Broom**, Managing Director, Kensa Contracting; **Dr Chiara Delmastro**, Energy Analyst Buildings, International Energy Agency (IEA)

[Q40–70](#)

Wednesday 25 October 2023

Councillor Linda Taylor, Vice Chair, Local Infrastructure and Net Zero Board, Local Government Association, Leader, Cornwall Council; **Francis Heil**, Chartered Engineer and Principal Consultant, AtkinsRéalis, Member, London Climate Change Partnership; **Adrian Dobson**, Executive Director, Professional Knowledge and Standards, Royal Institute of British Architects

[Q71–103](#)

Professor Elizabeth Robinson, Director, Grantham Research Institute, London School of Economics; **Omar Abdelaziz**, Assistant Professor, Department of Mechanical Engineering, The American University in Cairo, Lead Author, Global Cooling Stocktake report, UN Environment Programme; **Eleni Myrivili**, Global Chief Heat Officer, UN Habitat

[Q104–136](#)

Published written evidence

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

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

- 1 Anonymised ([HRSC0008](#))
- 2 British Geological Survey ([HRSC0009](#))
- 3 British Red Cross ([HRSC0033](#))
- 4 Building Research Establishment (BRE) ([HRSC0046](#))
- 5 Chemours ([HRSC0055](#))
- 6 Clade Engineering Services Ltd ([HRSC0014](#))
- 7 Cold Chain Federation ([HRSC0058](#))
- 8 DAUK ([HRSC0059](#))
- 9 DAUK (supplementary) ([HRSC0068](#))
- 10 Daw, Mr Philip (Director, Neatafan Ltd.) ([HRSC0010](#))
- 11 Department for Energy Security and Net Zero ([HRSC0029](#))
- 12 Department for Energy Security and Net Zero (supplementary) ([HRSC0072](#))
- 13 Electricity System Operator (ESO) ([HRSC0066](#))
- 14 Embassy of Denmark in the United Kingdom ([HRSC0061](#))
- 15 Environmental Investigation Agency ([HRSC0032](#))
- 16 Fitzgerald, Dr Shaun (Director, Centre for Climate Repair, University of Cambridge) ([HRSC0019](#))
- 17 Friends of the Earth ([HRSC0005](#))
- 18 Gardner & Co (Kent) Ltd ([HRSC0060](#))
- 19 Green Alliance ([HRSC0051](#))
- 20 Green Roof Organisation Ltd ([HRSC0016](#))
- 21 Gupta, Professor Rajat (Professor of Sustainable Architecture and Climate Change, Oxford Brookes University) ([HRSC0030](#))
- 22 HEICCAM Network ([HRSC0037](#))
- 23 Heat Pump Association ([HRSC0056](#))
- 24 Heil, Francis (Associate Director – Climate Change & Resilience, AtkinsRéalis; and Member, London Climate Change Partnership) ([HRSC0071](#))
- 25 Historic England ([HRSC0028](#))
- 26 Hoggett, Mr Richard (Research Associate , University of Exeter); King, Dr Louise (Research Associate, University of Bath); and Lowes, Dr Richard (Research Fellow, University of Exeter) ([HRSC0025](#))
- 27 Howarth, Dr Candice (Head of Local Climate Action, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science); Bian, Lei (Policy Fellow, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science); Dasgupta, Shouro (Visiting Senior Fellow, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science); Dookie,

Denyse (Research Officer, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science); Mehryar, Sara (Research Fellow, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science); Ravishankar, Srinidhi (Postgraduate Student, London School of Economics and Political Science); Robinson, Elizabeth (Director, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science); and Surminski, Swenja (Professor in Practice, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science) ([HRSC0011](#))

- 28 Imperial College London ([HRSC0036](#))
- 29 Inkling Partnership LLP ([HRSC0013](#))
- 30 Institute of Refrigeration ([HRSC0024](#))
- 31 Institution of Civil Engineers ([HRSC0012](#))
- 32 Institution of Mechanical Engineers ([HRSC0039](#))
- 33 Institution of Occupational Safety and Health (IOSH) ([HRSC0049](#))
- 34 Insulation Manufacturers Association ([HRSC0007](#))
- 35 International Energy Agency ([HRSC0067](#))
- 36 Kensa Group; and Kensa Group ([HRSC0035](#))
- 37 Lizana, Dr Jesus (Marie-Curie Research Fellow, University of Oxford); and Mylona, Dr Anastasia (Head of Research, Chartered Institution of Building Services Engineers (CIBSE)) ([HRSC0045](#))
- 38 Local Government Association ([HRSC0052](#))
- 39 Local Government Association (supplementary) ([HRSC0070](#))
- 40 London Climate Change Partnership ([HRSC0031](#))
- 41 Met Office ([HRSC0057](#))
- 42 Mineral Products Association ([HRSC0018](#))
- 43 NFRC (National Federation of Roofing Contractors) ([HRSC0047](#))
- 44 National Trust ([HRSC0054](#))
- 45 OVO ([HRSC0034](#))
- 46 Peterson, Dr Eric Laurentius (Visiting Research Fellow, University of Leeds) ([HRSC0002](#))
- 47 Peterson, Dr Eric Laurentius (Visiting Research Fellow, University of Leeds) (supplementary) ([HRSC0069](#))
- 48 Petrou, Dr Giorgos (Research Fellow, UCL Institute for Environmental Design and Engineering); and Symonds, Dr Phil (Lecturer, UCL Institute for Environmental Design and Engineering) ([HRSC0041](#))
- 49 Royal Institute of British Architects ([HRSC0048](#))
- 50 Royal Society for the Protection of Birds (RSPB); Nature-based Solutions Initiative, University of Oxford; and Worldwide Fund for Nature (WWF) ([HRSC0021](#))
- 51 Seeley International ([HRSC0004](#))
- 52 Shade the UK ([HRSC0020](#))

- 53 Simcock, Dr Neil (Senior Lecturer in Social Geography, Liverpool John Moores University); and Ambrose, Professor Aimee (Professor of Energy Policy, Sheffield Hallam University) ([HRSC0042](#))
- 54 South West Water Ltd ([HRSC0017](#))
- 55 The British Blind and Shutter Association ([HRSC0040](#))
- 56 The Physiological Society ([HRSC0006](#))
- 57 Transport for London ([HRSC0053](#))
- 58 Twinn, Mr Chris (Principal / consultant, Twinn Sustainability Innovation) ([HRSC0038](#))
- 59 UK Green Building Council ([HRSC0062](#))
- 60 UK Health Security Agency ([HRSC0043](#))
- 61 UK Health Security Agency (supplementary) ([HRSC0065](#))
- 62 University of Bristol; Met Office; University of Birmingham; University of Edinburgh; University of Leeds; University of Oxford; and UCL ([HRSC0027](#))
- 63 Urban Transformations Research Centre ([HRSC0015](#))
- 64 Wainwright, Dr Laurence (Departmental Lecturer, Smith School, University of Oxford) ([HRSC0044](#))
- 65 Wainwright, Dr Laurence (Departmental Lecturer & Course Director, Smith School of Enterprise and the Environment) (supplementary) ([HRSC0064](#))
- 66 Waller, Dr Alexander (Visiting Professor of Environmental Ethics, American University of Sovereign Nations) ([HRSC0023](#))
- 67 Webb, Dr Jonathan (Principal Research Fellow, Centre for Regional Economic and Social Research, Sheffield Hallam University); Ambrose, Dr Aimee (Professor, Centre for Regional Economic and Social Research, Sheffield Hallam University); and Shahzad, Dr Sally (Lecturer, School of Architecture, University of Sheffield) ([HRSC0050](#))
- 68 Zhao, Dr Jing (Senior Lecturer, University of West of England) ([HRSC0003](#))
- 69 Zurich UK ([HRSC0026](#))

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.

Session 2023–24

Number	Title	Reference
1st	The financial sector and the UK's net zero transition	HC 277
2nd	Environmental change and food security	HC 312
3rd	Net zero and the UK aviation sector	HC 404
4th	The UK's contribution to tackling global deforestation	HC 405
5th	Heat resilience and sustainable cooling	HC 279
1st Special Report	Seeing the wood for the trees: the contribution of the forestry and timber sectors to biodiversity and net zero goals: Government Response to the Committee's Fifth Report of Session 2022–23	HC 406
2nd Special Report	The UK and the Arctic Environment: Government Response to the Committee's Sixth Report of Session 2022–23	HC 431

Session 2022–23

Number	Title	Reference
1st	Building to net zero: costing carbon in construction	HC 103
2nd	Pre-appointment hearing: Chair of the Environment Agency (Pre-appointment hearing)	HC 546
3rd	Recommendations on the Government's draft environmental principles policy statement	HC 380
4th	Accelerating the transition from fossil fuels and securing energy supplies	HC 109
5th	Seeing the wood for the trees: the contribution of the forestry and timber sectors to biodiversity and net zero goals	HC 637
6th	The UK and the Arctic Environment	HC 1141
1st Special Report	Water quality in rivers: Government Response to the Committee's Fourth Report of Session 2021–22	HC 164
2nd Special Report	Greening imports: a UK carbon border approach: Government Response to the Committee's Fifth Report of Session 2021–22	HC 371
3rd Special Report	Building to net zero: costing carbon in construction: Government Response to the Committee's First Report	HC 643

4th Special Report	Accelerating the transition from fossil fuels and securing energy supplies: Government and Regulator Response to the Committee's Fourth Report	HC 1221
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Session 2021–22

Number	Title	Reference
1st	Biodiversity in the UK: bloom or bust?	HC 136
2nd	The UK's footprint on global biodiversity	HC 674
3rd	Green Jobs	HC 75
4th	Water quality in rivers	HC 74
5th	Greening imports: a UK carbon border approach	HC 737
1st Special Report	Energy efficiency of existing homes: Government Response to the Committee's Fourth Report of Session 2019–21	HC 135
2nd Special Report	Growing back better: putting nature and net zero at the heart of the economic recovery: Government and Bank of England Responses to the Committee's Third Report of Session 2019–21	HC 327
3rd Special Report	Biodiversity in the UK: bloom or bust?: Government Response to the Committee's First Report	HC 727
4th Special Report	Green Jobs: Government Response to the Committee's Third Report	HC 1010
5th Special Report	The UK's footprint on global biodiversity: Government Response to the Committee's Second Report	HC 1060

Session 2019–21

Number	Title	Reference
1st	Electronic Waste and the Circular Economy	HC 220
2nd	Pre-appointment hearing for the Chair-Designate of the Office for Environmental Protection (OEP)	HC 1042
3rd	Growing back better: putting nature and net zero at the heart of the economic recovery	HC 347
4th	Energy Efficiency of Existing Homes	HC 346
1st Special Report	Invasive species: Government Response to the Committee's First Report of Session 2019	HC 332
2nd Special Report	Our Planet, Our Health: Government Response to the Committee's Twenty-First Report of Session 2017–19	HC 467

Number	Title	Reference
3rd Special Report	Electronic Waste and the Circular Economy: Government Response to the Committee's First Report	HC 1268