Department for Education

Climate literacy amongst school leavers

Research report

December 2024

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Government Social Research

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This research report presents the findings of the 2024 Climate Literacy Survey, commissioned by the Department for Education (DfE) to assess the level of climate literacy amongst school leavers leaving secondary education in England. The survey, conducted with a sample of 522 Year 11 school leavers, aimed to:

- Monitor changes in school leavers' understanding of climate change topics over time

- Understand the potential impact of policies set out in the DfE's Sustainability and Climate Change Strategy.

The survey comprised 55 questions, including five core questions from the Royal Meteorological Society's (RMetS) 2022 survey and 50 new questions developed in collaboration with the RMetS and Ipsos. These questions assessed a broad range of climate literacy, including:

- Causes of climate change: Understanding weather versus climate, drivers of global climate variance, identifying greenhouse gases and fossil fuels.

- Evidence for and impacts of climate change: Recognising indicators of a warming climate, understanding future temperature projections and country vulnerability.

- Mitigation and Adaptation Solutions: Differentiating between the two concepts and identifying relevant strategies.

- Climate change in the UK: awareness of the projected impacts of climate change in the UK and adaptation and mitigation solutions.

- Communication: Evaluating scientific consensus, knowledge of key international organizations, and trust in different information sources.

The questions are intentionally not linked to any specific curriculum; they measure trends in knowledge across time and provide a holistic picture of climate literacy amongst school leavers. This ensures that the survey will remain a relevant way to track climate literacy if curriculum changes are implemented in the future and also means that the survey is relevant to all students, whether or not they attended schools which follow the national curriculum, and independent of their subject choices at GCSE.

The 2024 survey was conducted as part of the Ipsos Young People Omnibus. A sample of Year 11 school leavers in England were asked to complete the Climate Literacy Survey questions.

Differences in methodology across survey years mean that the data collected in 2024 should not be compared with the 2023 survey, which comprised the 5 core questions and whose findings are given in Appendix 1.

Key findings

Basic knowledge

Baseline knowledge and perceptions of climate change indicated that just over half of the school leavers that had taken part in the survey, recalled recent climate change education (55%), despite its inclusion in GCSE science and other subjects. Furthermore, 31% of school leavers said that they did not know the extent of global warming since 1850, and of those who did give an answer to the question, 52% overestimated the impact of global warming. School leavers correctly indicated that natural changes have the least impact (46%) on global warming. However, almost half of school leavers overestimated the contribution of transport (46% selected options 4 and 5) and 49% overestimated the contribution of plastic waste to global warming (selected options 3 to 5), underscoring the need for a more nuanced understanding of sustainability related issues. Just over a half (54%) of school leavers are concerned about climate change and a similar number (49%) indicated that they think that they will personally be affected by climate change. Of those who are concerned, 71% indicated that they think it will affect them personally.

Causes of climate change

Only 31% of school leavers could accurately define the difference between weather and climate and 44% were able to select the correct definition of climate change. Fewer than one in seven school leavers (14%) correctly identified large-scale weather patterns (such as El Niño) as the biggest cause of global climate variability, highlighting a lack of understanding about natural short term climate variability. While most school leavers correctly identified major greenhouse gases such as carbon dioxide (CO_2) (84%) and methane (CH_4) (76%), 40% mistakenly responded that carbon monoxide (CO) was a greenhouse gas. Almost nine in 10 (86%) school leavers correctly identified oil as a fossil fuel, followed by coal (85%) and natural gas (68%).

Evidence for and impacts of climate change

It was encouraging that 76% of school leavers indicated a general understanding that the Earth's climate system is not static. Around three quarters of school leavers recognised rising sea levels (74%), melting glaciers (79%) or melting sea ice (73%) as indicators of a warming climate. Fewer recognised migrating species (41%) and changing seasons (35%). However, the responses given displayed a lack of awareness of geographical variations in the impacts of climate change. While there was good awareness of the impact of climate change on extreme weather (43%), the extent of that impact was widely overestimated, suggesting a need for clearer communication about extreme weather event attribution.

Mitigation and adaptation

Around half of school leavers (51%) correctly identified what adaptation to climate change means, however only a third (34%) accurately defined climate change mitigation, reflecting a potential understanding gap. A tendency to misinterpret mitigation strategies (which

address the root causes of climate change) as adaptation (which focus on adjusting to its impacts) emerged, particularly for actions with immediate benefits like installing solar panels (incorrectly identified as adaptation by 62%). Only one in five (20%) school leavers were able to identify the correct meaning of net zero emissions, with twice as many admitting that they did not know (40%).

Climate Change in the UK

Only a third of school leavers (34%) correctly identified that the UK's winters will become warmer and wetter as the climate changes. This finding highlights the low awareness of climate projections for the UK. However, three quarters of school leavers (74%) correctly indicated that summers in the UK will become hotter and drier. Similarly, there was a mixed understanding of the contributors to rising sea levels, with 64% of school leavers correctly identifying melting glaciers and ice sheets whilst only 35% selected the expansion of sea water.

While school leavers correctly identified high-risk climate change impacts such as coastal flooding (65%), extreme summer heat (63%) and sea level rise (75%), only 47% recognised the high risk of increased river flooding, signifying a knowledge gap surrounding this specific impact. Three quarters of school leavers (76%) recognise solar energy as a source of electricity in the UK. However, their awareness of other renewable sources is comparatively lower, with offshore wind at 58%, nuclear fission at 49%, hydroelectric power at 60%, biomass at 55%, and on-shore wind at 50%.

Around a fifth (21%) of school leavers did not know of any of the UK's existing mitigation strategies, but awareness was highest of the promotion of the use of electric cars (52%).

School leavers also underestimated the contribution of renewable energy sources to the UK's electricity generation mix, with 72% of school leavers indicating that the UK's reliance on renewable energy was equal to or less than 30% whilst the UK's actual contribution is 43%.

Communication

Only 22% of school leavers accurately responded that between 80-100% of scientists agree about human-caused climate change, while 35% responded that the figure was below 60%. This finding demonstrates how school leavers significantly underestimate scientific consensus, which is estimated to between 97% and 99%.

Furthermore, there was limited understanding of the roles of international organisations such as the [United Nations Framework Convention on Climate Change](#) (UNFCCC) (45% did not know) and the [Intergovernmental Panel on Climate Change](#) (IPCC) (53% did not know) in global climate policy. School leavers placed the highest trust in science teachers (31%) and reputable news sources such as the BBC (27%) for information about climate change.

Chapter 1: Introduction

Purpose of the study

The aim of the research was to understand the level of climate literacy amongst those leaving secondary education. The Climate Literacy Survey allows the DfE to monitor changes in school leavers' knowledge and understanding of climate change topics on a large scale and see the potential impact of policies set out in the DfE's sustainability and climate change strategy.

Development of the survey questions

The questions within the study are designed to assess trends in climate literacy and awareness. These questions are intentionally not directly tied to any specific curriculum, as the goal is to measure changes and trends in knowledge over time.

Therefore, although there will be some variability in school leavers' knowledge depending on the subject choices they have made at GCSE, the questions are designed more to investigate their general or holistic understanding of climate change. The questions serve as a benchmark to track progress and shifts in understanding over the years and have therefore been designed to hopefully remain relevant for at least 10 years. This approach ensures the provision of valuable insights into the evolving literacy and awareness levels among school leavers, without the constraints of curriculum-specific knowledge.

The Climate Literacy Survey consists of five core questions, from the Royal Meteorological Society's (RMetS) 2022 survey, and 50 new questions developed subsequently. The core questions from the 2022 survey were designed to establish school leavers' level of knowledge and awareness of climate change. The five core questions were developed through extensive consultation with the RMetS membership, including IPCC authors, to ensure they provided a representative measure of literacy and would remain relevant over the coming years. In 2023, the RMetS, the DfE and Ipsos developed the bank of 50 new questions, which were cognitively tested before being finalised.

Through having a bank of 50 questions, of which 10 are randomly assigned to each individual student, the aim is to minimise the extent to which school leavers can be prepared for the survey by their peers or teachers as, over time, awareness of the questions included in the survey potentially increases.

The questions were selected to include aspects of climate literacy that go beyond climate science literacy and cover the causes of climate change, impacts of climate change, mitigation solutions, adaptation solutions, how to find/ assess scientifically credible information about climate and how to communicate about climate change. The focus is on concepts and issues that are relevant to the majority of learners, e.g. climate change

in the UK, and were designed to avoid raising climate anxiety, for example through inclusion of questions relating to climate action.

Methodology

The (CLS) was carried out within Ipsos' Young People Omnibus (YPO). The YPO used a three-stage sampling method to survey a sample of school leavers aged 11-17 years. The sample covered academies, independent schools and maintained secondary and middle schools in England, Scotland and Wales. In England, Year 11 school leavers were asked the CLS in their last four months at school prior to their GCSE exams. The three-stage sampling method was as follows:

- In England and Wales, the sample of schools was selected from the DfE 'Get Information about Schools' database and in Scotland, from the Scottish Government database of schools. Special schools were excluded from the sampling frame. The frame was stratified by country and within England by Government Office Region (GOR). Within each stratum, schools were selected proportional to the number of pupils attending, to ensure that when a random sample of class groups from within schools was selected, all school leavers in the survey population had an equal chance of participating in the survey. In total, 660 schools from England, Scotland and Wales were selected to participate.

- Each school was asked to participate with two classes, each from a different national curriculum year group (Year 7-Year 12). Interviewers were given preferences for national curriculum year groups to recruit, and where possible, were instructed to select only mixed ability class groups for survey completion.

- All members of the selected class within the nominated national curriculum year group were asked to participate in the self-completion online survey.

- Of the 660 schools approached, 70 schools participated between January and June 2024, giving an unadjusted school response rate of 11%. Overall, completed questionnaires were obtained from 3,697 school leavers. Of these 70 schools, 23 that were in England provided at least one Year 11 class, with a total of 522 school leavers.

- The research presented in this report was conducted amongst those Year 11 school leavers in England only.

Sample demographics

The following tables show the demographic breakdown of the 522 Year 11 school leavers in English schools who took part in the Climate Literacy Survey in 2024. The data was weighted by gender and region and applied at the individual respondent level. The weights were derived from data supplied by the Department for Education.

Table 1.   Sample weighting variables

Group	Category	Count	Unweighted	Weighted
Gender	Boy/male	250	53%	48%
	Girl/female	244	42%	47%
	Non-binary	5	1%	1%
	My gender is not listed	5	1%	1%
	Prefer not to say	14	3%	3%
Region	East Midlands	17	4%	3%
	East of England	32	6%	6%
	London	75	14%	14%
	North East	65	12%	12%
	North West	56	10%	11%
	South East	77	15%	15%
	South West	62	12%	12%
	West Midlands	104	20%	20%
	Yorkshire and the Humber	31	6%	6%

Table 2.   Sample non-weighting variables

Group	Category	Count	Unweighted	Weighted
Ethnicity	White	337	66%	65%
	Black or Black British	37	7%	7%
	Asian or Asian British	96	18%	19%
	Mixed / other	36	7%	7%
	Prefer not to say	12	2%	2%
Household composition	Both parents in household	391	76%	75%
	Single parent household	94	18%	18%
	Sibling in household	396	76%	76%
	Prefer not to say	22	4%	4%
Free school meals	Yes	61	12%	12%
	No	421	82%	81%
	Don't know	24	4%	5%
	Prefer not to say	12	2%	2%

Interpreting the findings

When interpreting the findings it is important to bear in mind the following points:

Statistical significance

Results are based on a sample of the maintained and independent school population, and not the entire population. Consequently, results are subject to sampling tolerances, and not all differences between sub-groups are statistically significant. Due to the limited sample size, it is not meaningful to conduct significance testing between sub-groups.

Presentation of data

In tables and charts, where percentages do not add up to 100%, this is due to multiple answers, computer rounding, or to the exclusion of 'Don't know' or 'No response' categories. Please note that the unweighted sample size has been included as reference for the purpose of the report.

Chapter 2: Baseline questions

This chapter establishes baseline knowledge and perceptions of climate change among Year 11 school leavers in England. It covers the age at which school leavers last learned about climate change, their understanding of the extent of global warming, perceived causes of climate change, and their awareness of its impacts.

Learning about climate change

Over half of school leavers (55%) remember learning about climate change recently, stating they were aged 15-16 years when they were last taught about it in a lesson at school. Around a quarter (26%) stated they were either younger than 15 or had never been taught about climate change, whilst a further 17% could not remember.

Figure 1   Learning about climate change during school lessons
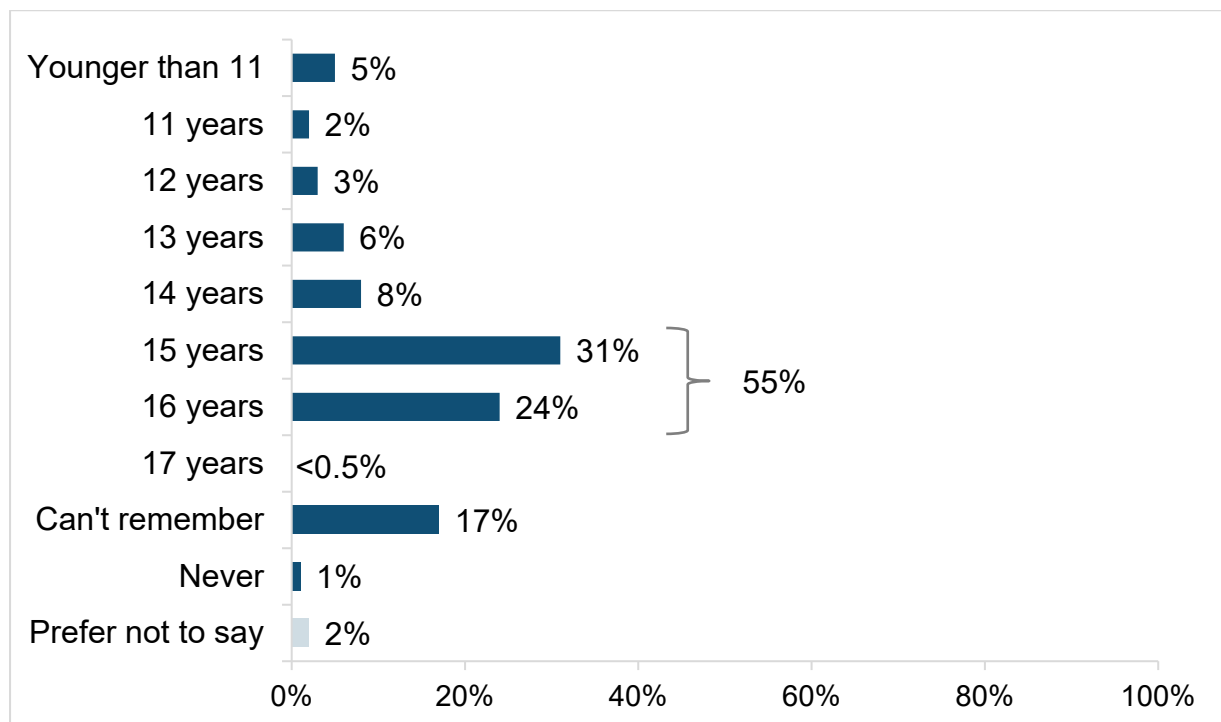
Age	Percentage
Younger than 11	5%
11 years	2%
12 years	3%
13 years	6%
14 years	8%
15 years	31%
16 years	24%
17 years	<0.5%
Can't remember	17%
Never	1%
Prefer not to say	2%

15 years and 16 years: 55%

Source: MS_AGECC – How old were you when you were last taught about climate change in a lesson at school? Base: n=518.

Perceived earth temperature changes since 1850

The majority of school leavers either 'did not know' (31%) or overestimated (52%) the extent of global warming since 1850. The actual temperature increase is approximately 1.1 degrees Celsius, yet only 5% of school leavers indicated a value between 1.06 and 1.25 degrees Celsius. Nearly a quarter of school leavers (24%) indicated between 2.06 and 3.05 degrees Celsius and 14% indicated between 3.06 and 4.05 degrees Celsius.

Very few school leavers thought that the climate had warmed less than it has, indicating an awareness that the climate has changed, but a lack of awareness of the impact of a global temperature increase of 2 or more degrees Celsius would have, and a lack of awareness of the 1.5 and 2 degree Celsius targets.

Figure 2   How much do you think the climate of the Earth has warmed since 1850?
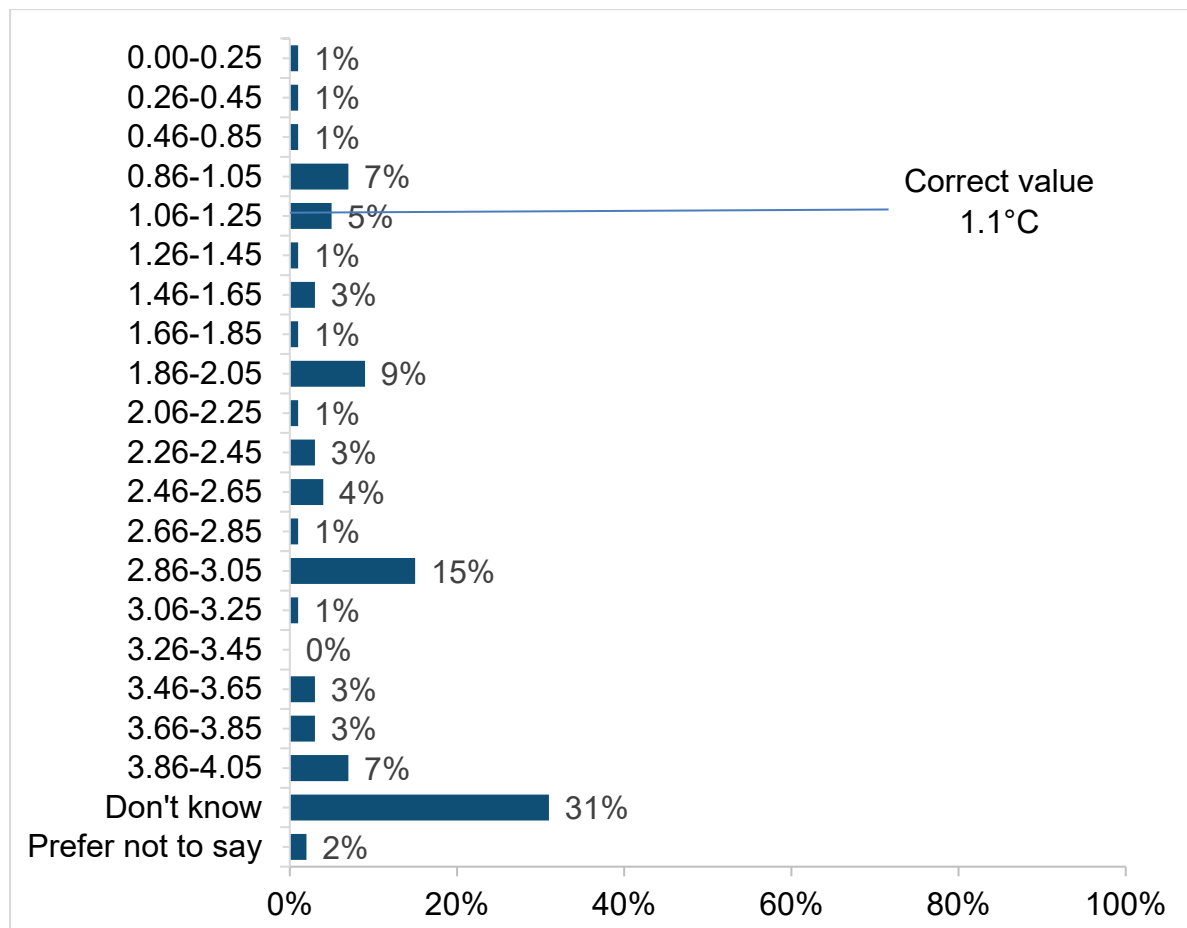
Source: MS_WARM - How much do you think the climate of the Earth has warmed since 1850, if at all? Base: n=517. Year 11 school leavers in England, Wales and Scotland

Perceived contributions to global warming

School leavers correctly indicated that natural changes are generally the least impactful (46%) on global warming. However, there is an overestimation of the contribution from transport (46% think it contributes more than it does) and disposal of plastic waste (49% think it contributes more than it does).

Based on school leavers' responses there may be a varied understanding between the contribution to global warming globally or by the UK/England. Globally, industry has contributed to global warming most but in the UK, transport is more significant. The correct level of contribution has been highlighted in grey in Table 3.

Table 3.   Perceived contribution to global warming

	1 Least	2	3	4	5 Most	Prefer not to say / Not answered	Don't know
Natural changes such as volcanoes and variations in the Sun and Earth's orbit	46%	16%	10%	6%	5%	5%	13%
Production of plastic and management of plastic waste	11%	20%	17%	17%	15%	5%	13%
Transport (cars, lorries, planes, trains, ships, etc)	5%	12%	20%	22%	24%	5%	13%
Deforestation, agriculture and other land use changes	7%	17%	18%	21%	19%	5%	13%
Industry, electricity and heat production	12%	17%	17%	16%	19%	5%	13%

Source: MS_GLOBAL – How much, if at all, do you think the following have contributed to global warming? Base: n=518. Year 11 school leavers in England, Wales and Scotland

Levels of concern about climate change

The level of concern regarding climate change is highlighted in Figure 3. More than half of the sample (53%) indicated some concern about climate change. While only 12% are 'very concerned', a larger proportion fall into the 'fairly concerned' category (42%). More than a third (35%) of school leavers indicated that they are 'not at all' (10%) or 'not very' (25%) concerned about climate change which, combined, is a larger proportion than those who are 'very concerned' (12%).

Figure 3   Levels of concern about climate change
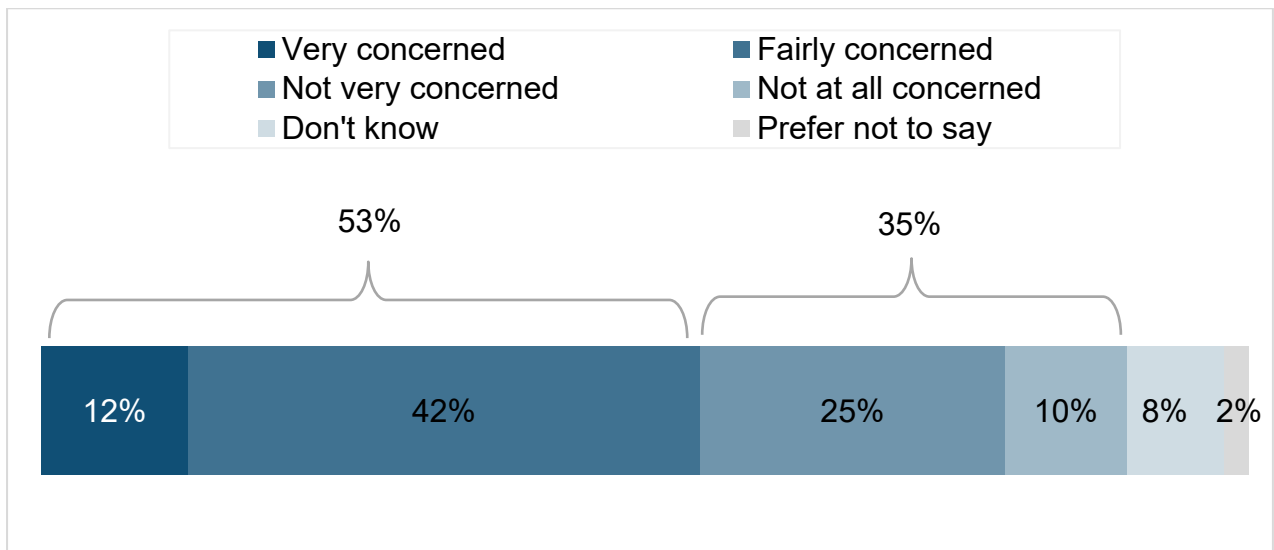
Source: MS_CONCC – How concerned are you about climate change, if at all? Base: n=518. Note: The chart does not show the proportion for 'not stated / not answered'

Personal impact of climate change

Almost half of school leavers (49%) appreciated that climate change will impact them personally, with 11% expecting a "great deal" of impact and 38% indicating quite a bit.

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Figure 4   The effect of climate change
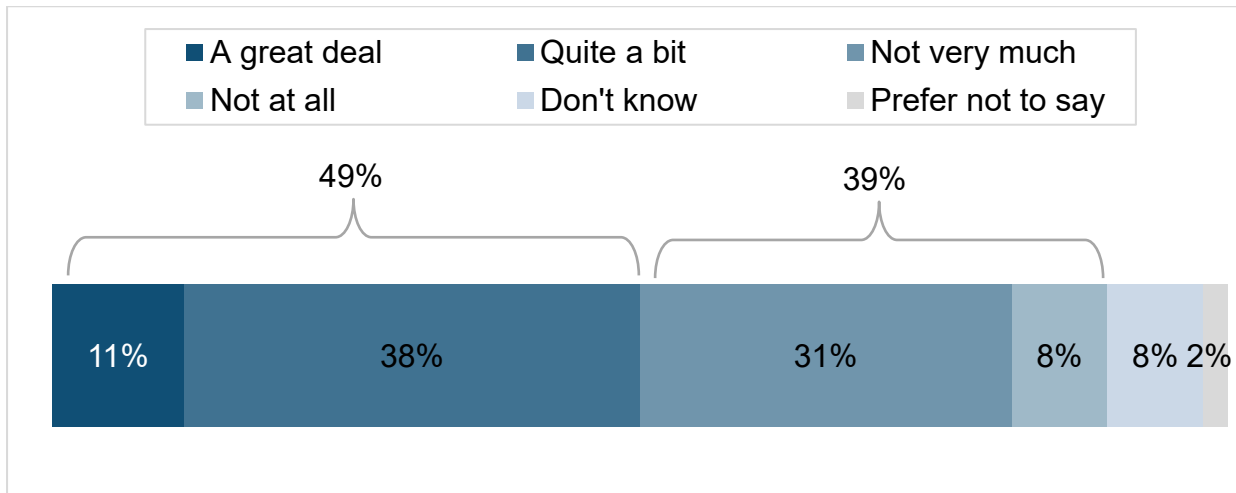
Source: MS_PERSONCC – In your lifetime, to what extent do you think climate change will affect you personally, if at all? Base: n= 518. To note: The chart does not include the proportion for 'not stated/not answered'

Personal impact versus concern about climate change

School leavers who were more concerned about climate change were also comparatively more likely to indicate that they thought that they will be affected the most by climate change (71%). In contrast, school leavers who were not concerned about climate change were comparatively more likely to think that they will not be impacted by climate change during their lifetime (70%).

Figure 5   Concern about climate change versus impact of climate change.
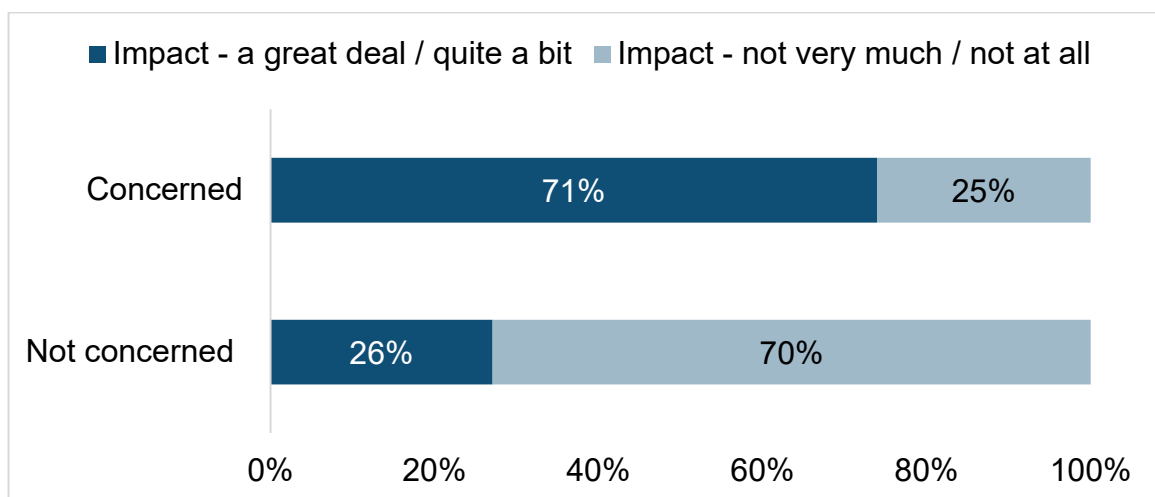
Source: MS_CONCC – How concerned are you about climate change, if at all? Base: n=518. MS_PERSONCC. In your lifetime, to what extent do you think climate change will affect you personally, if at all? Base: n=460. Table excludes 'don't know' options.

Summary

- Just over half of school leavers (55%) remembered learning about climate change recently, stating they were aged 15-16 years when they were last taught about it in a lesson at school.

- The majority of school leavers either 'did not know' (31%) or overestimated (52%) the extent of global warming since 1850.

- School leavers correctly indicated that natural changes are generally the least impactful (46%) on global warming. However, there was an overestimation of the contribution from transport (46% thought it contributed more than it does) and disposal of plastic waste (49% thought it contributed more than it does) and a corresponding underestimation of the role of industry and deforestation, agriculture and other land use changes.

- More than half of the sample (54%) indicated some concern about climate change.

- Almost half of school leavers (49%) appreciated that climate change will impact them personally, with 11% expecting a "great deal" of impact and 38% indicating quite a bit.

Chapter 3: Causes of climate change

This chapter delves into school leavers' understanding of the fundamental concepts related to climate change, specifically weather and climate, global climate variability and the definition of climate change. It also explores their understanding of fossil fuels, the climate system, greenhouse gases and their sources.

Defining Weather and Climate

In this question, school leavers were asked to place the words weather and climate into a sentence to explore whether they understood the difference between them. The data indicates that around a third (31%) of school leavers correctly identified that 'climate is the average weather conditions for a particular place', and 'weather varies a lot from year to year'. Just over a third, 34%, incorrectly thought 'climate is the average weather conditions for a particular place' and 'climate varies a lot from year to year.' This may highlight some uncertainty about the definitions of weather and climate.

Figure 6   Defining weather and climate

Climate is the average weather conditions for a particular place. Climate varies a lot from year to year — 34%

Climate is the average weather conditions for a particular place. Weather varies a lot from year to year — 31%

Weather is the average climate conditions for a particular place. Weather varies a lot from year to year — 19%

Weather is the average weather conditions for a particular place. Climate varies a lot from year to year — 6%

Weather is the average climate conditions for a particular place. Climate varies a lot from year to year — 5%

Climate is the average climate conditions for a particular place. Weather varies a lot from year to year — 4%

Weather is the average weather conditions for a particular place. Weather varies a lot from year to year — 1%

Climate is the average climate conditions for a particular place. Climate varies a lot from year to year — 0%

Source: DfE_WEATHER – Put the words weather and climate in the correct places in this phrase. …
is the average… conditions for a particular place. … varies a lot from year to year. Base: n=96*.
*Caution: small base size of less than 100 school leavers.
The dotted box denotes the correct answer.

Defining climate change

This question investigated school leavers' understanding of the best definition of climate change. The data shows that 44% of school leavers identified climate change as 'a large-scale, long-term shift in the Earth's weather patterns and average temperatures' which is the definition most frequently encountered in schools, capturing both anthropogenic and natural causes of climate change. Another 44% responded that it is 'an increase in global temperature because of changing greenhouse gas concentrations in the atmosphere,' which is close to the UN definition of climate change. A further 6% thought it was due to 'an increase in global temperatures due to

human activity'. School leavers did not select 'a short term change in the weather' whilst a small proportion, 6%, admitted to not knowing the answer.

Figure 7   Best definition of climate change?

A large-scale, longterm shift in the Earth's weather patterns and average temperatures — 44%

An increase in global temperature because of changing greenhouse gas concentrations in the atmosphere — 44%

An increase in global temperature because of human activity — 6%

A short term change in the weather — 0%

I don't know — 6%
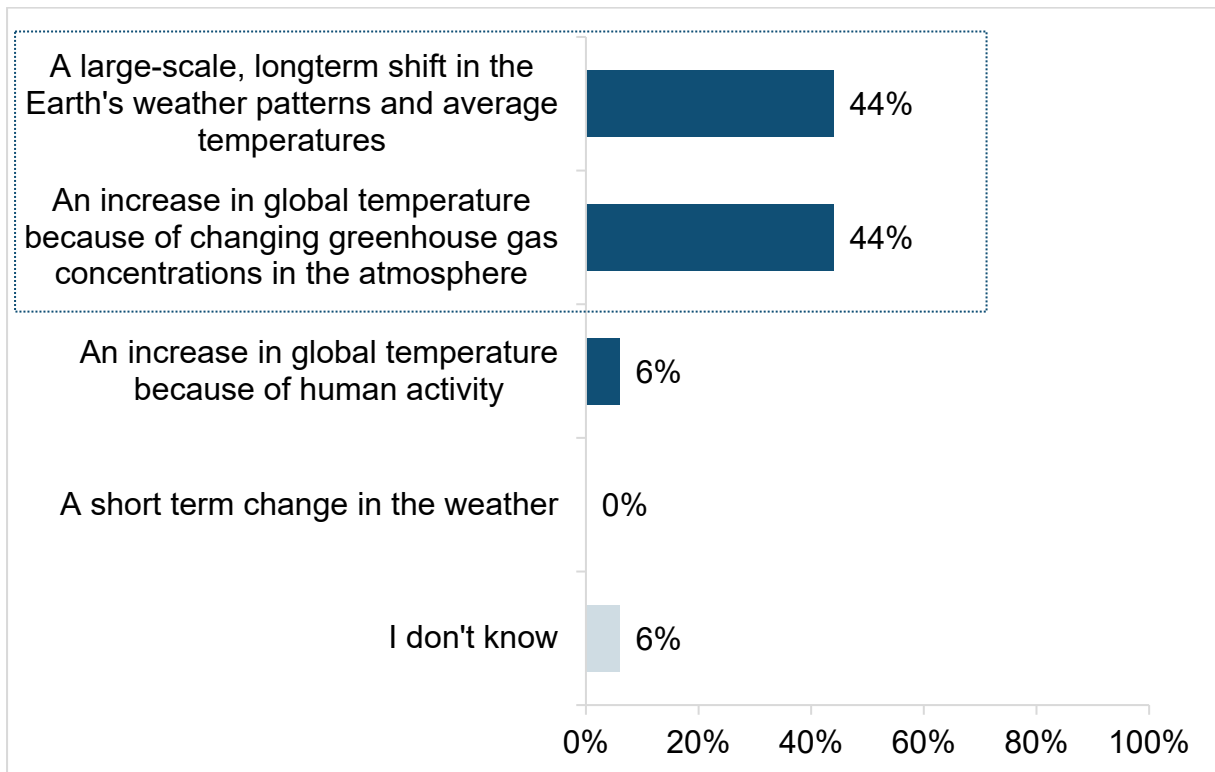
Source: DfE_CLIMATECHANGE – What is the best definition of climate change? Base: n=100. The dotted box denotes the correct answer.

Reasons for global climate variability

Climate variability refers to natural fluctuations in weather patterns over different time scales, from seasons to years, while climate change refers to long-term shifts in climate averages and ranges, typically over decades or centuries. Climate variability is a normal part of the Earth's climate system, with phenomena like El Niño and La Niña causing year-to-year variations in temperature and rainfall. These natural fluctuations can sometimes mask the underlying trends of climate change, which is primarily driven by human activities, particularly the increase in greenhouse gas concentrations.

Around one in seven school leavers (14%) correctly identified the biggest reason for climate variability as 'large scale weather patterns (such as El Niño)'. Over half of school leavers (54%) identified the 'changes in the concentration of greenhouse gasses in the atmosphere' (a primary driver of climate change) as the main contributor to global climate variations, however 19% ranked this as less important than it actually

is. Over half of school leavers (53%) identified changes in the Earth's orbit (a factor related to long-term climate variability) as being more important than it really is. Around one in six school leavers did not answer this question. The correct impact levels have been shaded in grey in Table 4.

**Table 4. Reasons for global climate variability**

	1 Biggest	2	3	4 Smallest	Don't know
Large scale weather patterns (such as El Niño)	14%	36%	20%	14%	16%
Changes in the concentration of greenhouse gases in the atmosphere	54%	11%	7%	12%	16%
Changes in the Sun	12%	12%	32%	27%	16%
Changes to Earth's orbit	4%	25%	24%	30%	16%

Source: DfE_GLOBALCLIMATE – The global climate mainly varies from year to year because of…
Base: n=93*. *Caution: small base size of less than 100 school leavers.

Identifying greenhouse gases

The majority of school leavers correctly identified Carbon Dioxide (CO_2) as a greenhouse gas (84%), followed by Methane (CH_4) at 76%, and Nitrous Oxide (N_2O) at 32%. A substantial proportion of school leavers, 44%, correctly recognised water vapour (H_2O) as a greenhouse gas, which is often overlooked in public discourse. However, there are misconceptions evident from the data: 40% of school leavers mistakenly identified Carbon Monoxide (CO) as a greenhouse gas, 18% incorrectly pointed to Sulphur Dioxide (SO_2) and 10% incorrectly identified Oxygen (O_2). Given this, it is possible that a proportion of the Nitrous Oxide responses are 'false positives' as school leavers will have heard of the gas in other contexts. Almost one in 10 school leavers (8%) admitted to not knowing the answer.

Figure 8   Identifying greenhouse gases
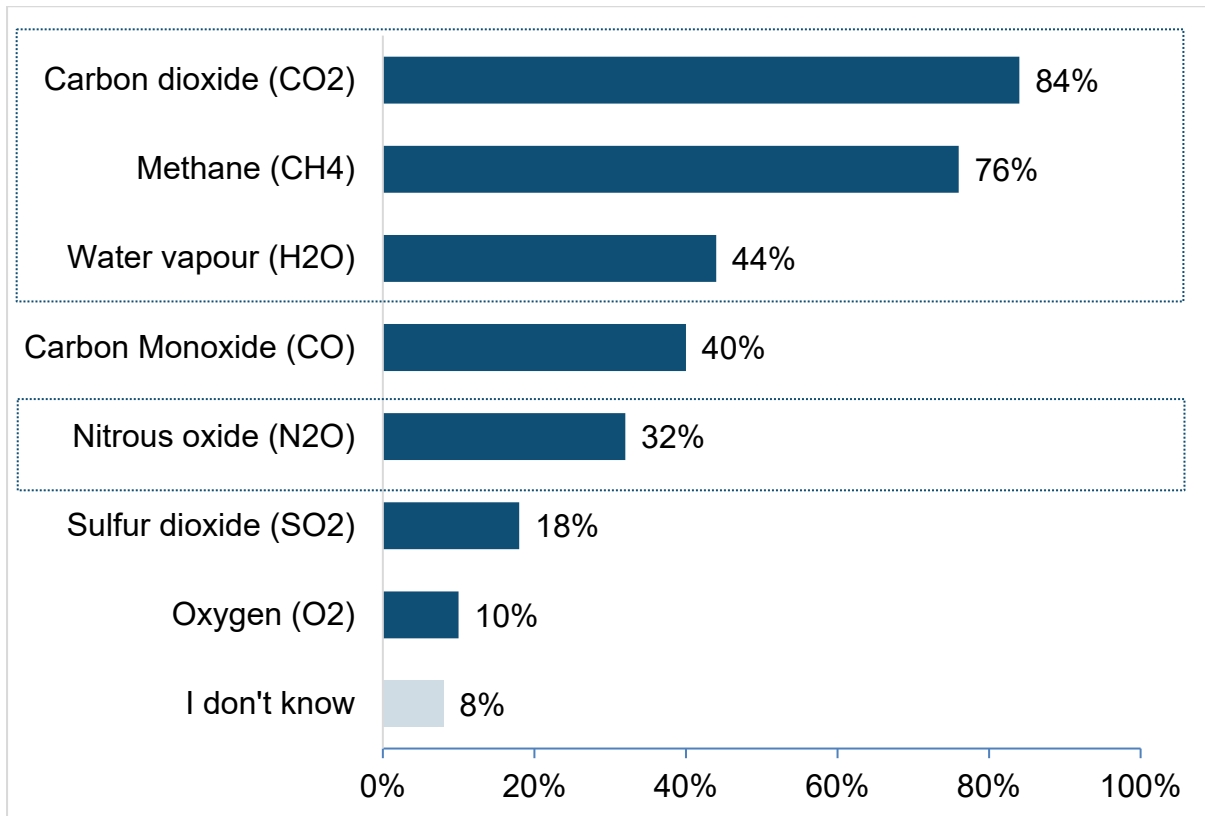
Source: DfE_GHGASES - Which of the following are greenhouse gases? Base: n=100.
The dotted boxes denote the correct answer.

Identifying Fossil fuels

Over eight in 10 (86%) school leavers correctly identified oil as a fossil fuel, followed by coal (85%) and natural gas (68%). However, some school leavers incorrectly identified nuclear power (20%), bioenergy from crops or wood (7%) and wind (1%) as fossil fuels.

Figure 9   Identifying fossil fuels
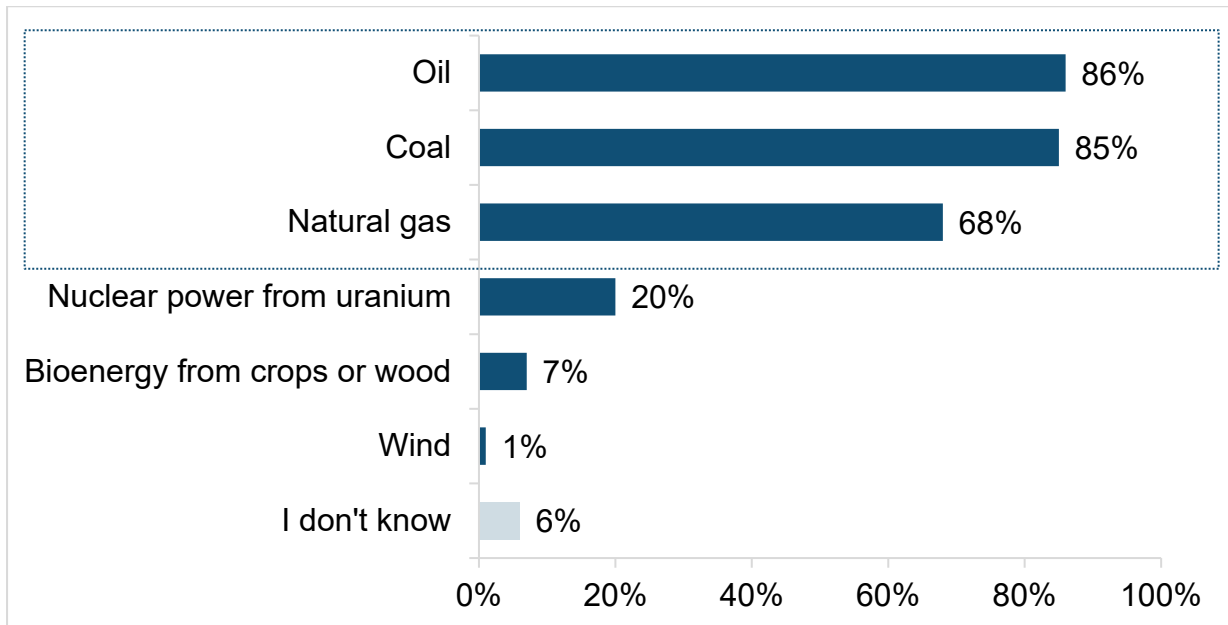
Source: DfE_FOSSILFUELS – Which of the following are 'fossil fuels'? Base: n=93*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Countries contributing to greenhouse gas emissions through burning fossil fuels

The majority of school leavers (55%) correctly identified China as the current largest emitter of greenhouse gases annually from burning fossil fuels. The USA was selected by 23% of school leavers, while 6% thought it was Saudi Arabia, and 2% incorrectly thought it was the UK. Around one in eight (12%) school leavers admitted to not knowing the answer.

Figure 10   Countries contributing to greenhouse gas emissions through burning fossil fuels
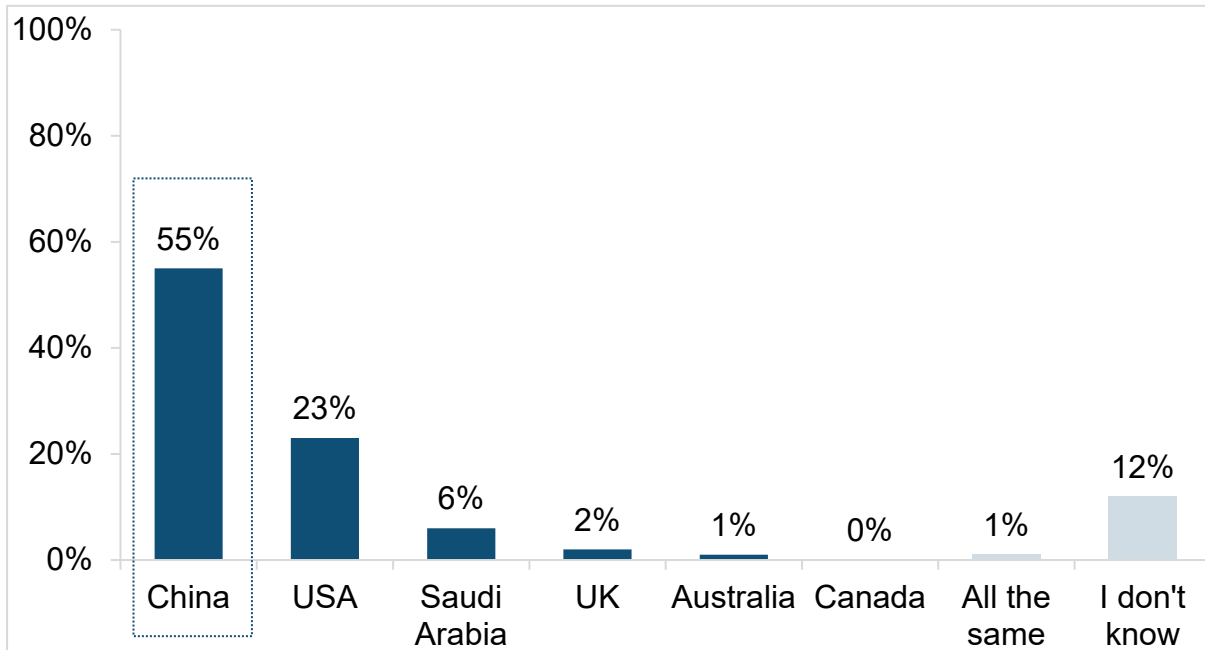
Source: DfE_BURNINGFOSSILFUELS - Which of the following countries emits the largest amount of greenhouse gas each year from the burning of fossil fuels? Base: n=98*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Sources of carbon dioxide (CO_2) emissions

Burning fossil fuels (77%) and deforestation (65%) were correctly recognised as sources of carbon dioxide (CO_2) by the majority of school leavers. However, only 11% recognised cement production, which produces 5-9% of global emissions. Other important sources such as respiration and decomposition were correctly identified by 57% and 38% of school leavers respectively.

Answers such as rice farming (25%) suggest there may be some limited understanding with regards to the sources of methane (CH_4). Over a quarter (28%) of school leavers suggested that nuclear power was a source of carbon dioxide (CO_2) although the emissions associated with the industry are negligible compared to some of the other options that were presented. Rock weathering is a sink of carbon dioxide (CO_2) and 10% of school leavers incorrectly identified it as a source. Additionally, more than one in 10 school leavers (14%) admitted to not knowing the sources of carbon dioxide (CO_2) emissions.[1]

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[1] Although correct, nuclear power, wildfire and volcanoes and geological sources are minor compared to the others

Figure 11   Processes as sources of carbon dioxide (CO$_2$), a greenhouse gas
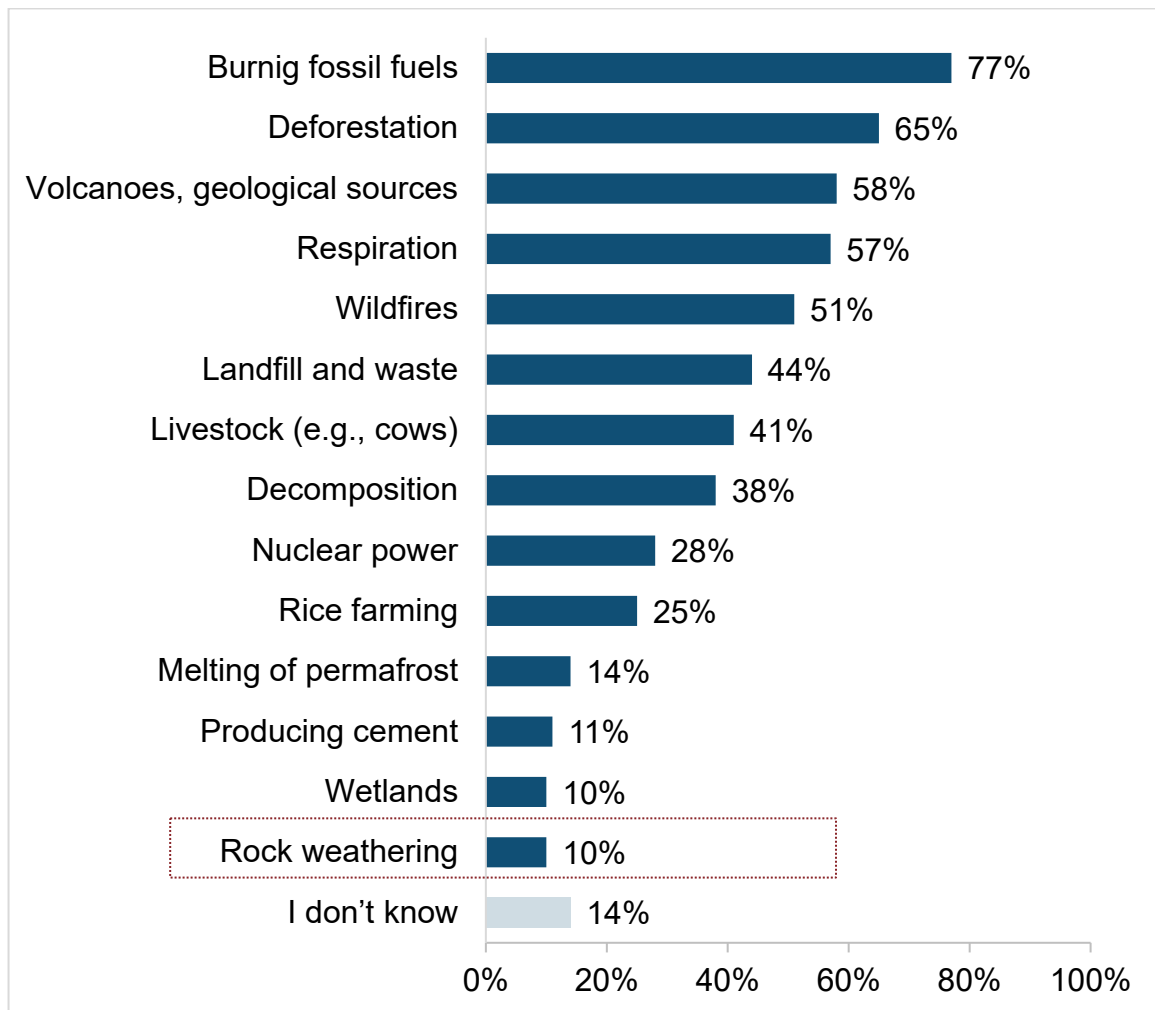
Source: DfE_CARBONDIOXIDE – Which of the following processes are sources of carbon dioxide, a greenhouse gas? Base: n=100. The majority of these processes are sources of carbon dioxide with the exception of rock weathering. The incorrect option is noted in a red dotted box.

Countries per capita emissions of Carbon dioxide (CO$_2$)

School leavers' understanding of which country emits the most carbon dioxide (CO$_2$) per person from the burning of fossil fuels was also assessed, as this links to ideas related to climate justice. Only 6% of school leavers correctly identified Saudi Arabia as having the highest per capita (per person) emissions. A large proportion (40%) identified China as the main contributor per capita, though it is only ranked 34th globally in terms of emissions per capita (whilst it is the main contributor if overall total emissions are considered). Just over one in three (36%) school leavers suggested the United States of America, which ranks 11th globally, whilst Australia, which ranks 10th globally, was not selected by any of the school leavers surveyed. This suggests a clear misconception regarding per capita emissions, indicating that while school leavers may have some awareness of relative overall national emissions, they may not

understand the significance of how this pattern changes when considering emissions per person. Around one in 10 school leavers (11%) admitted to not knowing the answer.

Figure 12   Countries emitting the most carbon dioxide (CO$_2$) per person from the burning of fossil fuels
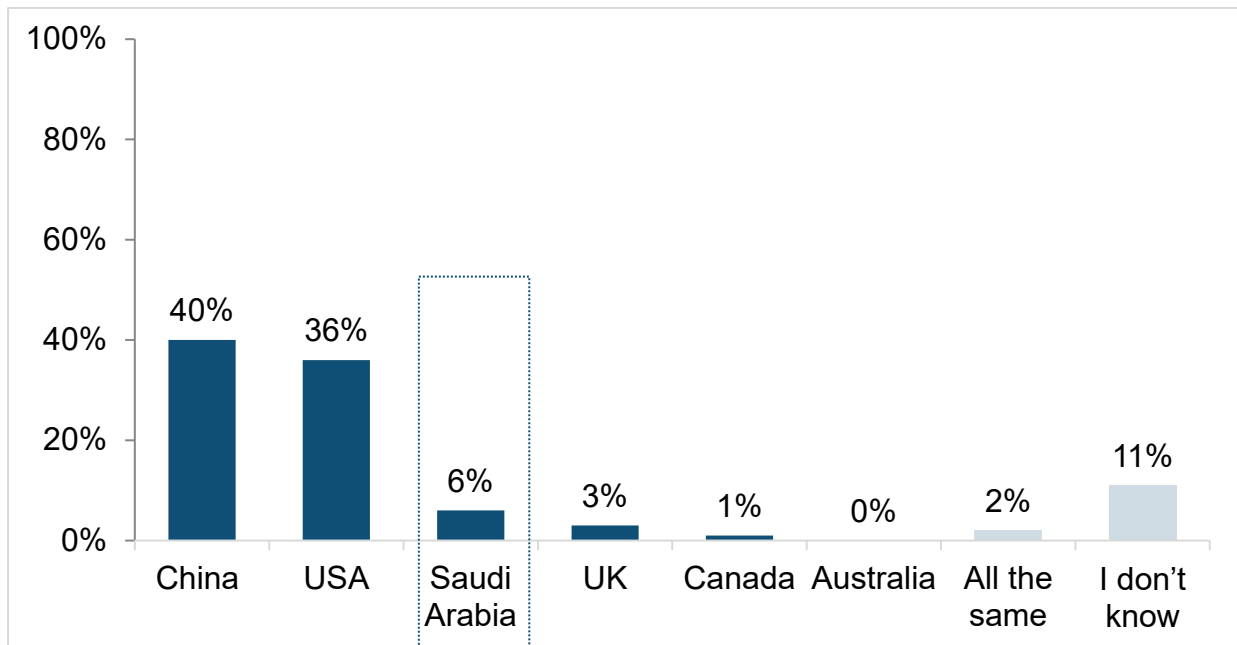
Source: DfE_EMITSCARBONDIOXIDE – Which of the following countries emits the most carbon dioxide per person from the burning of fossil fuels? Base: n=100. The dotted box denotes the correct answer.

Country emitters of carbon dioxide (CO$_2$)

Half (50%) of school leavers incorrectly identified China as the largest emitter of carbon dioxide (CO$_2$) from burning fossil fuels, land use change, and forestry since 1850. The USA, which has emitted almost twice as much as China over this period was correctly identified by 27% of school leavers. A small proportion selected Russia (5%) which has been the third biggest contributor. A small percentage (6%) of school leavers admitted to not knowing the answer. These results suggest a relatively low level of awareness about historical carbon emissions and the impacts of deforestation, and possible varied understanding between current and historical emissions.

Figure 13   Countries that emitted the largest amount of carbon dioxide (CO_2) from burning fossil fuels, land use change and forestry since 1850
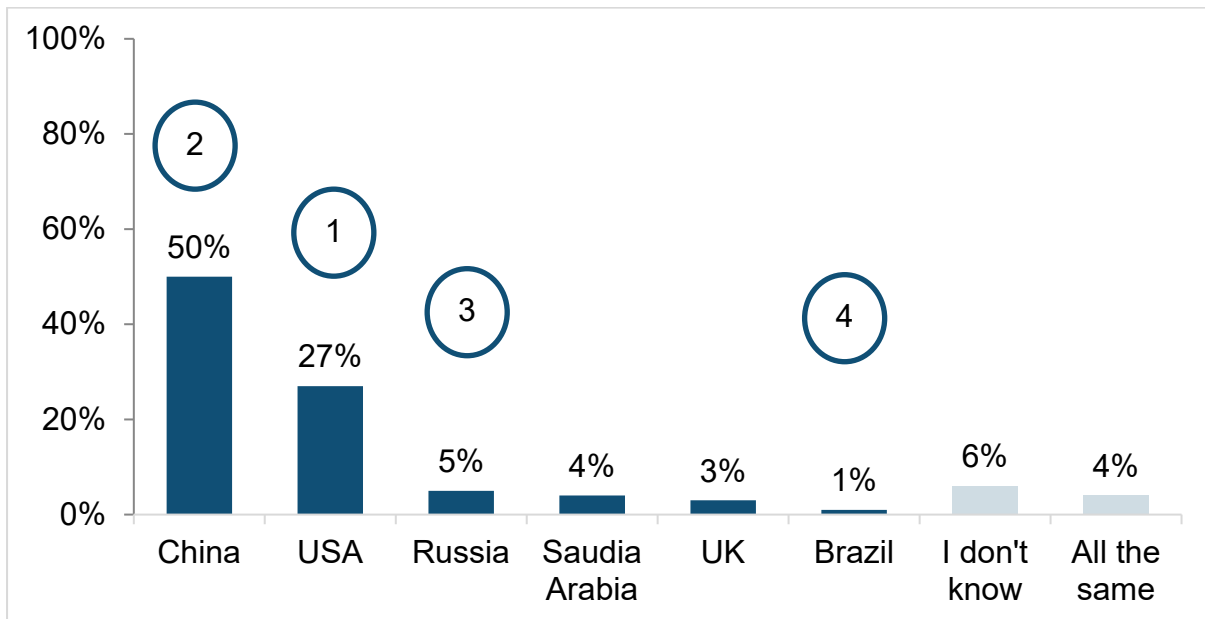
Source: DfE_BURNING – Which of the following countries has emitted the largest amount of carbon dioxide from burning fossil fuels, land use change and forestry since 1850? Base: n=98*. *Caution: small base size of less than 100 school leavers. The figure in the circles denotes the correct order of countries emitting the largest amount of carbon dioxide (CO_2)

Visual understanding of 500 years of atmospheric carbon dioxide (CO_2) changes

School leavers demonstrated a strong understanding that atmospheric carbon dioxide (CO_2) has increased over the past 500 years, with 83% correctly identifying an increase. When asked about the type of change that has occurred, nearly half of them correctly chose an exponential increase (49%), while just over a third chose a linear increase (34%). However, 7% of school leavers thought that the amount of carbon dioxide (CO_2) in the atmosphere has decreased over the past 500 years and 9% did not know. Even though 'no change' was included as an option, this option was not selected by any of the school leavers.

Figure 14   Understanding of how the amount of carbon dioxide (CO$_2$) in the atmosphere has changed over the past 500 years
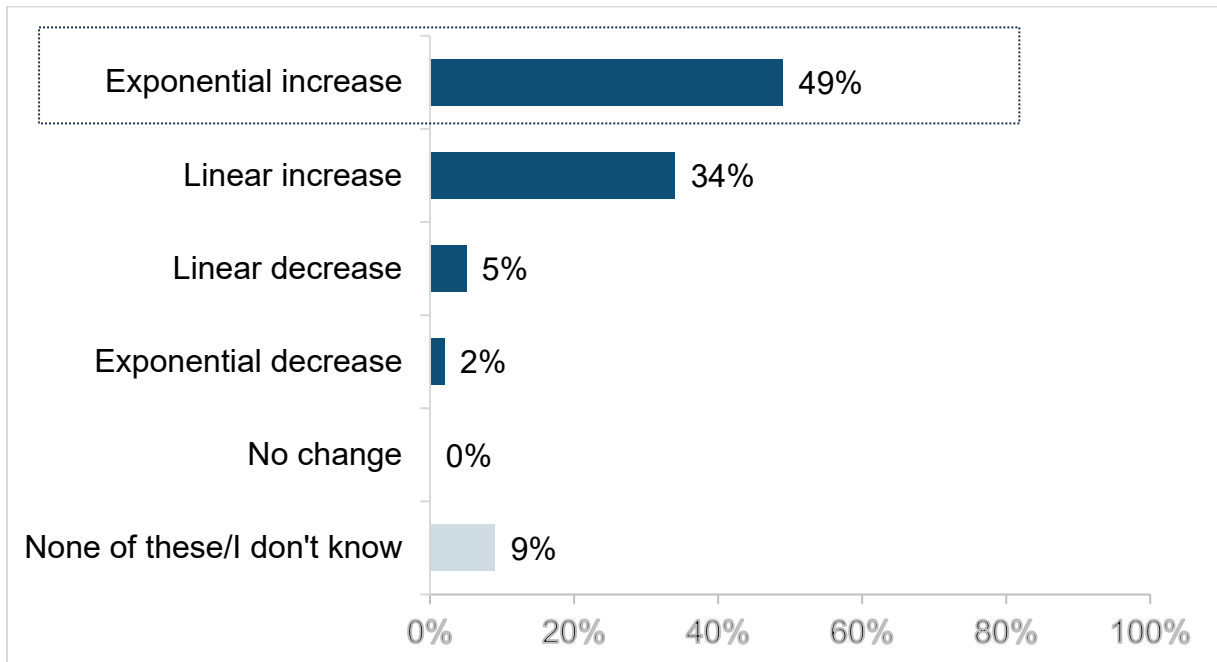
Source: DfE_500YEARS – Which picture best represents your understanding of how the amount of carbon dioxide in the atmosphere has changed over the past 500 years? Base: n=96*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Sources of methane (CH$_4$)

The majority of school leavers (61%) correctly identified livestock as a major source of methane (CH$_4$). School leavers were less likely to select other major sources of methane including landfill and waste (32%), rice cultivation (27%), producing fossil fuels (21%), and wetlands (12%). Almost half (49%) of school leavers incorrectly identified burning fossil fuels, although there may have been a misunderstanding with the production of fossil fuels. Over one in 10 school leavers (13%) indicated that they did not know the correct answer.

Figure 15 Sources of methane (CH$_4$)

Livestock (e.g. cows) 61%
Burning fossil fuels 49%
Volcanoes, geological sources 36%
Landfill and waste 32%
Decomposition 29%
Rice farming 27%
Producing fossil fuels 21%
Wild fires 19%
Deforestation 19%
Melting of permafrost 18%
Nuclear power 16%
Wetlands 12%
Respiration 11%
Producing cement 10%
Rock weathering 9%
I don't know 13%
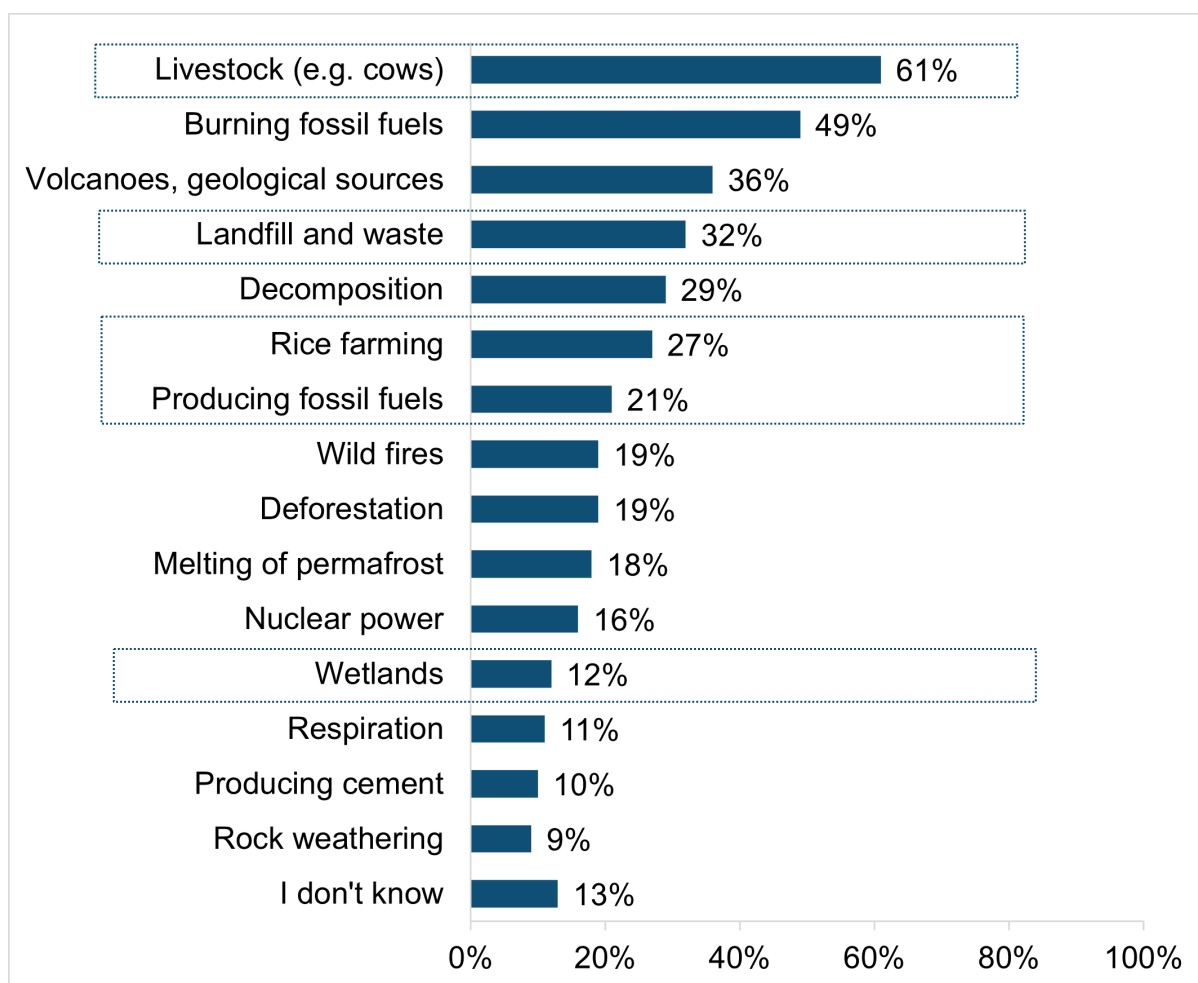
Source: DfE_METHANE – Which of the following processes are sources of methane, a greenhouse gas? Multi mention. Base: n=98*. *Caution: small base size of less than 100 school leavers.

The dotted boxes denote the correct answers.

Comparisons of responses provided at the related questions about carbon dioxide and methane emissions indicates that whilst some school leavers are aware of the different sources of greenhouse gases, there is also misunderstanding between the two gasses and their respective sources.[2]

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[2] While burning fossil fuels primarily releases carbon dioxide, incomplete combustion can also release small amounts of methane.

Table 5. Processes as sources of carbon dioxide (CO$_2$) and methane (CH$_4$)

Source	Percentage identifying as a source of carbon dioxide (CO$_2$)	Percentage identifying as a source of methane (CH$_4$)
Burning fossil fuels	77%	49%
Deforestation	65%	19%
Volcanoes, geological sources	58%	36%
Respiration	57%	11%
Wildfires	51%	19%
Landfill and waste	44%	32%
Livestock (e.g. cows)	41%	61%
Decomposition	38%	29%
Nuclear power	28%	16%
Rice farming	25%	27%
Melting of permafrost	14%	18%
Producing cement	11%	10%
Rock weathering	10%	9%
Wetlands	10%	12%
Producing fossil fuels	Not included	21%
I don't know	14%	13%

Source: DfE_CARBONDIOXIDE– Which of the following processes are sources of carbon dioxide, a greenhouse gas? Multi mention. Base: n=100. Incorrect answer highlighted in red.

DfE_METHANE – Which of the following processes are sources of methane, a greenhouse gas? Multi mention. Base: n=98*. *Caution: small base size of less than 100 school leavers. Incorrect answer highlighted in red.

Human contribution to the increase in global temperatures

The Intergovernmental Panel on Climate Change (IPCC) states that humans have caused all of the increase in global temperatures since the Industrial Revolution. Whilst the majority of school leavers identified humans as having contributed to some of the increase in global temperature since 1850, most of them felt that humans had accounted for less than 80% of the increase (69% of school leavers selecting an option below 80% contribution). Fewer than one in five school leavers, 18%, correctly chose the 80-100% option. Just over one in five chose a proportion of 40-59% (22%) and a third chose 60-79% (33%). Over one in 10 school leavers (12%) noted that they did not know the answer.

Figure 16   Human contribution to the increase in global temperatures
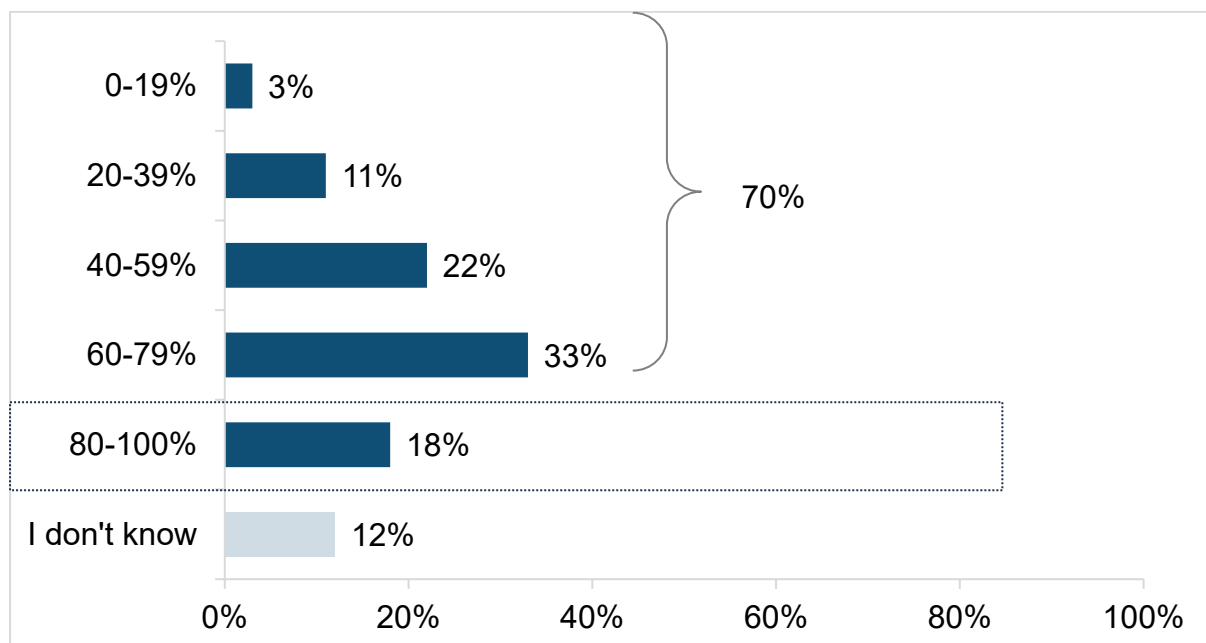
Source: DfE_AVERAGETEMP1850 – The average global temperature has increased since 1850. What proportion of this temperature increase have humans caused? Base: n=93*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

The impact of stopping greenhouse gas emissions

A quarter of school leavers (25%) correctly identified that global temperatures would 'stay about the same' if greenhouse gas emissions were stopped. The largest proportion, 37%, incorrectly suggested that temperatures would 'start cooling,' whereas 24% suggested that temperatures would 'keep rising,' reflecting common low awareness of the immediate effects of halting emissions. The remaining 14% of school leavers indicated that they 'don't know.'

Figure 17   The influence of stopping greenhouse gas emissions
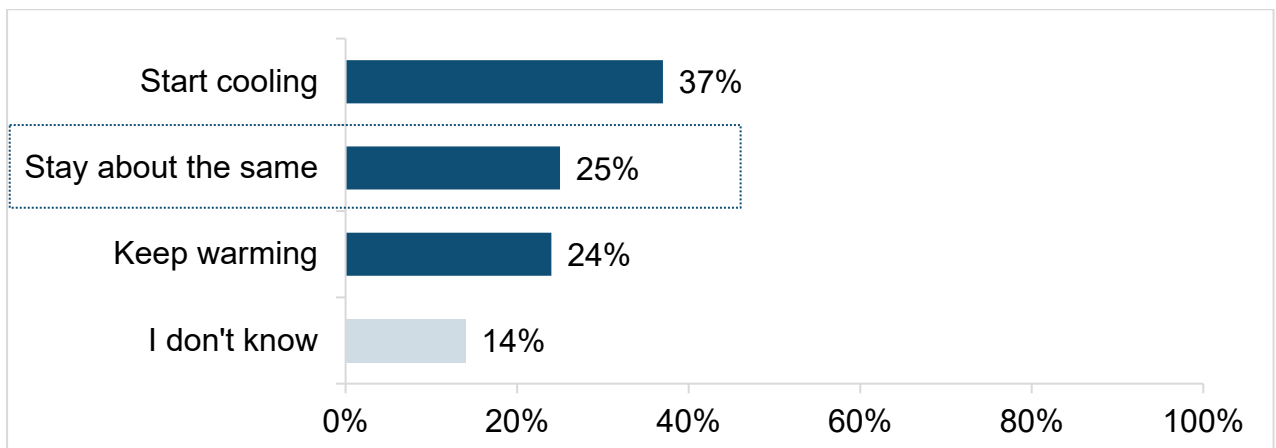
Source: DfE_TEMPERATURE - How would temperatures around the world respond over the next few decades if people were to stop greenhouse gas emissions today? Base: n=98*. * Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Understanding of factors impacting Earth's average temperature

Understanding how much different factors such as greenhouse gases in the atmosphere could affect the average temperature of the Earth were subjective questions as answers could depend on timescale or the magnitude e.g. of a volcanic event therefore there is no definitive answer that is correct.

Nevertheless, there was a good understanding amongst school leavers that greenhouse gases in the atmosphere are the main contributing factor impacting the Earth's temperature (selected by 92%) and 77% noting it could affect the average temperature of the Earth 'a lot'. However, 35% of school leavers incorrectly thought that earthquakes could have an impact on the temperature of the Earth and 20% incorrectly thought that the phases of the moon could have an impact on the temperature of the Earth.

Over half of school leavers (53%) suggested that changes in the Earth's orbit around the Sun affect the Earth's temperature a lot.

Figure 18   Understanding of factors impacting on earth's temperature
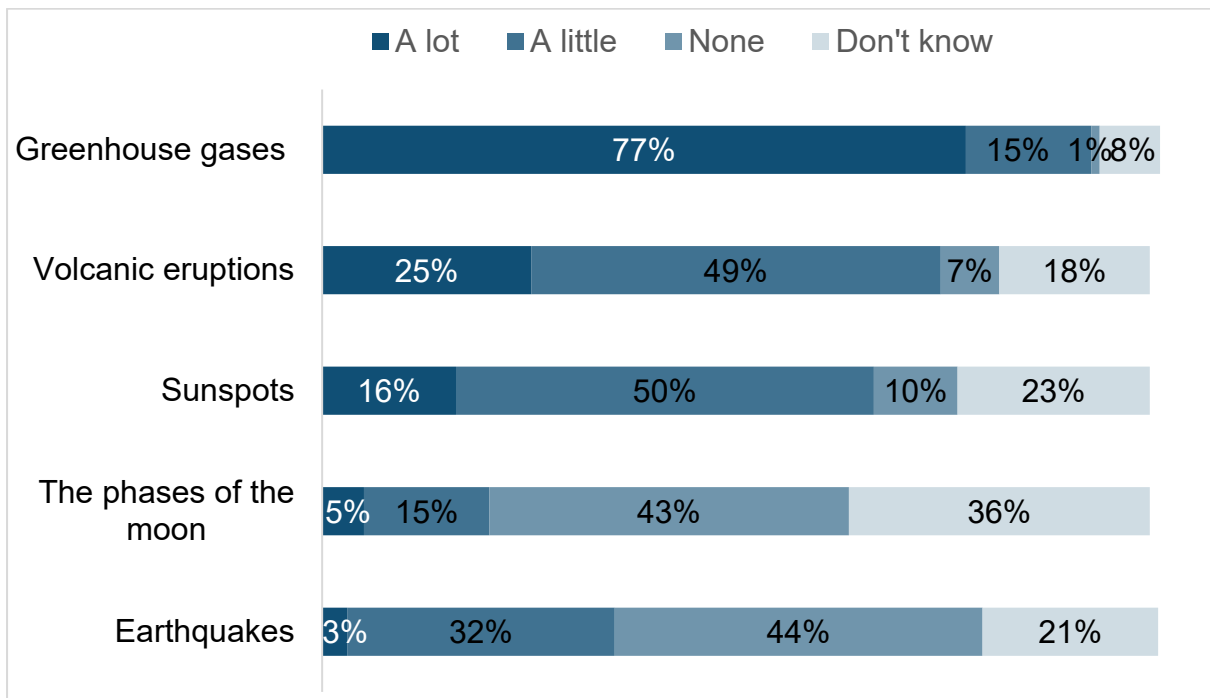
Source: DfE_AVERAGETEMP – How much could each of the following affect the average temperature of the Earth? Base: n=96*. *Caution: small base size of less than 100 school leavers. Subjective question – no single correct answer.

Factors affecting the average temperature of the Earth

School leavers were presented with a range of factors and asked the extent to which each one might affect the average temperature of the Earth. Over half of school leavers (53%) correctly identified that the Milankovitch cycles (changes in the Earth's orbit around the sun) can have a large effect on the average temperature of the Earth. Atmospheric dust can have both warming and cooling effects and 29% indicated that its affect is 'a lot'. Lighter surfaces, like ice and snow, have a high albedo, meaning they reflect a large portion of incoming solar radiation back into space compared to darker surfaces including oceans and forests. One in five (20%) school leavers indicated that the colour of the Earth's surface influences the average temperature 'a lot'. Cloud cover plays a complex role in regulating the Earth's temperature and 17% of school leavers indicated that it affects average temperatures 'a lot'. The proportion of school leavers who indicated that they did not know the impact of each factor ranged from 18-26%.

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Figure 19   How much can each of the following affect the average temperature of the Earth?

Legend: A lot ■ A little ■ Not at all ■ I don't know

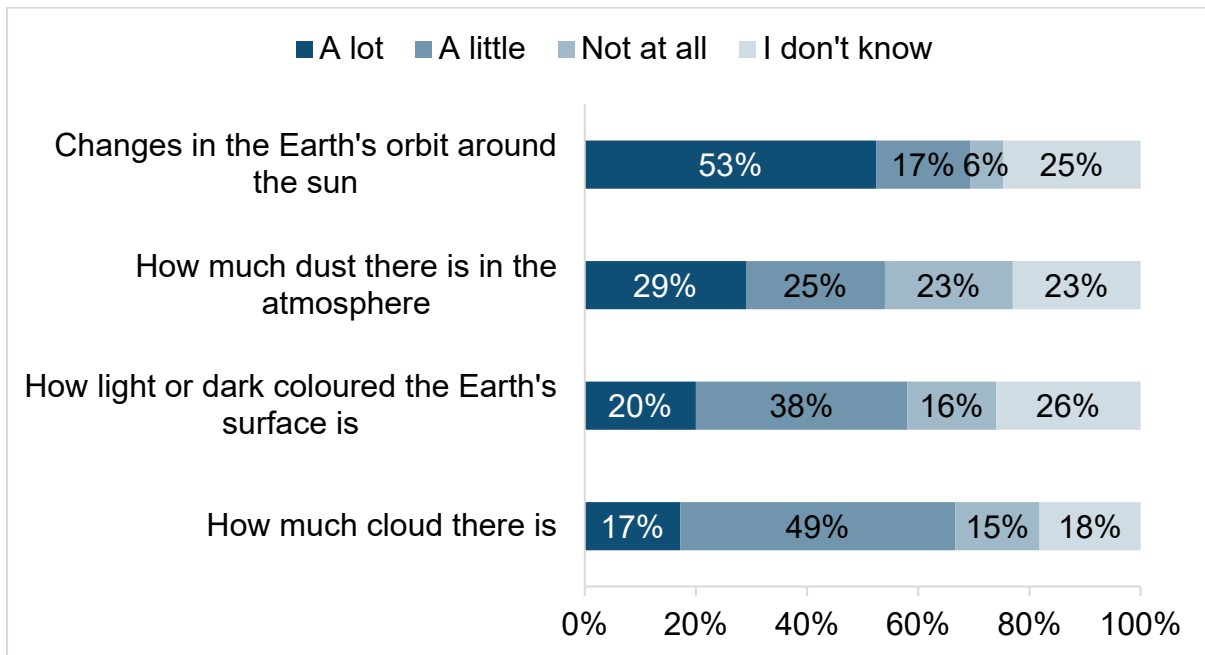|	A lot	A little	Not at all	I don't know
Changes in the Earth's orbit around the sun	53%	17%	6%	25%
How much dust there is in the atmosphere	29%	25%	23%	23%
How light or dark coloured the Earth's surface is	20%	38%	16%	26%
How much cloud there is	17%	49%	15%	18%

Source: DfE_EARTHTEMP – How much can each of the following affect the average temperature of the Earth? Base: n=98*. *Caution: small base size of less than 100 school leavers.

Summary

- School leavers showed a good understanding of the difference between weather and climate and of the definition of climate change.

- When exploring the causes of global climate variability, school leavers tended to overestimate the impact of changes in the Earth's orbit, but generally appreciated the impact of changes in greenhouse gas concentrations. There was low awareness of role of large scale weather patterns.

- Carbon dioxide (CO_2) and methane (CH_4) are well recognised as greenhouse gases, water vapour and nitrous oxide less well.

- Oil and coal are well recognised as fossil fuels, natural gas less well.

- Whilst school leavers demonstrated a good awareness of which countries are currently emitting most greenhouse gases, there was less understanding of historical emissions or per capita emissions.

- Burning fossil fuels and deforestation are well recognised as sources of carbon dioxide (CO_2) by school leavers, however, cement and decomposition were less well recognised.

- School leavers demonstrated a strong understanding that atmospheric carbon dioxide (CO_2) has increased over the past 500 years, with 83% correctly identifying an increase.

- The majority of school leavers (61%) correctly identified livestock as a major source of methane (CH_4). However, there was lower awareness of other major sources of methane including landfill and waste, wetlands and rice cultivation.

- Whilst school leavers are aware of the different sources of greenhouse gases, there is a misunderstanding between methane and carbon dioxide and their respective sources.

- Only 18% of school leavers correctly identified that over 80% of global climate change since the industrial revolution has been caused by people.

- There was a good understanding amongst school leavers that greenhouse gases in the atmosphere are the main contributing factor impacting the Earth's temperature.

Chapter 4: Evidence and impacts of climate change

This chapter focuses on school leavers' understanding of the evidence and potential impacts of climate change. It explores their perception of the Earth's climate system, their recognition of indicators of a warming climate, knowledge of future temperature projections, and understanding of the vulnerability of different countries to climate change.

Understanding the Earth's climate

This question explored school leavers' perception of the stability of the climate system. There is no single 'correct' answer, to this question, with 'gradual' (35%), 'threshold' (24%) and 'fragile' (17%) being appropriate responses which were encouragingly given by 76% of school leavers when combined. It is generally agreed amongst the scientific community that 'random' and 'stable' are not correct ways to describe the stability of the Earth's climate system, and these answers were selected by 12% and 4% of school leavers respectively. Almost one in 10 (8%) school leavers indicated that they did not know the answer.

Figure 20   Understanding of the Earth's climate
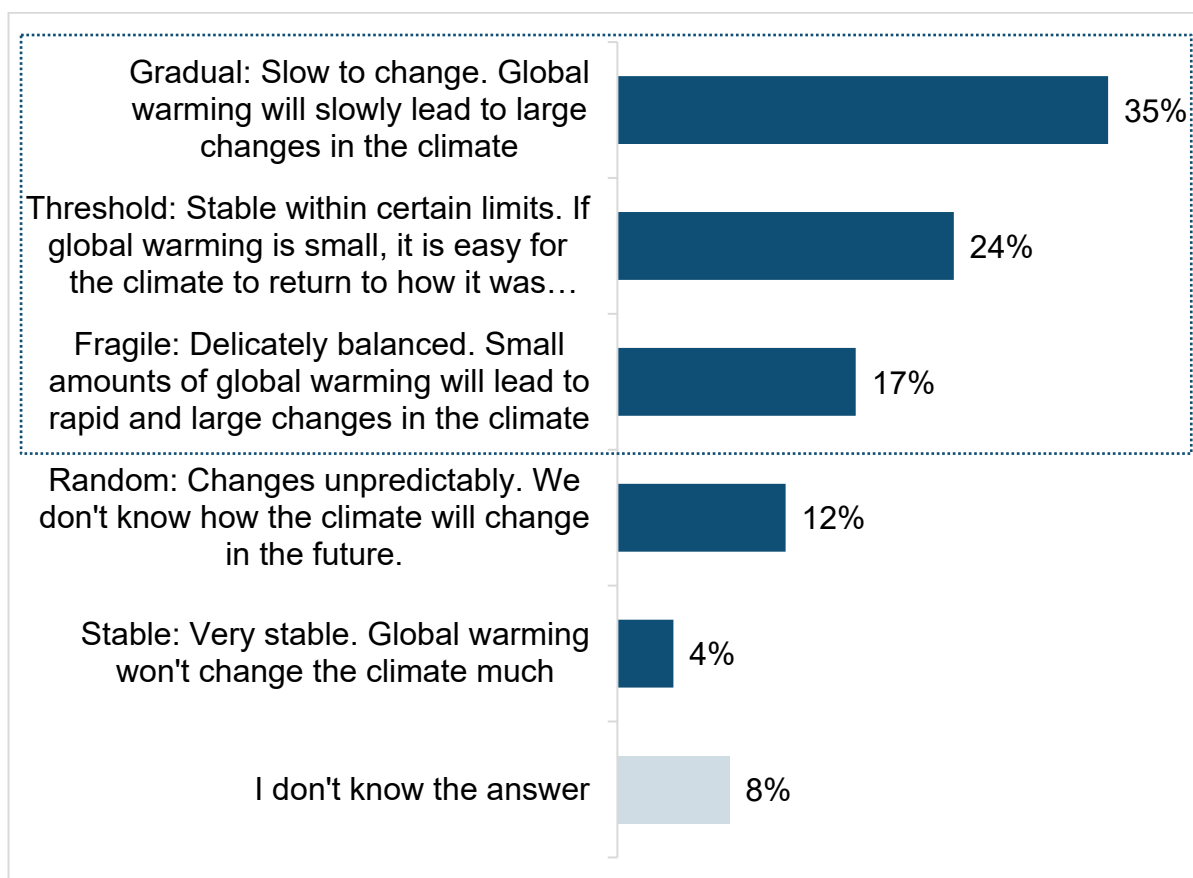
Source: DfE_EARTHSCLIMATE – Earth's climate is… Base: n=91*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

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Indicators of a warming climate

Around three quarters of school leavers recognised rising sea level (74%), melting glaciers (79%), or melting sea ice (73%) as indicators of a warming climate. Fewer recognised migrating species (41%) and changing seasons (35%) as indicators.

Ocean acidification is due to increasing carbon dioxide (CO_2) concentrations and so although linked to a warming climate, it is not directly an indicator of such warming. Three in 10 (30%) school leavers selected this option. It is possible that school leavers who selected 'ozone hole' as an indicator of a warming climate are likely to be a false positive, selecting it because of a varied understanding between ozone loss and the greenhouse effect, rather than due to an understanding of how a warming climate is delaying the recovery of the ozone hole.

Just over a third (38%) of school leavers incorrectly identified 'more frequent hurricanes' as an indicator of a warming climate and 9% of school leavers noted that they did not know the answer.

**Figure 21   Indicators of a warming climate**
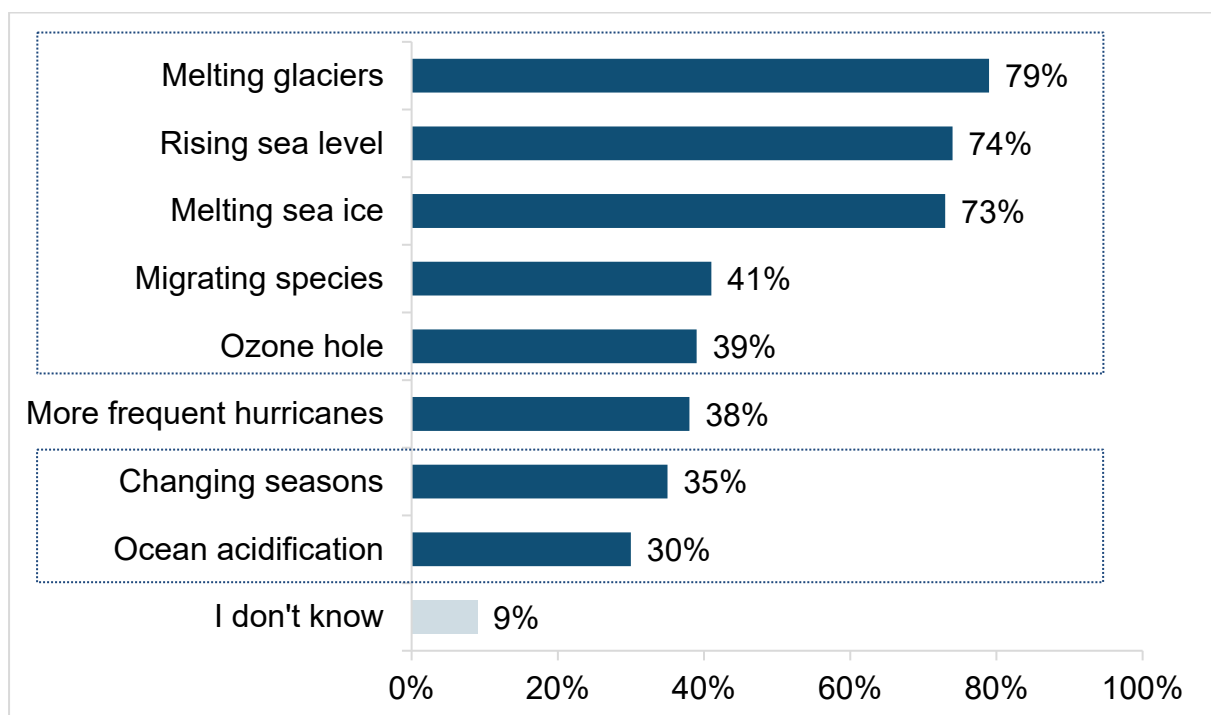
Source: DfE_WARMINGCLIMATE – Which of the following are indicators of a warming climate?
Base: n=100. The dotted boxes denote the correct answers.

Future temperature projections

Only 9% of school leavers correctly identified Canada as the country where, out of the four countries given, temperatures are projected to increase the fastest. Almost a quarter of school leavers (29%) incorrectly identified Bangladesh as the country where temperature is projected to increase the fastest. This misunderstanding may be a reflection of awareness that Bangladesh is projected to experience severe impacts as a result of changing climate, changing extreme weather events and sea level rise. The UK was incorrectly selected by 17% of school leavers, and China was chosen by 24%. Around one in five (21%) admitted to not knowing the answer.

Figure 22   Countries where the temperature is projected to increase the fastest
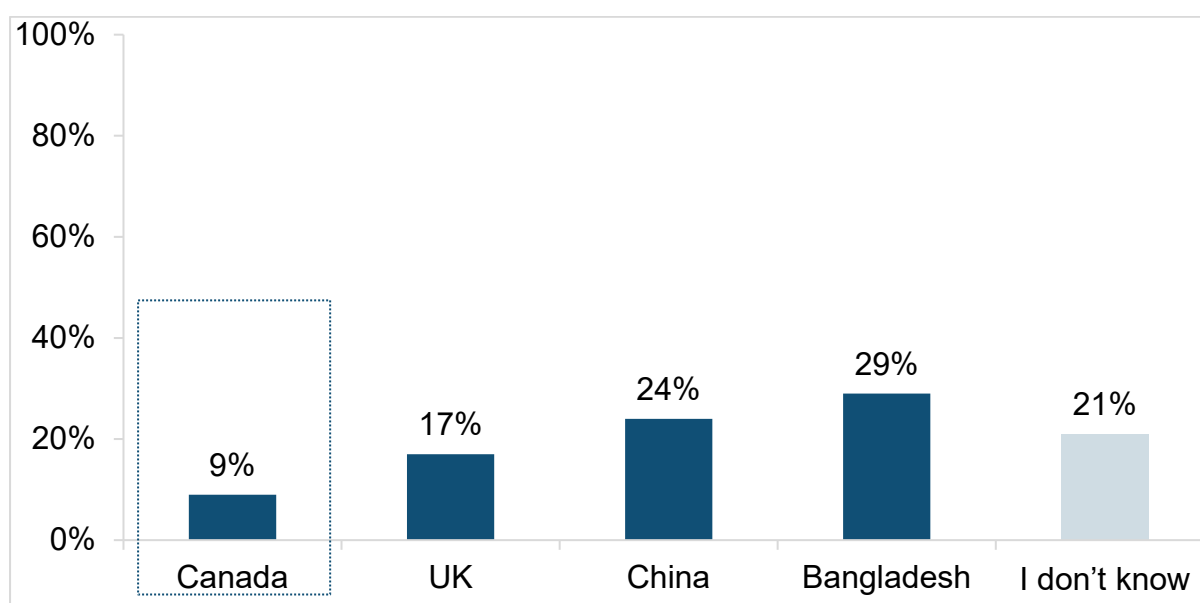
Source: DfE_TEMPINCREASE – In which of these countries is the temperature projected to increase fastest? Base: n=98*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Countries most vulnerable to climate change

When asking school leavers to identify countries most vulnerable to climate change, more than a quarter (29%) correctly identified Sudan as the country projected to be most vulnerable to climate change. Brazil was selected by 25%, the UK by 19%, and China by 13%. In reality, all countries are vulnerable to climate change, and this may be reflected in the distribution of responses amongst school leavers. Around one in seven (14%) admitted to not knowing the answer.

Figure 23   Countries most vulnerable to climate change
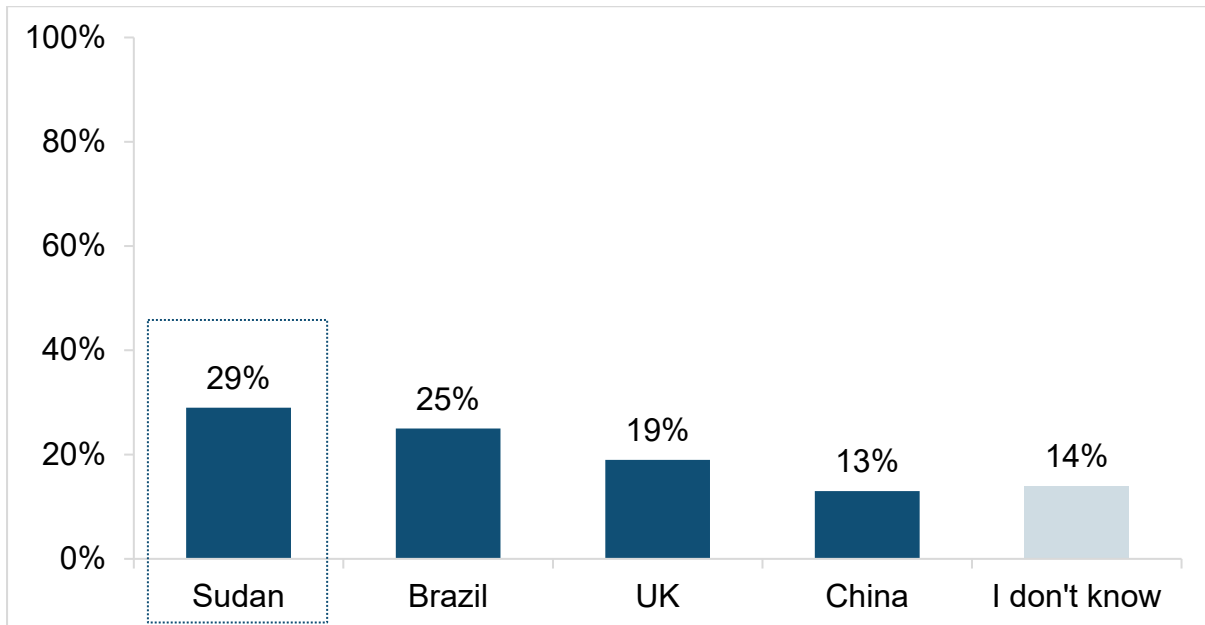
Source: DfE_COUNTRIES – Which of these countries is projected to be most vulnerable to climate change in the future? Base: n=97*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Impact of climate change on extreme weather

Just over four in 10 (43%) school leavers correctly identified that climate change would make 'some extreme weather events more frequent, intense and impactful'. Around the same number, 44%, incorrectly thought it would have an impact on 'all' extreme weather events. Only 1% thought it would have little or no impact on extreme weather events in most places. This highlights that almost all the school leavers surveyed were aware that climate change has an impact on extreme weather, but the extent of that impact was widely overestimated, indicating that there may be scope for strengthening messaging about extreme event attribution, both in education and the wider media.

Figure 24   The impact of climate change on extreme weather
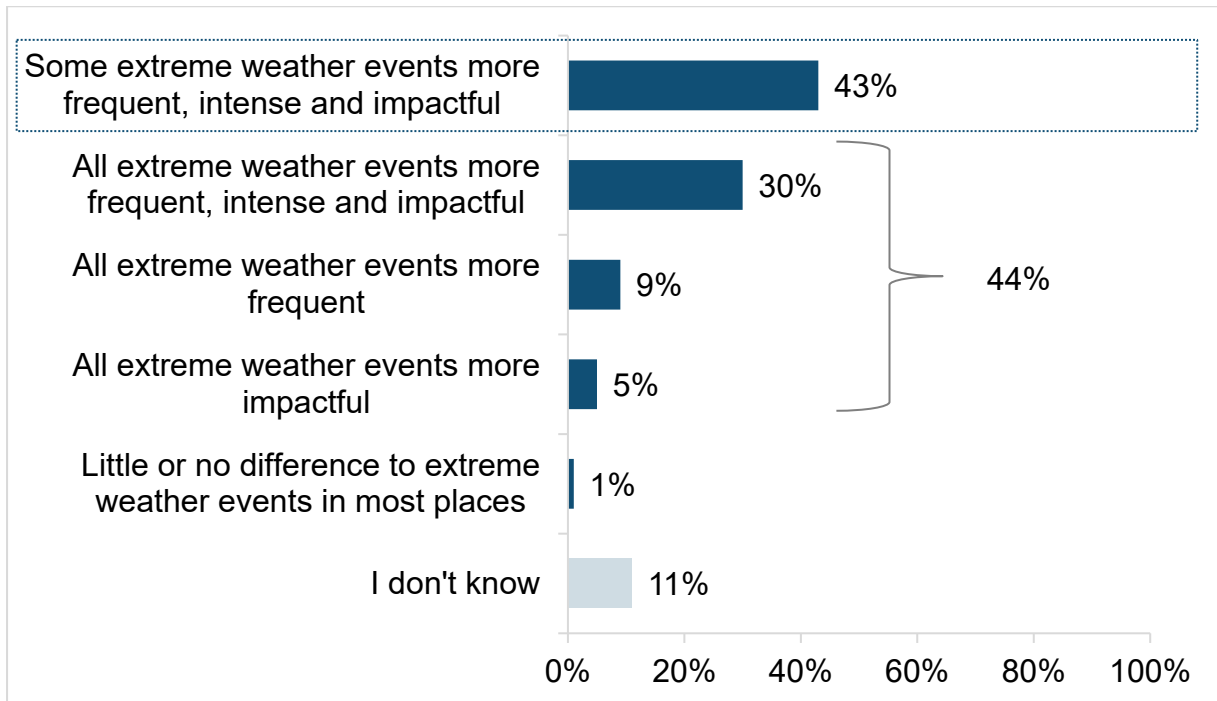
Source: DfE_CLIMATECHANGEWILL – Complete the following sentence: Climate change will make… Base: n=92*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Areas with the fastest climate change

Just over a quarter (28%) of school leavers correctly identified the Arctic (North Pole) as the area that has seen the fastest climate change. However, misconceptions remain, with over one in five (21%) school leavers sampled suggesting that all places would warm equally. A similar proportion (19%) indicated that they did not know the answer. This suggests a relatively low level of awareness about the geographical variations in climate change.

Figure 25   Areas with the fastest climate change
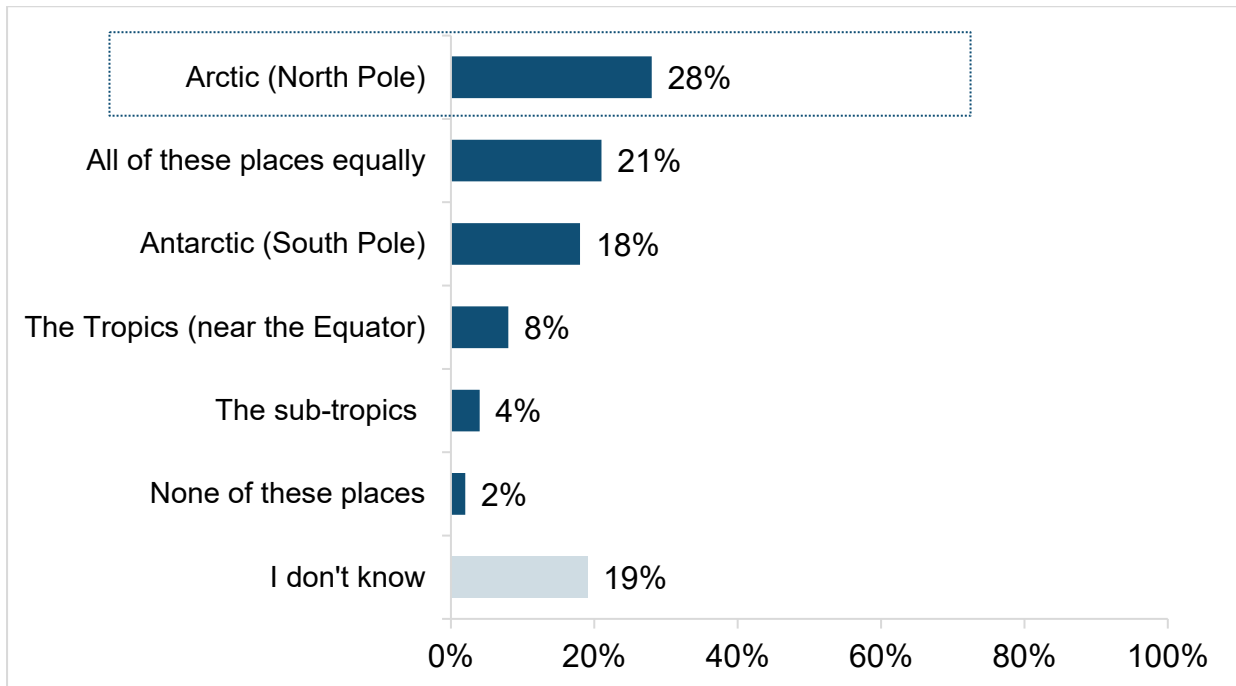
Source: DfE_FASTEST – Which of these areas has seen the fastest climate change? Base: n=91*.
*Caution: small base size of less than 100 school leavers.
The dotted box denotes the correct answer.

Summary

- School leavers present a variety of perspectives on the stability of the Earth's climate system, with most recognising its gradual nature (35% gradual, 24% threshold, 17% fragile).

- There is a strong awareness of common indicators of a warming climate such as melting glaciers (79%) and rising sea levels (74%), as well as the impact of climate change on extreme weather events.

- Awareness of geographical variations in future temperature changes and their impacts is weaker.

- While school leavers demonstrated awareness of the general vulnerability of countries to climate change, they often lack an understanding of how these vulnerabilities vary by region.

Chapter 5: Adaptation and mitigation

Adaptation and mitigation are the two main strategies for climate action. Climate change mitigation aims to reduce the severity of climate change by addressing the root cause which is the emission of greenhouse gases. This can involve transitioning to renewable energy sources and increasing carbon sequestration. On the other hand, climate change adaptation focuses on adjusting to the current and future effects of climate change, such as building sea walls to protect against rising sea levels and developing drought-resistant crops. Both mitigation and adaptation are crucial for addressing climate change. School leavers were asked about their understanding of these concepts and awareness of strategies to achieve them, as well as the potential impact of mitigation on the climate system.

Questions also explored school leavers' understanding of concepts such as the 1.5°C and 2°C targets, net zero and the potential contribution of various actions on reducing personal carbon footprints.

Adaptation

Adaptation to climate change

Around half of school leavers (51%) correctly identified 'Minimising the potential impacts of climate change', as the correct definition of adaptation to climate change. One in 10 school leavers (10%) indicated that they did not know the answer and a further 6% indicated that they did not know what adaptation is.

Figure 26   Meaning of adaptation to climate change
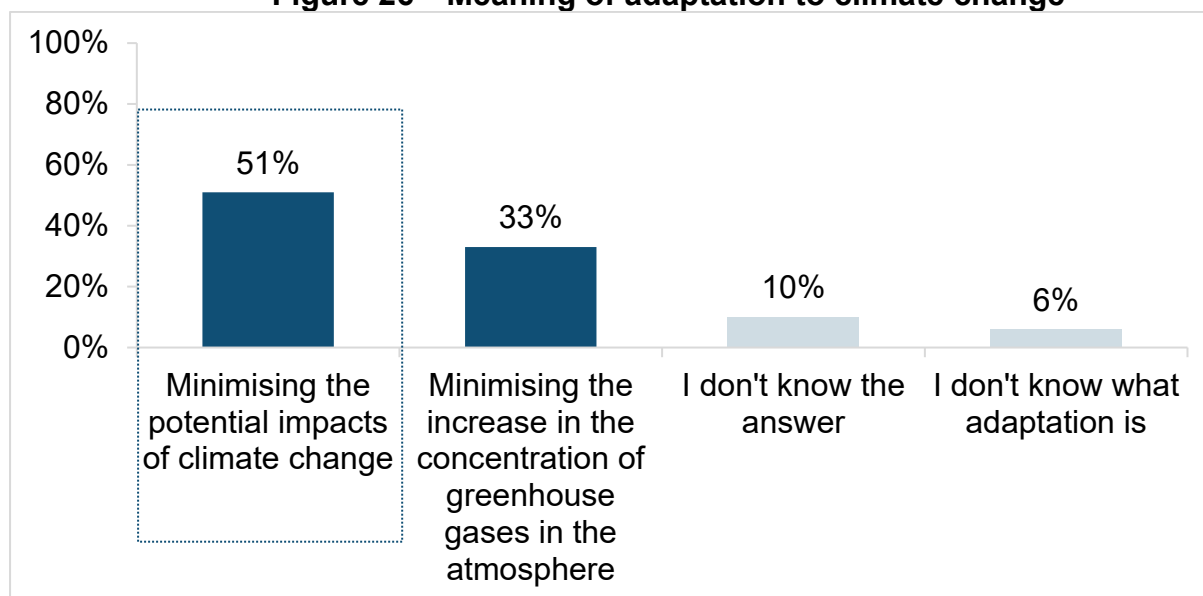
Source: DfE_ADAPTATION – What is meant by adaptation to climate change? Base: n=97*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

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The majority of school leavers correctly identified planting trees in towns and cities (60%) as an adaptation strategy. Around half (48%) identified building flood barriers and a quarter (25%) recognised installing window shades as adaptation strategies. Nature-based solutions such as peatland (28%) and saltmarsh development (22%) were recognised as adaptation strategies by around a quarter of school leavers.

Actions perceived as offering immediate, tangible benefits are likely to be categorised as adaptation, even if their primary impact lies in mitigating climate change. For example, installing solar panels, a typical mitigation strategy due to its direct role in reducing fossil fuel dependence, was incorrectly categorised as adaptation by a majority of school leavers (62%), as was switching to electric vehicles (53%).

Table 6. Adaptation strategies

Statements	Adaptation strategies
Installing solar panels	62%
Planting trees in towns and cities	60%
Introducing clean air zones in towns & cities	58%
Using less plastic	55%
Planting trees in the countryside	54%
Switching to electric vehicles	53%
Building flood barriers	48%
Restoring peatland	28%
Installing window shades	25%
Installing heat pumps	22%
Developing salt marshes	22%
I don't know the answer	12%
I don't know what adapting is	1%

Source: DfE_ADAPTING – Which of the following are strategies for adapting to climate change?
Base: n=92*. *Caution: small base size of less than 100 school leavers.
Darker shading indicates correct answers.

As in the previous question, over 10% of school leavers said they either did not know the answer or did not know what adaptation was, indicating a lack of awareness of this key component of climate action.

Mitigation

Mitigating climate change

Around one in three (34%) school leavers correctly identified 'minimising the increase in the concentration of greenhouse gasses in the atmosphere' as the correct definition of mitigation.

Just over a third (35%) of the sample indicated that they either did not know the answer (12%) or did not know what mitigation is (23%).

Figure 27   What is meant by climate change mitigation?

Source: DfE_CCMITIGATION – What is meant by climate change mitigation? Base: n=98*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Mitigation strategies

Solar panels were correctly identified as a mitigation strategy by only 38% of school leavers, while 43% correctly identified planting trees in the countryside as a mitigation strategy. In terms of other nature-based solutions, restoring peatlands was only identified as mitigation by 38% of school leavers. This suggests that future messaging within education and broader communication might benefit from placing greater emphasis on highlighting the vital role of peatlands and other natural carbon sinks in mitigating climate change.

Over two in five (44%) school leavers said they either did not know the answer or did not know what mitigation was, indicating a lack of awareness of this key component of climate action.
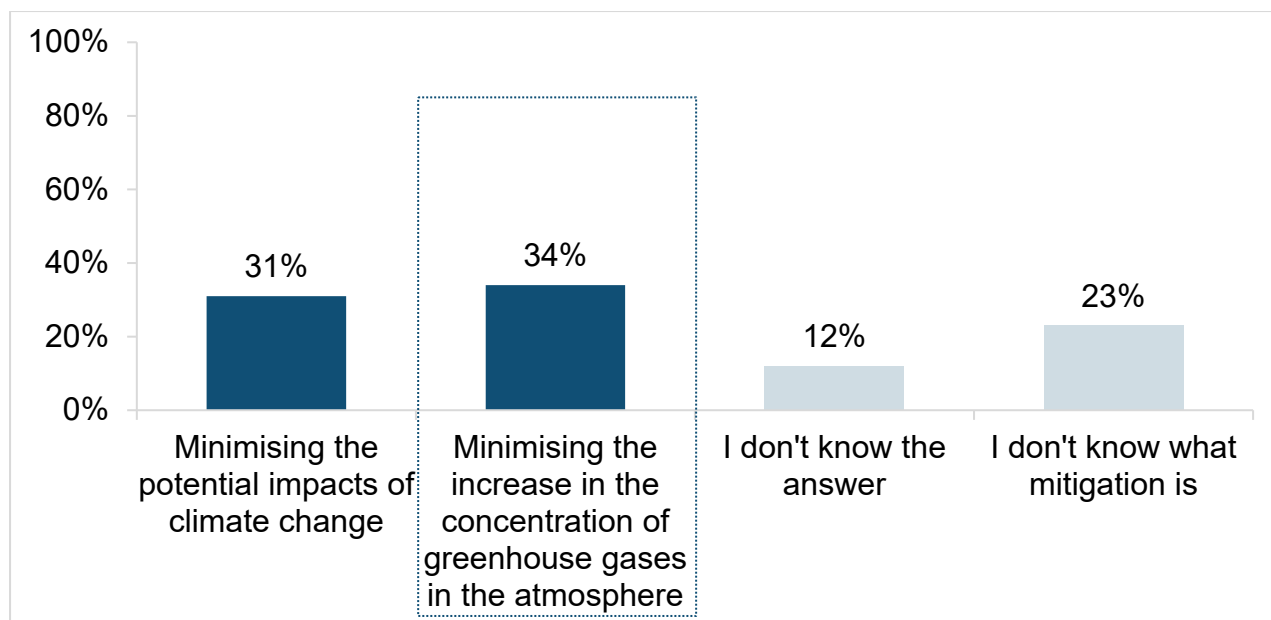
Table 7.   Mitigation strategies

Statements	Mitigation strategies
Installing solar panels	38%
Planting trees in towns and cities	43%
Introducing clean air zones in towns & cities	40%
Using less plastic	40%
Planting trees in the countryside	43%
Switching to electric vehicles	38%
Building flood barriers	44%
Restoring peatland	38%
Installing window shades	21%
Installing heat pumps	22%
Developing salt marshes	24%
I don't know the answer	12%
I don't know what mitigation is	32%

Source: DfE_MITIGATION – Which of the following are mitigation strategies? Multi Mention Base: n=94*. *Caution: small base size of less than 100 school leavers. Darker shading indicates correct answers.

For comparison, the answers given to the mitigation and adaptation questions are presented in Table 8. The comparison suggests a potential understanding gap, where the immediate, tangible benefits of certain actions (like reduced electricity bills with solar panels) might overshadow their long-term impact on mitigating climate change. This trend was also evident in responses regarding planting trees, switching to electric vehicles, and restoring peatlands, all of which were more frequently categorised as adaptation despite their substantial contributions to reducing greenhouse gas emissions.

In each survey question covering adaptation and mitigation, larger numbers of school leavers responded that they did not know what mitigation is than indicated that they did not know what adaptation is. The findings also show a tendency for school leavers to think that mitigation strategies are the same than adaptation strategies as per Table 8.

Table 8. Adaptation and mitigation strategies

Statements	Adaptation strategies	Mitigation strategies
Installing solar panels	62%	38%
Planting trees in towns and cities	60%	43%
Introducing clean air zones in towns & cities	58%	40%
Using less plastic	55%	40%
Planting trees in the countryside	54%	43%
Switching to electric vehicles	53%	38%
Building flood barriers	48%	44%
Restoring peatland	28%	38%
Installing window shades	25%	21%
Installing heat pumps	22%	22%
Developing salt marshes	22%	24%
I don't know the answer	12%	12%
I don't know what adapting / mitigation is	1%	32%

Source: DfE_ADAPTING – Which of the following are strategies for adapting to climate change?
Base: n=92*. *Caution: small base size of less than 100 school leavers.
Source: DfE_MITIGATION – Which of the following are mitigation strategies? Multi Mention Base:
n=94*. *Caution: small base size of less than 100 school leavers.
Darker shading indicates correct answers.

Reducing greenhouse gas emissions

School leavers were asked a series of questions pertaining to reducing greenhouse gas emissions in order to gauge their awareness of the impact of various mitigation strategies relevant to individuals.

In the first question, over half of school leavers (57%) incorrectly identified recycling as the measure that reduces greenhouse gas emissions the most from the two options presented. Eating a vegan/plant-based diet was selected by only 15% of school leavers, despite this being approximately four times more impactful than recycling.

Over a quarter noted that they either felt the impact was the same for both options (18%) or that they did not know (10%).

Figure 28   Reducing greenhouse gas emissions – question 1
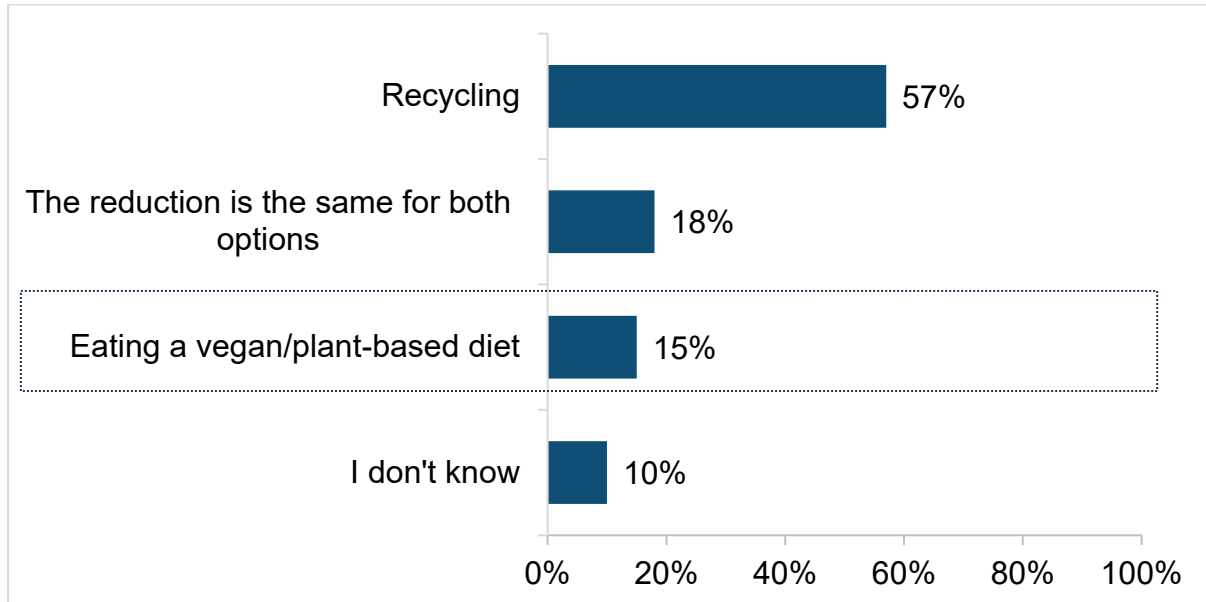
In the second question, around seven in 10 (71%) suggested that living without a car was more impactful than living without a pet dog (5%), whereas the correct answer is 'living without a pet dog'. The environmental impact of pets is commonly largely underestimated[3].

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[3] https://www.zerosmart.co.uk/post/the-average-carbon-footprint-of-a-pet

Figure 29   Reducing greenhouse gas emissions – question 2

Living without using a car — 71%
The reduction is the same for both options — 13%
Living without a pet dog — 5%
I don't know — 10%

Source: DfE_REDUCEEMISSIONS – Which of the following reduces greenhouse gas emissions more? Second rotation Base: n=96*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

In the third question, over two in five school leavers (42%) thought that using low energy light bulbs reduces greenhouse gas emissions more than eating a plant-based diet whereas, in reality, eating a plant-based diet is about eight times more effective than using low energy light bulbs.

Figure 30   Reducing greenhouse gas emissions – question 3

Using low energy bulbs — 42%
The reduction is the same for both options — 25%
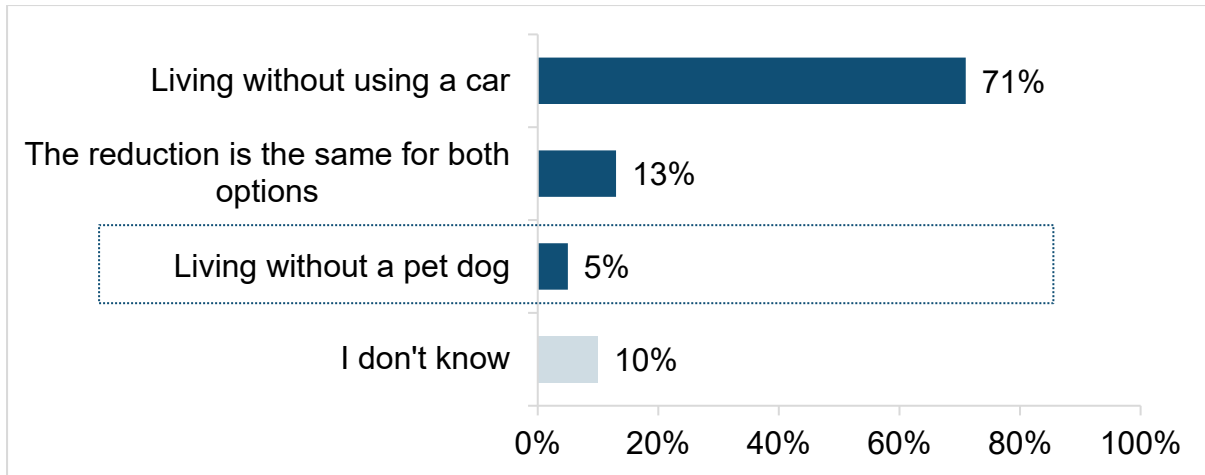Eating a vegan/plant based diet — 16%
I don't know — 16%

Source: DfE_REDUCESEMISSIONS – Which of the following reduces greenhouse gas emissions more? Third rotation Base: n=93*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

When asked whether buying green (renewable) energy or recycling reduces greenhouse gas emissions more, 32% of school leavers correctly responded that 'Buying green (renewable) energy' is more effective in reducing emissions, while 8% thought 'Recycling' is more effective. Around four in 10 school leavers (42%) thought that both actions have the same impact, and the remaining 18% admitted to not knowing the answer. This suggests that while a substantial proportion of school leavers recognised the importance of renewable energy in reducing emissions, there is still a substantial number who either overestimated the impact of recycling or were uncertain about the comparative effectiveness of these actions.
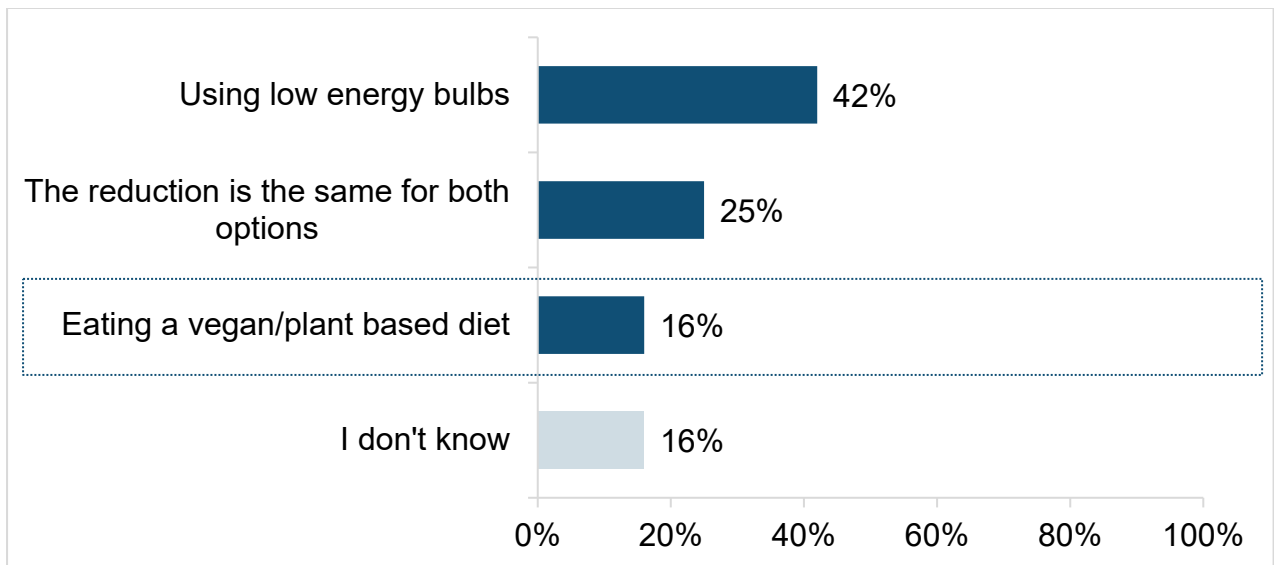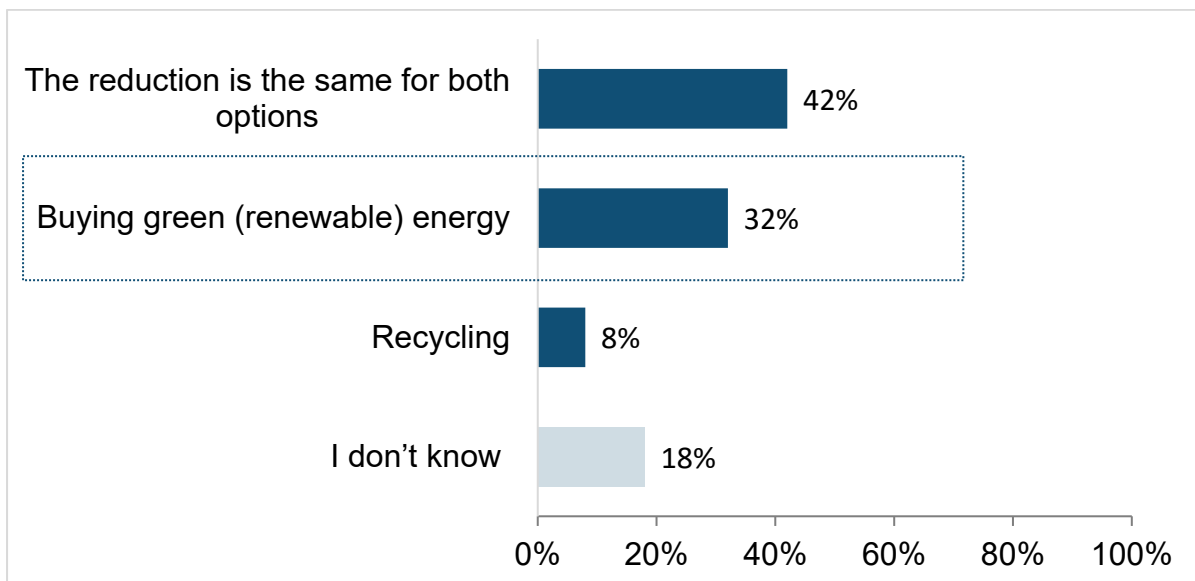
Figure 31   Reducing greenhouse gas emissions – question 4

Source: DfE_EMISSIONS – Which of the following reduces greenhouse gas emissions more? Base: n=98*. *Caution: small base size of less than 100 school leavers.

The dotted box denotes the correct answer.

The survey also examined school leavers' understanding of whether buying green (renewable) energy or living without using a car reduces greenhouse gas emissions more effectively. Around a third (32%) of school leavers thought that the reduction is the same for both options. Over a quarter of school leavers indicated that 'Buying green (renewable) energy' is more effective in reducing emissions (29%), closely followed by the correct response 'Living without using a car' at 26%. The remaining 13% admitted to not knowing the answer. Living without a car has, in fact, about twice the impact of buying green energy. However, this difference in impact is smaller than the difference between the choices presented in the previous questions outlined above.

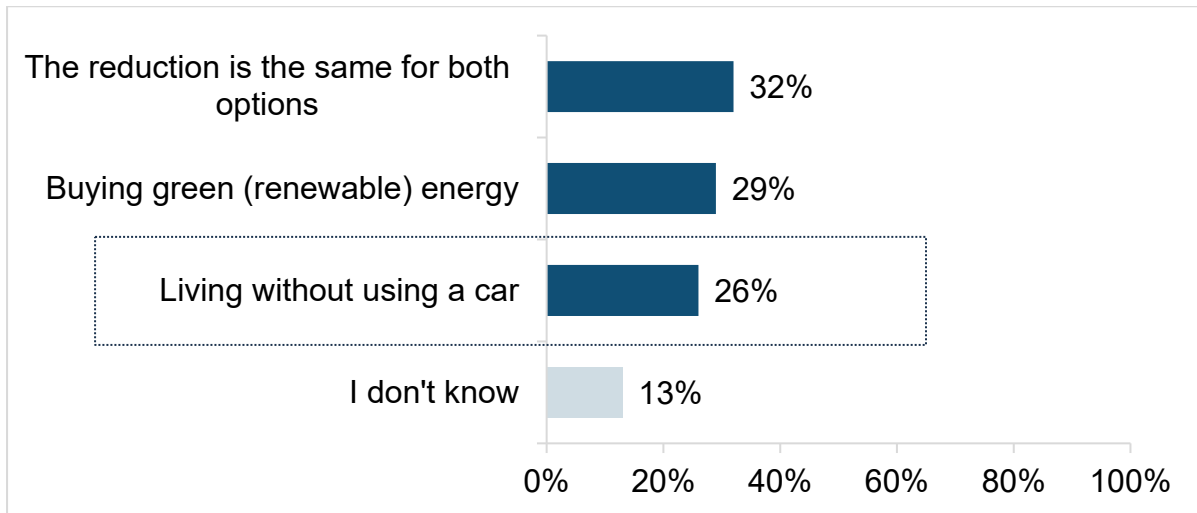**Figure 32   Reducing greenhouse gas emissions – question 5**

Source: DfE_REDUCES – Which of the following reduces greenhouse gas emissions more? Base: n=97*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

The meaning of 'net zero' emissions

Net zero emissions refer to achieving a balance between the amount of greenhouse gases produced and the amount removed from the atmosphere. When presented with a range of possible definitions, only one in five (20%) school leavers surveyed were able to identify the correct meaning of this term which is widely used in the media and across a diverse range of organisations and employers whilst, notably, twice as many school leavers indicated that they did not know (40%).

Figure 33   The meaning of net zero
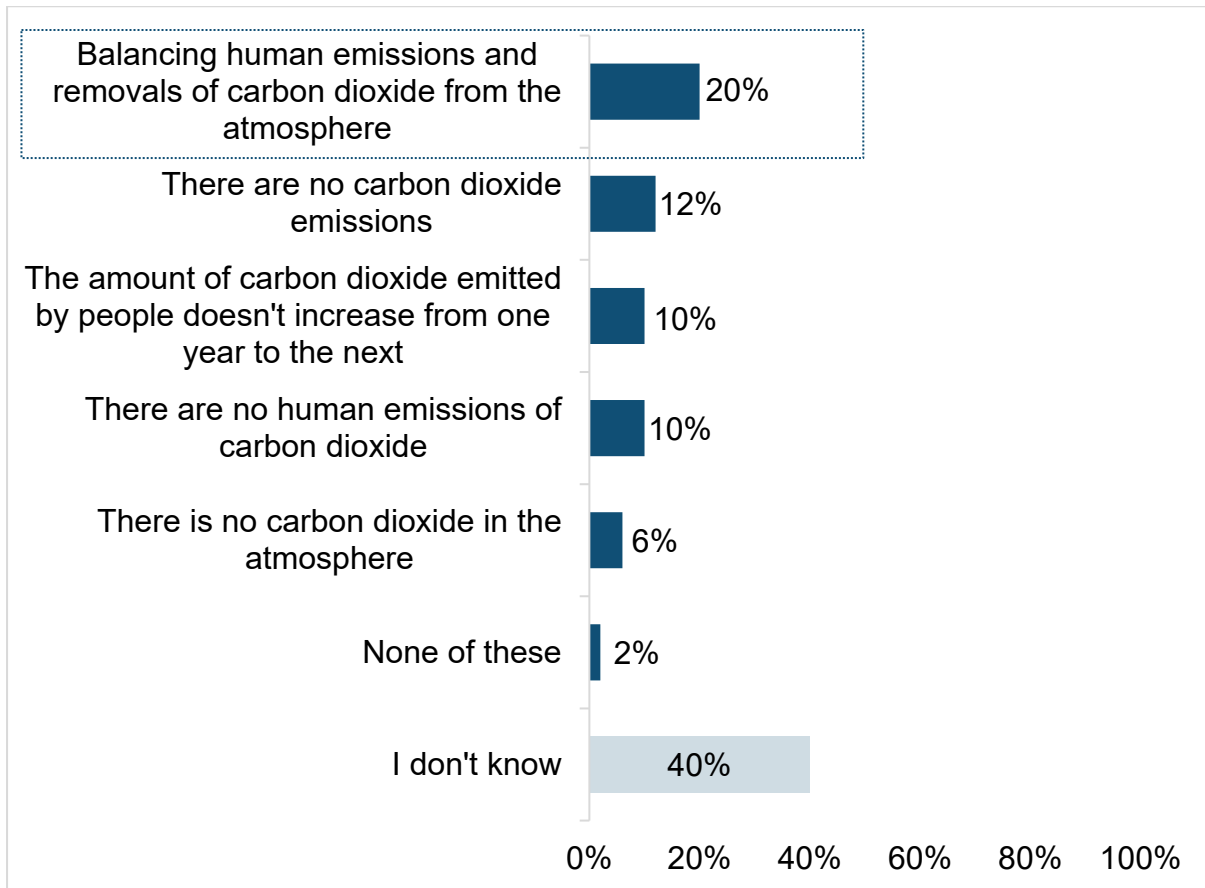
Understanding the meaning of the 2°C international policy goal target

School leavers were also asked to identify the correct meaning of the two degree Celsius target. Fewer than one in five (17%) correctly identified it as referring to a global average temperature increase above pre-industrial levels. Half of the sample (50%) selected an incorrect answer, whilst nearly a third (31%) stated that they did not know the answer.

Figure 34   Meaning of the 2°C target

On average the world warms by 2°C above pre-industrial (around 1850) temperatures — 17%
On average the world warms by 2°C above today's temperature — 4%
Nowhere warms by more than 2°C above pre-industrial (around 1850) temperatures — 19%
Nowhere warms by more than 2°C above today's temperature — 18%
Everywhere warms by 2°C above the preindustrial (around 1850) temperature — 7%
Everywhere warms by 2°C above today's temperature — 2%
I don't know — 31%
None of these — 1%

Source: DfE_TARGET - 2°C target means? Base: n=97*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Zero-carbon footprint activities

When asked which actions would have a zero carbon footprint, around one in 20 (6%) responded that they did not know what a carbon footprint was.

Arguably, there is no correct answer to this question and 4% said 'none of these' which is an insightful answer, as it could be argued that none do. The apple picked from a tree, which 41% selected, will only have emissions associated with the care of the tree. Walking to school has a very small footprint and this option was selected by over half (55%) the school leavers surveyed. Almost a quarter thought that electric cars have a zero-carbon footprint (24%). Around one in seven (14%) school leavers indicated that 'A cotton shopping bag' and 'A bottle made out of recycled glass' have a zero-carbon footprint, suggesting uncertainty between recycling and greenhouse gas emissions. Just under one in five (17%) admitted to not knowing the answer.

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Figure 35   Zero-carbon footprint activities
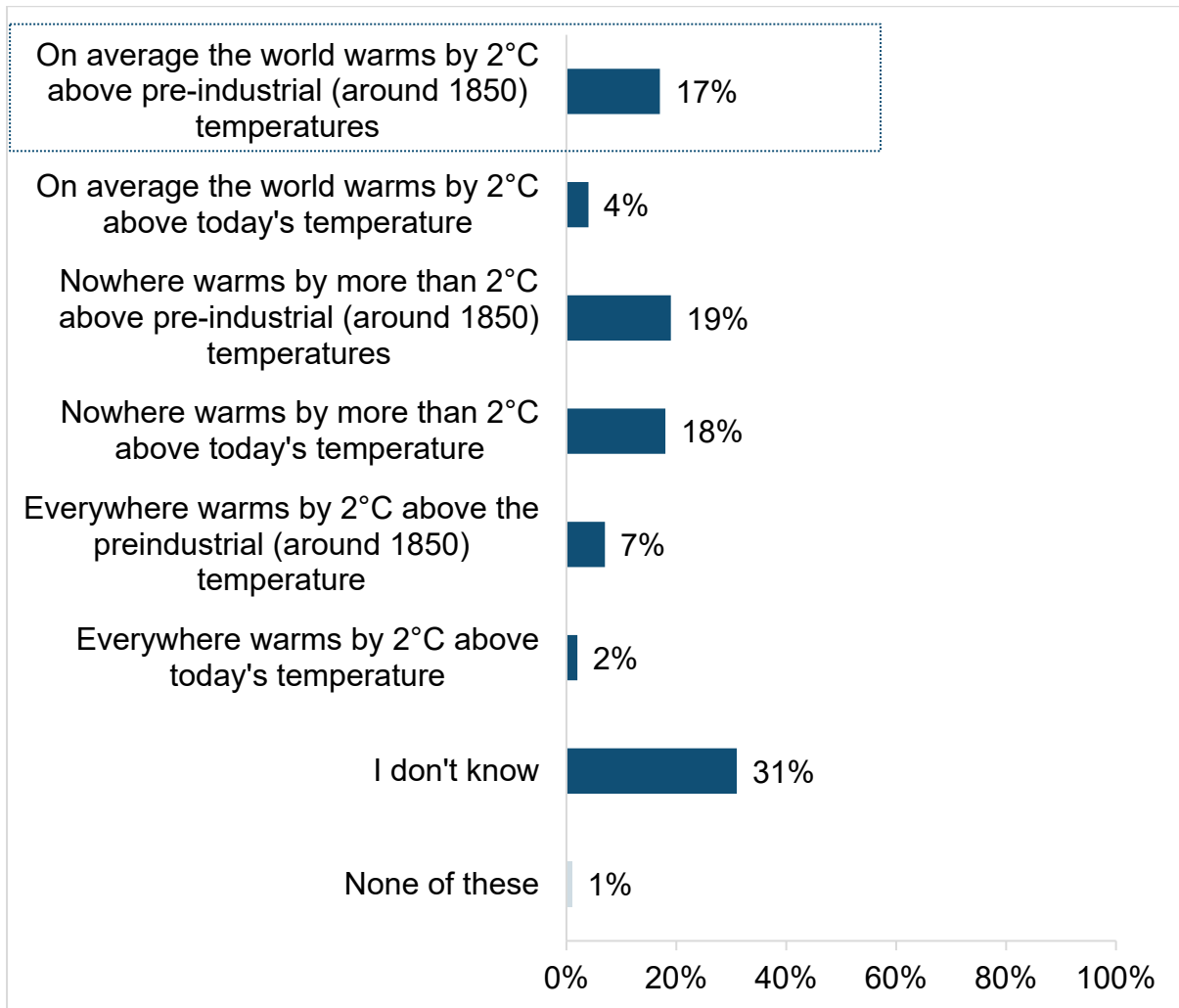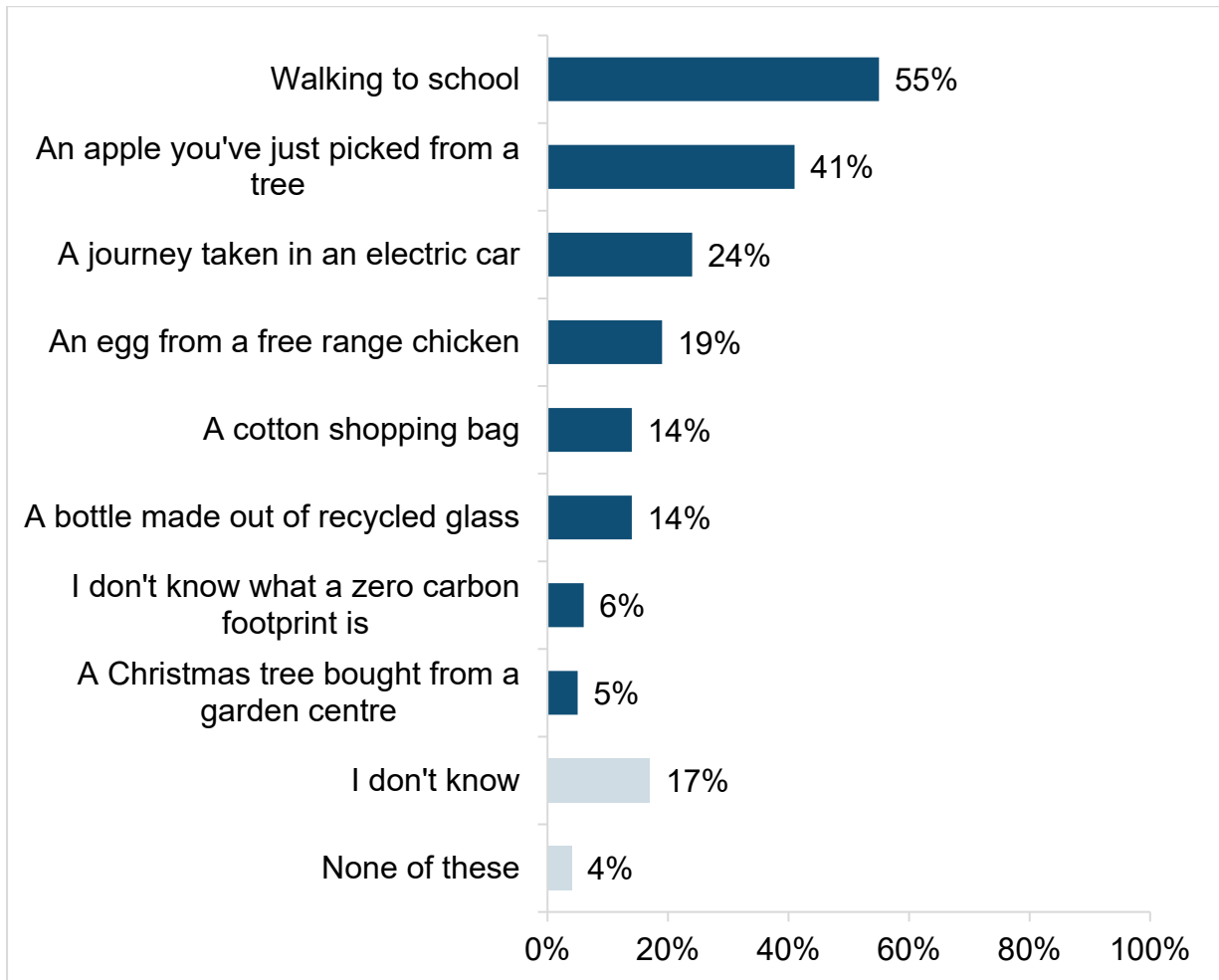

Source: DfE_ZEROCARBON – Which of the following has a zero-carbon footprint? Base: n=98*.
*Caution: small base size of less than 100 school leavers.

Carbon capture and storage

Half of school leavers (50%) correctly identified carbon capture and storage as the 'process of trapping emitted carbon dioxide (CO_2) and storing it securely', 21% recognised it as 'a way of mitigating climate change' and only 10% were aware that it is 'part of the UK's net zero strategy'. Almost a third (30%) responded that they did not know the correct answers, while others mistook it with greenhouse gas removal from the atmosphere (16%), methane capture from agriculture (15%) or climate change adaptation (10%).

Figure 36   Carbon capture and storage

| Category	Percentage
The process of trapping carbon dioxide as it is emitted and storing it in a deep and secure location	50%
A way of mitigating climate change	21%
Large scale removal of carbon dioxide from the atmosphere	16%
A way of capturing the methane emitted by agriculture and storing it in a deep and secure location	15%
Part of the UKs net zero stratergy	10%
A way of adapting to climate change	10%
I don't know	30%

Source: DfE_CARBONCAPTURE - What is carbon capture and storage? Multiple Answer Option
Base: n=92*. *Caution: small base size of less than 100 school leavers.
The dotted boxes denote the correct answers.

Sources of Carbon Dioxide (CO$_2$)

This question explores school leavers' understanding of the carbon cycle, specifically what happens when a tree grows, falls, and is burned locally. The data indicates that 26% of school leavers correctly identified that there would be 'approximately the same amount of greenhouse gas in the atmosphere than before the tree grew.' The majority of school leavers (58%) thought there would be 'more greenhouse gas in the atmosphere than before the tree grew' indicating either a limited understanding of the carbon cycle or that there was uncertainty about other sustainability issues such as air quality, or that they were factoring in additional considerations such as transport of the felled tree. A small number of school leavers (3%) mistakenly thought that there would be 'less greenhouse gas in the atmosphere than before the tree grew,' and 13% admitted to not knowing the answer.

Figure 37   If a tree grows, falls down and is then burned locally there will be…

More greenhouse gas in the atmosphere than before the tree grew — 58%

Approximately the same amount of greenhouse gas in the atmosphere than before the tree grew — 26%

Less greenhouse gas in the atmosphere than before the tree grew — 3%

I don't know — 13%
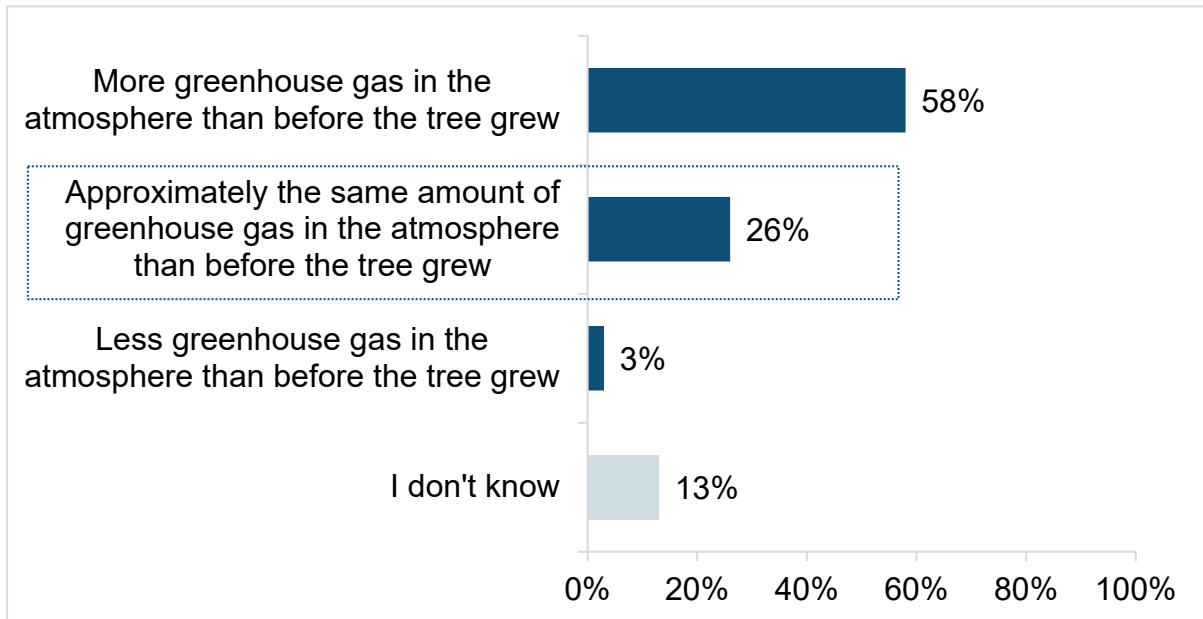
Source: DfE_TREE – When a tree grows, it removes carbon dioxide from the atmosphere. If a tree grows, falls down and is then burned locally there will be… Base: n=97*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Industries Mitigating Climate Change

School leavers were asked about industries that could help mitigate climate change. All of the 11 industries listed as possible options within the question could help mitigate climate change. However, only very small numbers of survey respondents selected all 11 industries (3%), whilst 18% selected six or more. Over half of school leavers (54%) identified agriculture as an industry that could help mitigate climate change. Transport (42%) and car manufacture (40%) were also identified as major contributors. This suggests a good level of awareness about traditional industries but some misunderstanding about the role of other sectors. Around one in five (19%) indicated that they did not know what mitigation is.

Figure 38   Industries that could help mitigate climate change
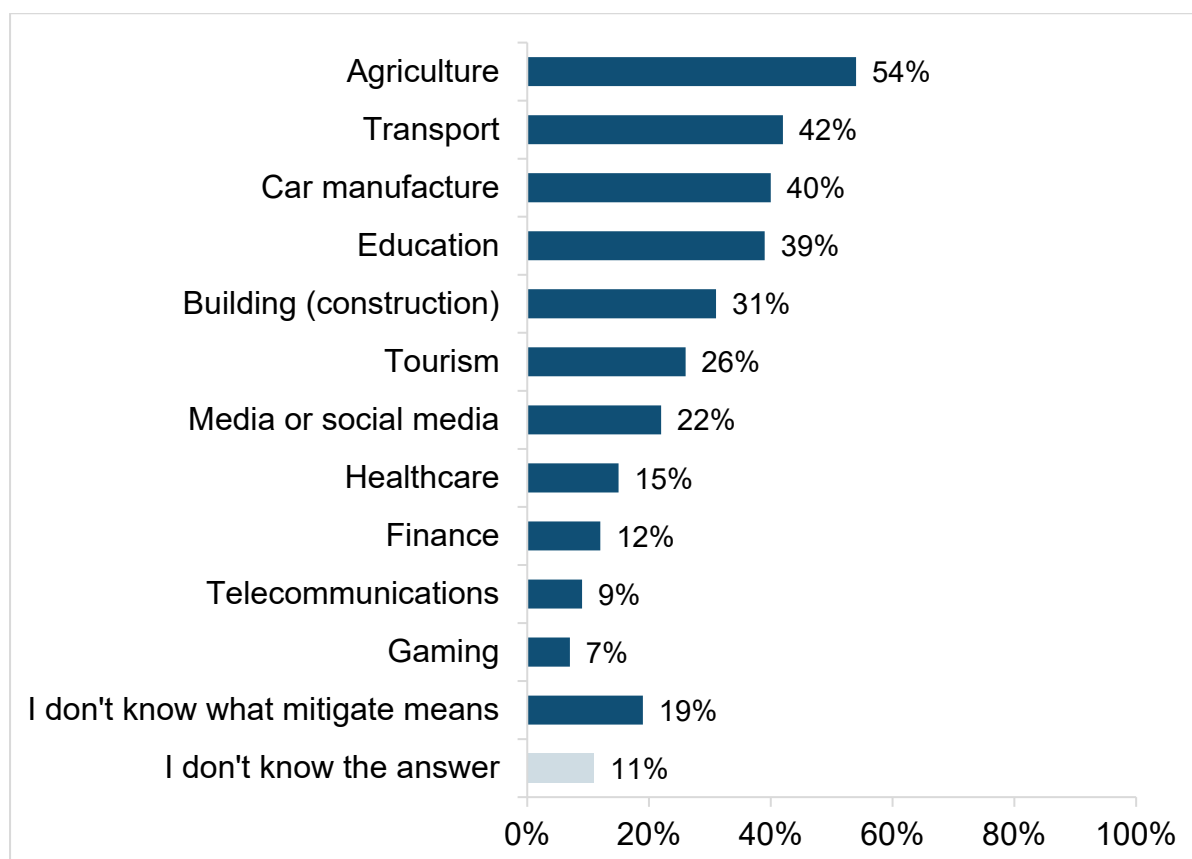
Source: DfE_INDUSTRIES – Which of the following industries could help mitigate climate change?
Base: n=86*. *Caution: small base size of less than 100 school leavers.

Summary

- The majority of school leavers (51%) correctly identified 'Minimising the potential impacts of climate change', as the correct definition of adaptation to climate change, but only 34% of school leavers correctly identified the correct definition of mitigation.

- Larger numbers consistently respond that they don't know what mitigation is than indicate that they don't know what adaptation is.

- The majority of school leavers correctly identified planting trees in towns and cities (60%) as an adaptation strategy. However, fewer (48%) identified building flood barriers and only a quarter (25%) recognised installing window shades as adaptation strategies.

- School leavers demonstrate a better understanding of common adaptation strategies than mitigation strategies. The data reveals a tendency for school leavers to think that mitigation strategies are adaptation strategies, as well as a low general awareness or understanding of mitigation strategies.

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- Almost a quarter of school leavers indicated that they thought that global temperatures would keep rising if anthropogenic emissions of greenhouse gases were halted, implying low awareness that global warming can still be mitigated.

- Only one in five (20%) of school leavers were able to identify the correct meaning of 'net zero' which is a term widely used in the media and across a diverse range of organisations and employers, whilst twice as many school leavers indicated that they did not know (40%). Nearly a third (31%) stated that they did not know what the 2 degree Celsius climate change was and fewer than one in five (17%) correctly identified it as referring to a global average temperature increase above pre-industrial levels.

- Whilst only 6% of school leavers said that they did not know what a zero carbon footprint was, there was a general underestimation of the impact of diet or keeping pets and an overestimation of the impact of recycling on greenhouse gas emissions.

- Half of school leavers (50%) correctly identified carbon capture and storage as the 'process of trapping emitted carbon dioxide (CO_2) and storing it securely', 21% recognised it as 'a way of mitigating climate change' and only 10% were aware that it is part of the UK's net zero strategy.

- Whilst over half of school leavers recognised that agriculture could reduce greenhouse gas emissions, most school leavers did not recognise that a broad range of other industries could do so.

Chapter 6: Climate change in the UK

This chapter explores school leavers' understanding of climate change impacts and actions in the UK. It examines their awareness of projected climate changes, their knowledge of energy sources and their perceptions of national mitigation and adaptation strategies. By examining these areas, the study aims to highlight both the strengths and gaps in school leavers' understanding of the local relevance of climate change issues.

Projected climate change in UK winter

A third of school leavers (34%) correctly identified that the UK climate will become warmer and wetter during winters as the global climate warms. However, almost a quarter of school leavers incorrectly responded that it would become cooler and wetter (29%) and another quarter of school leavers indicated that the UK would get warmer and drier (24%), while 12% admitted they did not know. These responses indicate a lot of uncertainty amongst school leavers.

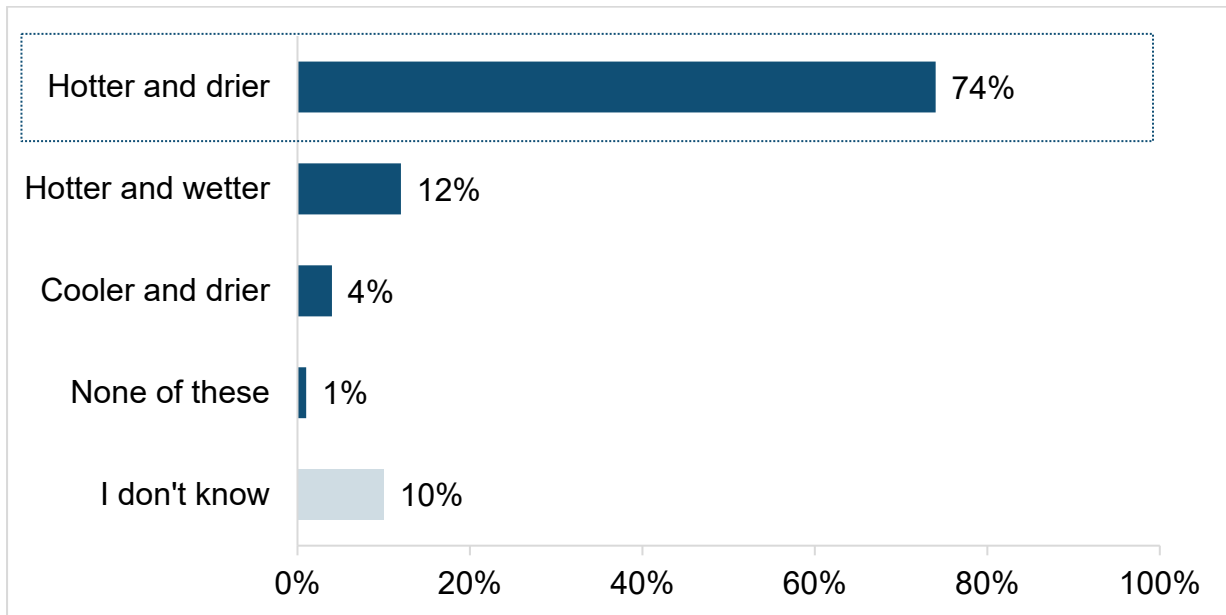**Figure 39   Projected winter climate change in the UK**
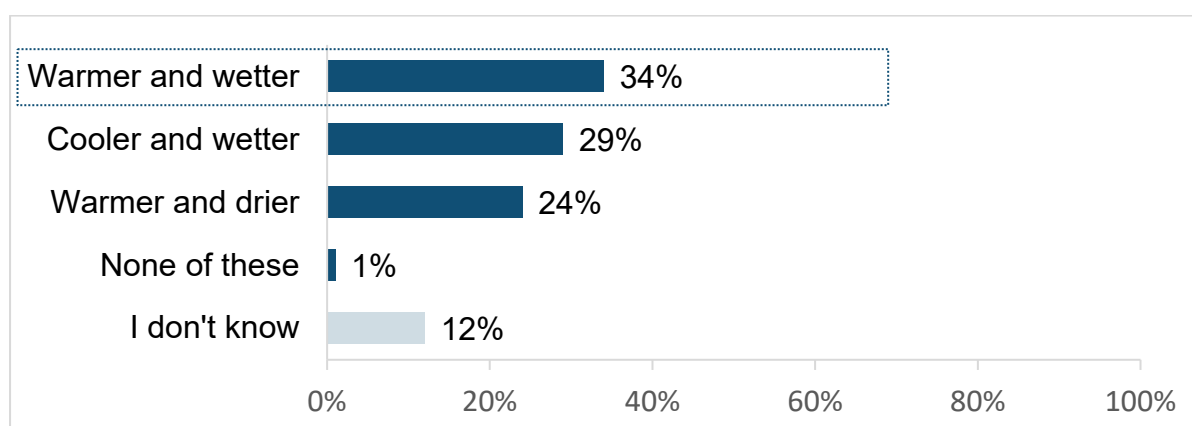
Source: DfE_UKWINTER – As the global climate warms, how will the climate of the UK change during the winter? Base: n=98*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Projected climate change in UK summer

Around three quarters (74%) of school leavers correctly identified that the UK climate will become hotter and drier during summers as global climate warms. One in eight (12%) incorrectly selected that it would become hotter and wetter, while one in 10 school leavers indicating that they did not know (10%).

**Figure 40 Projected summer climate change in the UK**

Source: DfE_UKSUMMER – As the global climate warms, how will the climate of the UK change during the summer? Base: n=98*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Contributors to rising sea levels

The majority (64%) of school leavers correctly identified 'melting glaciers and ice sheets' as contributors to relative sea level rise around the UK, however, far fewer correctly identified 'Expansion of sea water as it warms' (35%). Three in 10 school leavers selected 'coastal erosion' (30%), which is minor compared to 'sinking land' (selected by 19%).

Considerable misconceptions were identified here as sizeable proportions of school leavers incorrectly identified both 'melting sea ice' (61%) and 'higher annual rainfall' (42%) as contributors. A small number of school leavers (4%) did not think that sea levels were rising in the UK.

Figure 41   Contributors of relative sea level rise around the UK
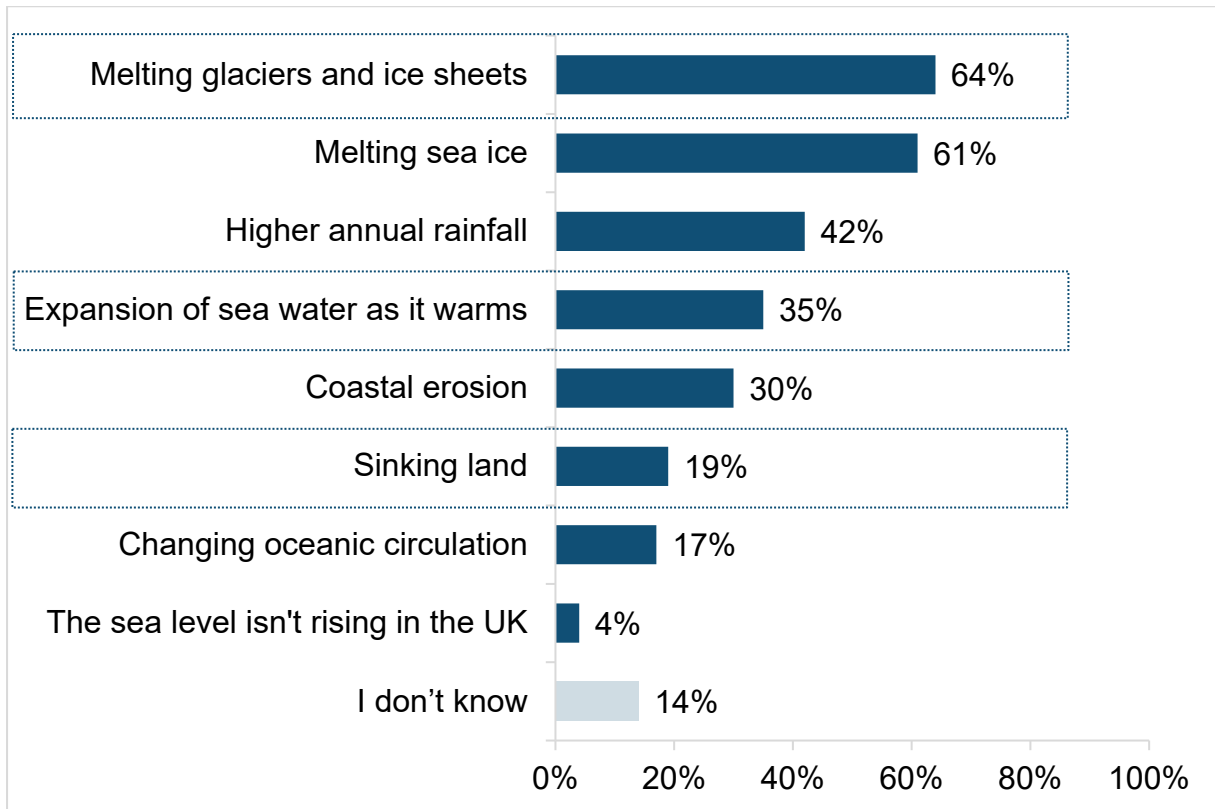
Source: DfE_SEALEVEL – Which of the following contribute to relative sea level rise around the UK? Base: n=93*. *Caution: small base size of less than 100 school leavers. The dotted boxes denote the correct answers.

Climate change risks in the UK

School leavers were asked to identify the level of climate change risk to various phenomena in the UK. The majority of school leavers correctly identified 'sea level rising' (75%), 'coastal flooding' (65%), and 'extreme summer heat' (63%) as high risks. However, the link between climate change and increased river flooding was less well recognised, with just under half (47%) identifying it as a high risk. A similar proportion of school leavers (49%) correctly identified vector-borne diseases as low risk. Additionally, there is a misunderstanding regarding hurricanes (identified by 23% as a high risk), which cannot affect the UK, and tsunamis (19%), which are not linked to climate change. Within Table 9, the correct level of risk is highlighted in grey.

The proportion of school leavers who stated that they did not know the answer varied between 9% and 24%.

Table 9. The level of risk in the UK

| High level of risk	High risk	Low risk	No risk	I don't know
Sea level rise	75%	14%	2%	9%
Coastal flooding	65%	21%	2%	12%
Extreme summer heat	63%	21%	4%	11%
River flooding	47%	38%	2%	13%
Vector-borne diseases	13%	49%	15%	24%
Tsunamis	19%	42%	21%	19%
Hurricanes	23%	41%	17%	19%
Wildfires	50%	30%	9%	11%

Source: DfE_RISK – In the UK, what level of risk will climate change cause to the following? Base: n=95*. *Caution: small base size of less than 100 school leavers. Shading indicates correct answers.

Perceptions of the cost of climate action

School leavers were asked to compare the costs of different approaches to climate change in the UK. A third of school leavers (33%) correctly recognised that it will cost more for the UK to adapt to climate change impacts than it will to implement globally agreed policies to limit climate change. In reality it is likely to work out less expensive to act now to limit the amount of climate change experienced. A greater proportion (45%) incorrectly thought that it will cost more for the UK to implement globally agreed policies to limit climate change. 13% responded that they did not know.
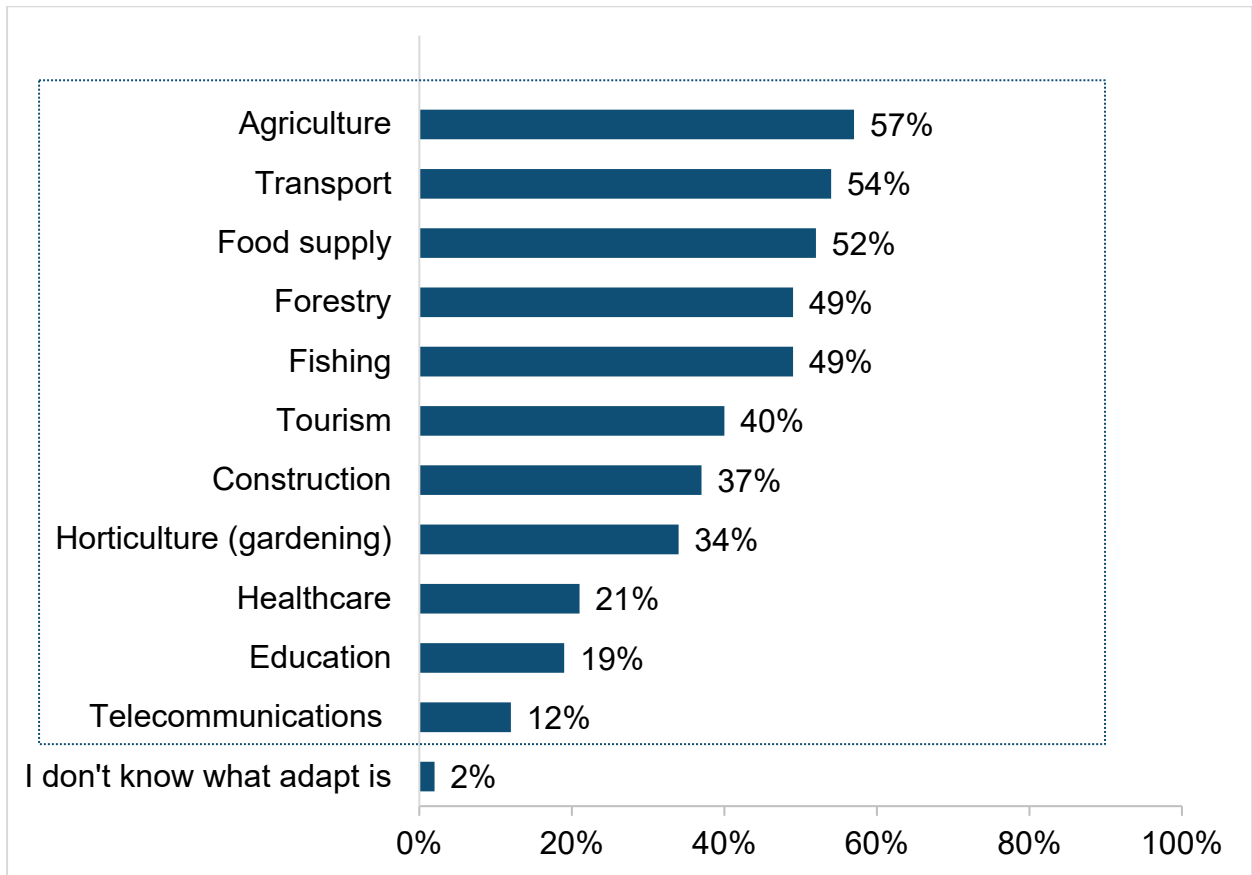
Figure 42 Climate action costs in the UK
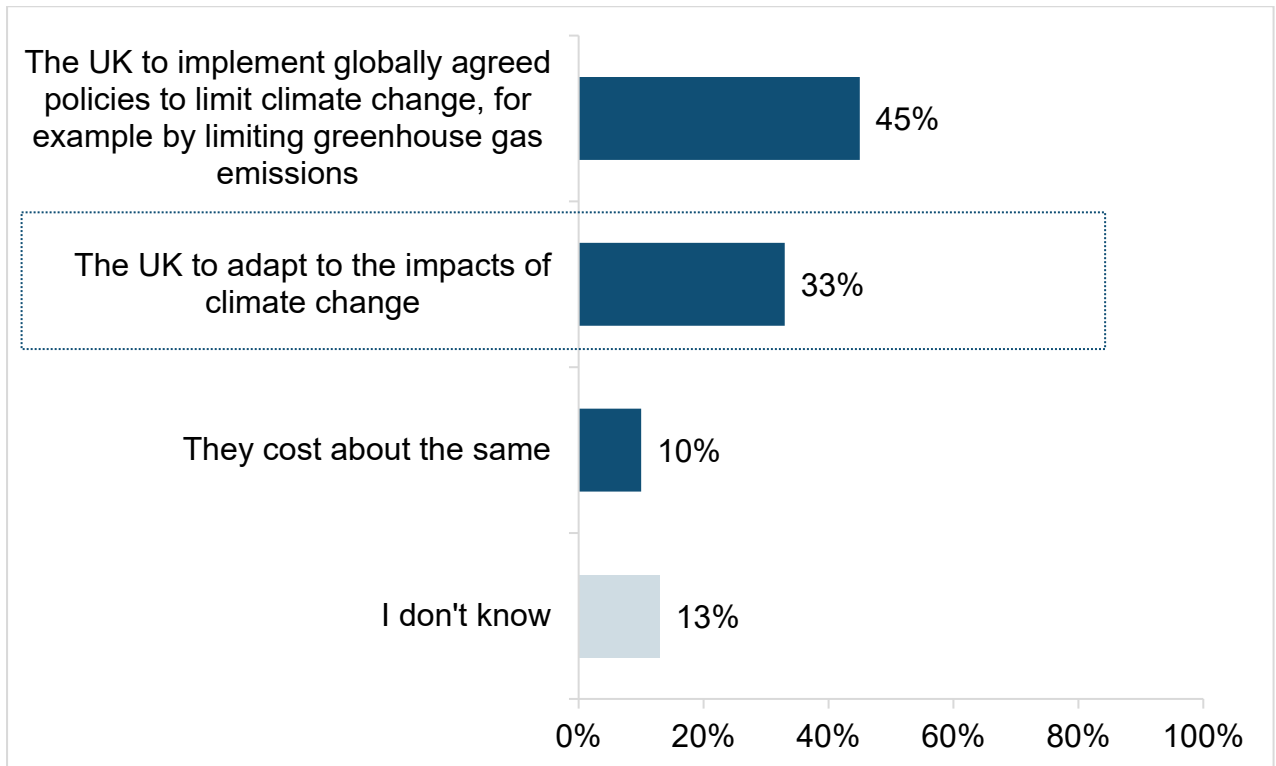
Source: DfE_COST – Will it cost more for… Base: n=92*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

UK based industries that need to adapt to the changing climate

In general, there was a low awareness of the projected impact of climate change in the UK. Around one in 10 (9%) school leavers correctly indicated that all of the industries listed within the response options will have to adapt due to the impact that climate change is having on their business.

Agriculture (57%), transport (54%) and food supply (52%) were selected by the majority of school leavers. Telecommunication (12%) and education (19%) were the least selected industries. Around one in six (16%) indicated that they did not know the answer.

Figure 43   UK industries adapting to climate change

Industry	Percentage
Agriculture	57%
Transport	54%
Food supply	52%
Forestry	49%
Fishing	49%
Tourism	40%
Construction	37%
Horticulture (gardening)	34%
Healthcare	21%
Education	19%
Telecommunications	12%
I don't know what adapt is	2%

Source: DfE_INDUSTRIESADAPT – Which of the following industries in the UK need to adapt because of the impact that climate change is having on their business/ operations? Base: n=98*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answers.

The UK's energy mix

School leavers were asked about the extent to which the UK uses different energy sources giving responses ranging from none to a lot.

The majority of school leavers indicated a high awareness of solar as a source of electricity for the UK (76% of school leavers citing it as being used a lot or a little as a source of electricity). Awareness was lower for other renewables such as hydroelectric (60%), offshore wind (58%), biomass (55%), onshore wind (50%), and nuclear fission (49%).

Nuclear fusion, which is not yet a viable source of energy, was identified as a current source by around a third of the sample (36%). In addition, 40% incorrectly identified that the UK uses geothermal energy as a source of electricity.

In some cases almost one in 10 school leavers indicated that they did not know the answer for the various sources, or what was meant by the source. For example, 15% indicated that they did not know what on shore wind energy is, 12% indicated that they did not know what offshore wind energy is, and 11% admitted that they did not know what nuclear fusion is.

**Figure 44   The UK's sources of electricity**
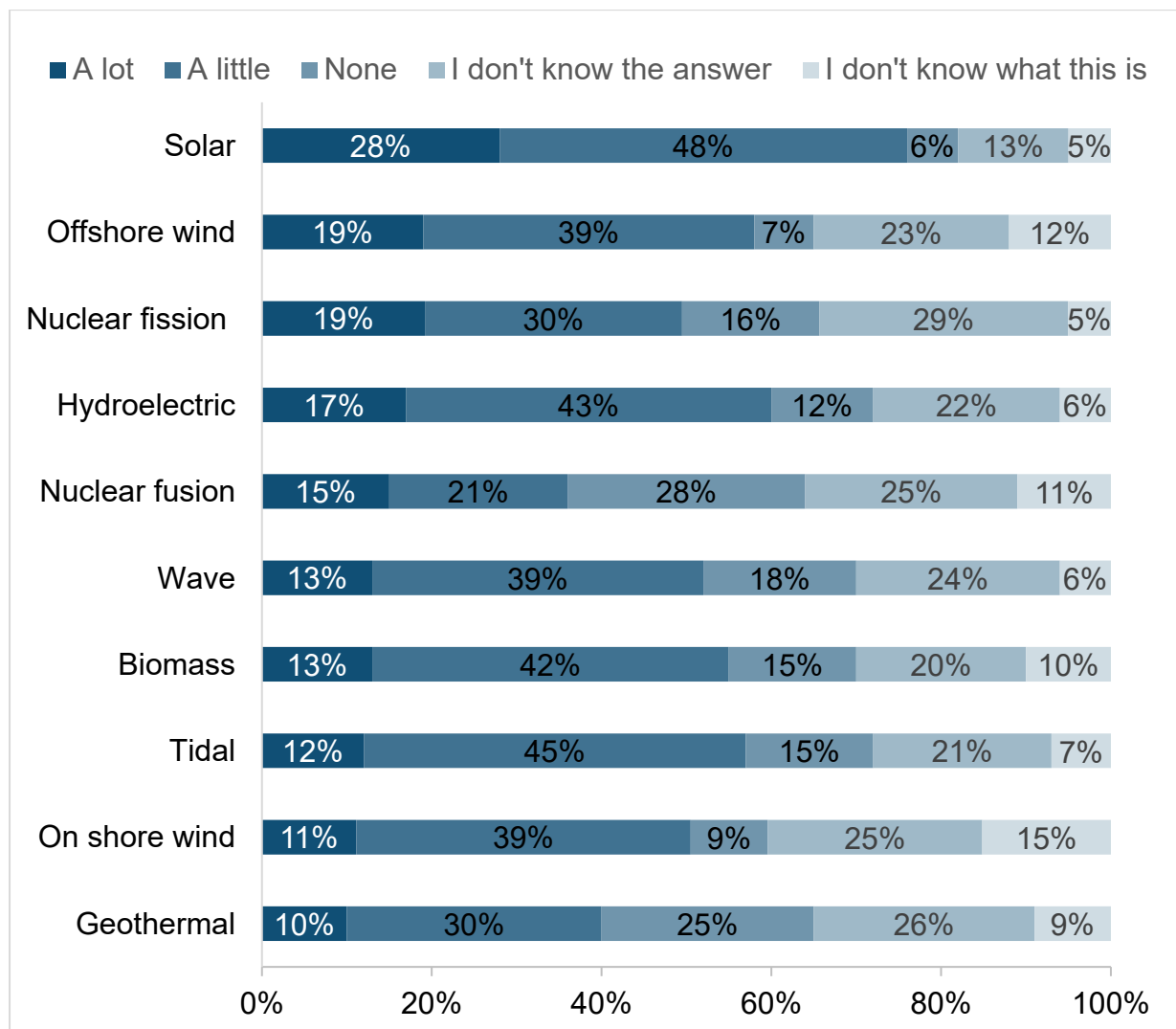
Source: DfE_ELECTRICITYSOURCES – Which of the following sources of electricity does the UK currently use? Base: n=99*. *Caution: small base size of less than 100 school leavers.

Perceptions of UK fossil fuel reliance

The majority of school leavers (74%) overestimated the UK's reliance on fossil fuels for the generation of electricity, with 40% responding that fossil fuels generated 60% of electricity used in the UK and 13% responding that 90% of electricity were generated by fossil fuels. The answer that is closest to the actual proportion, 30%[4], was selected by only 4% of school leavers.

Figure 45   Perceptions of UK's fossil fuel reliance
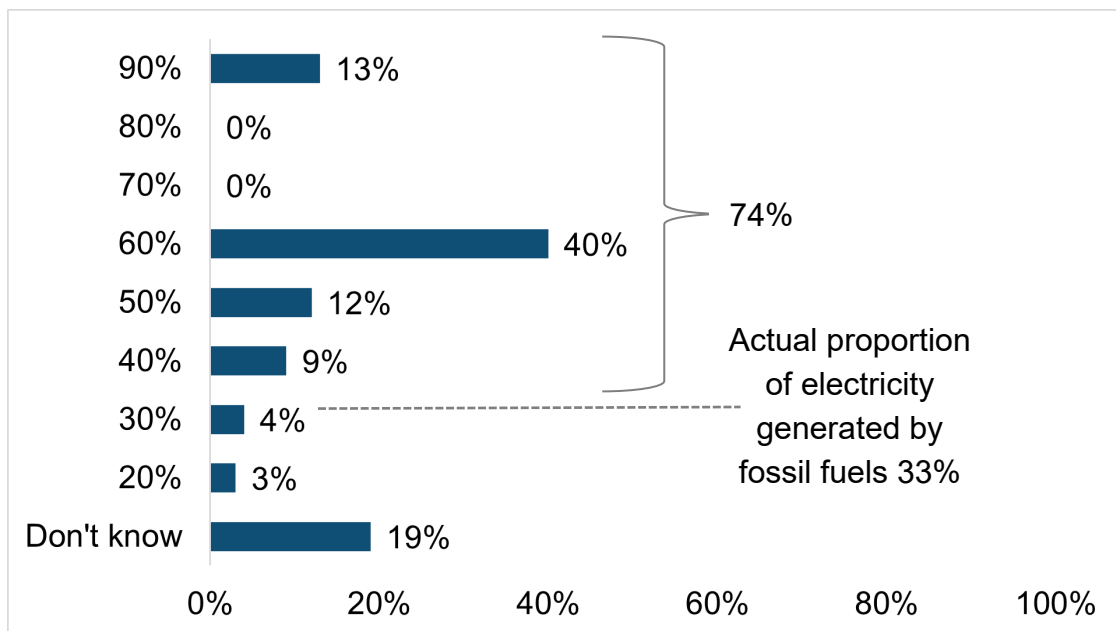
Source: DfE_ELECTRICITY – Approximately what proportion of electricity used in the UK was generated by fossil fuels last year? Base: n=97*. *Caution: small base size of less than 100 school leavers.

Awareness of the UK's climate change mitigation strategies

A list of mitigation strategies was presented to school leavers. All of these strategies are currently being used in the UK with the exception of 'engineered removal of greenhouse gases from the atmosphere' which was incorrectly identified by 16% of school leavers. Around a half or fewer school leavers identified some of the key mitigation strategies being used in the UK, such as promoting electric cars (identified by 52%), tree planting (47%), and switching to renewables (44%). Awareness was lower still for other important measures like peatland restoration (16%) and providing incentives for businesses to develop wind farms (16%). Around one in five (21%) responded that they did not know the answer, whilst a further one in 10 (10%) noted that they did not know what mitigation was.

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[4] The actual proportion of electricity generated by fossil fuels being 33%

Table 10. Climate change mitigation strategies used in the UK

| Climate change mitigation strategies already being used in the UK	%
Promoting the use of electric cars	52%
Tree planting	47%
Switching from fossil fuel based to renewable electricity generation	44%
Providing incentives for homeowners to install solar panels	34%
Providing incentives for homeowners to increase insulation	27%
Providing incentives for people to eat less meat	17%
Engineered removal of greenhouse gases from the atmosphere	16%
Restoring peatlands	16%
Providing incentives for businesses to develop wind farms	16%
Running aircraft partly from biofuels	15%
Providing incentives for homeowners to install heat pumps	14%
None of these	1%
I don't know what mitigation is	10%
I don't know the answer	21%

Source: DfE_UKMITIGATION – Which of the following climate change mitigation strategies are already being used in the UK? Base: n=95*. *Caution: small base size of less than 100 school leavers. Shading indicates correct answers.

Perceptions of UK's renewables contribution

School leavers underestimated the contribution of renewables to UK electricity generation. The proportion closest to the actual level[5], 40%, was identified by only 17% of school leavers, whilst 72% thought it was 30% or less.

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[5] The actual proportion of electricity generated by renewables being 43%

Figure 46   Perceptions of the UK's contribution by renewable energy sources
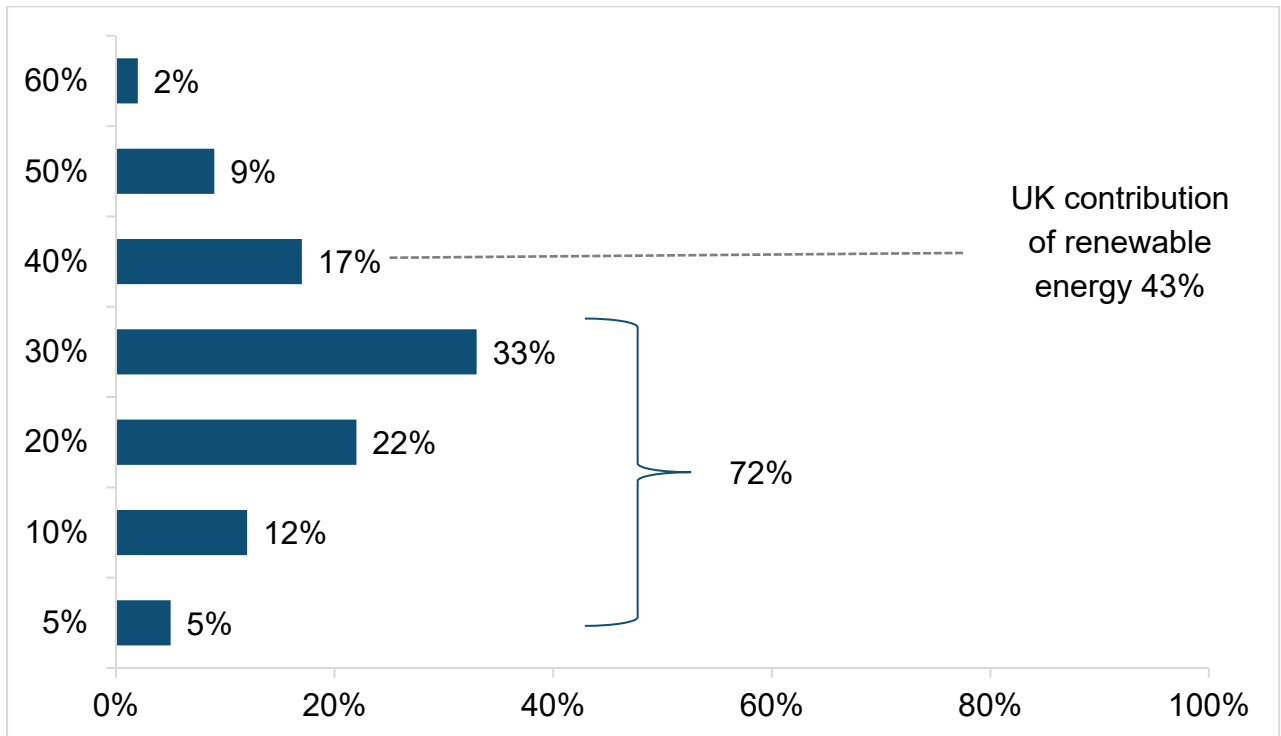
Source: DfE_RENEWABLE – Approximately what proportion of electricity used in the UK was generated by renewable sources in the last calendar year? Base: n=94*. *Caution: small base size of less than 100 school leavers.

Summary

There is mixed understanding of projected climate change and climate change impacts in the UK.

- Around a third of school leavers (34%) correctly identified that the UK climate will become warmer and wetter during winters as the global climate warms.

- Almost three quarters (74%) of school leavers correctly identified that the UK climate will become hotter and drier during summers as global climate warms.

- The majority (64%) of school leavers correctly identified 'melting glaciers and ice sheets' as contributors to relative sea level rise around the UK, however, far fewer correctly identified 'expansion of sea water as it warms' (35%).

- There was generally good awareness of climate change risks in the UK, particularly of coastal flooding and extreme summer heat.

- Only a third of school leavers (33%) correctly recognised that it will cost more for the UK to adapt to climate change impacts compared to implementing policies to limit climate change. A higher proportion, 45%, thought that it will

cost more for the UK to implement globally agreed policies to limit climate change.

- One in 11 school leavers (9%) correctly indicated that all of the industries suggested will have to adapt due to the impact that climate change is having on their business. Agriculture (57%), transport (54%) and food supply (52%) were selected by the majority of school leavers.

- The majority of school leavers indicated a high awareness of solar (76%) as a source of electricity, potentially demonstrating that they appreciated that the solar panels they see on house roofs contribute to the UK's energy mix. Awareness was lower for other renewables such as offshore wind, nuclear fission, hydroelectric, biomass and on-shore wind.

- The majority of school leavers (74%) overestimated the UK's reliance on fossil fuels for the generation of electricity and underestimated the contribution of renewables to UK electricity generation (72%).

- School leavers showed low awareness of some key mitigation strategies being used in the UK.

Chapter 7: Communication

This chapter covers issues surrounding the communication of climate change information. It focuses on school leavers' estimation of the scientific consensus on climate change, their knowledge of key international organisations involved in climate policy, and their trust in different sources of information about global warming.

Estimation of scientific consensus

The consensus within the scientific community is accepted to be between 97% and 99%. There is a knowledge gap in understanding regarding scientific consensus on climate change, with only 22% of school leavers thinking that between 80-100% of scientists agree on human-caused climate change and 35% thinking that fewer than 60% of scientists are in agreement on climate change.

Figure 47   Estimation of scientific consensus
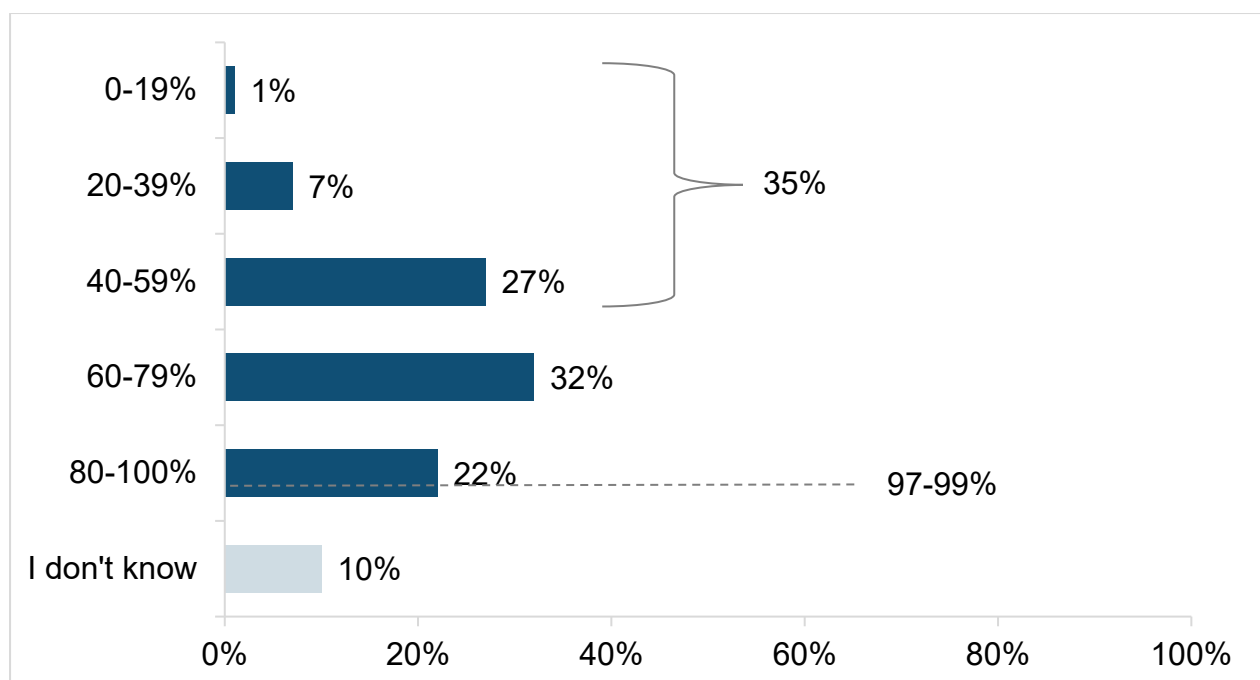
Source: DfE_HUMANACTIVITIES – What proportion of scientists do you think agree that climate change is happening because of the activities of humans? Base: n=98*. *Caution: small base size of less than 100 school leavers.

The role of the United Nations Framework Convention in Climate Change (UNFCCC) on global climate policy

Around one in three (35%) school leavers correctly identified the United Nations Framework Convention on Climate Change's (UNFCCC) role in global climate policy as 'keeping track of countries' greenhouse gas emissions'. Fewer recognised the UNFCCC's role in 'organising international climate conferences' (31%) or 'informing governments about climate change' (29%). Notably, over four in 10 (45%) school leavers indicated that they did not know the answer. This indicates a lack of knowledge about the specific roles of the UNFCCC in global climate policy.

Figure 48   The role of the United Nations Framework Convention on Climate Change (UNFCCC)
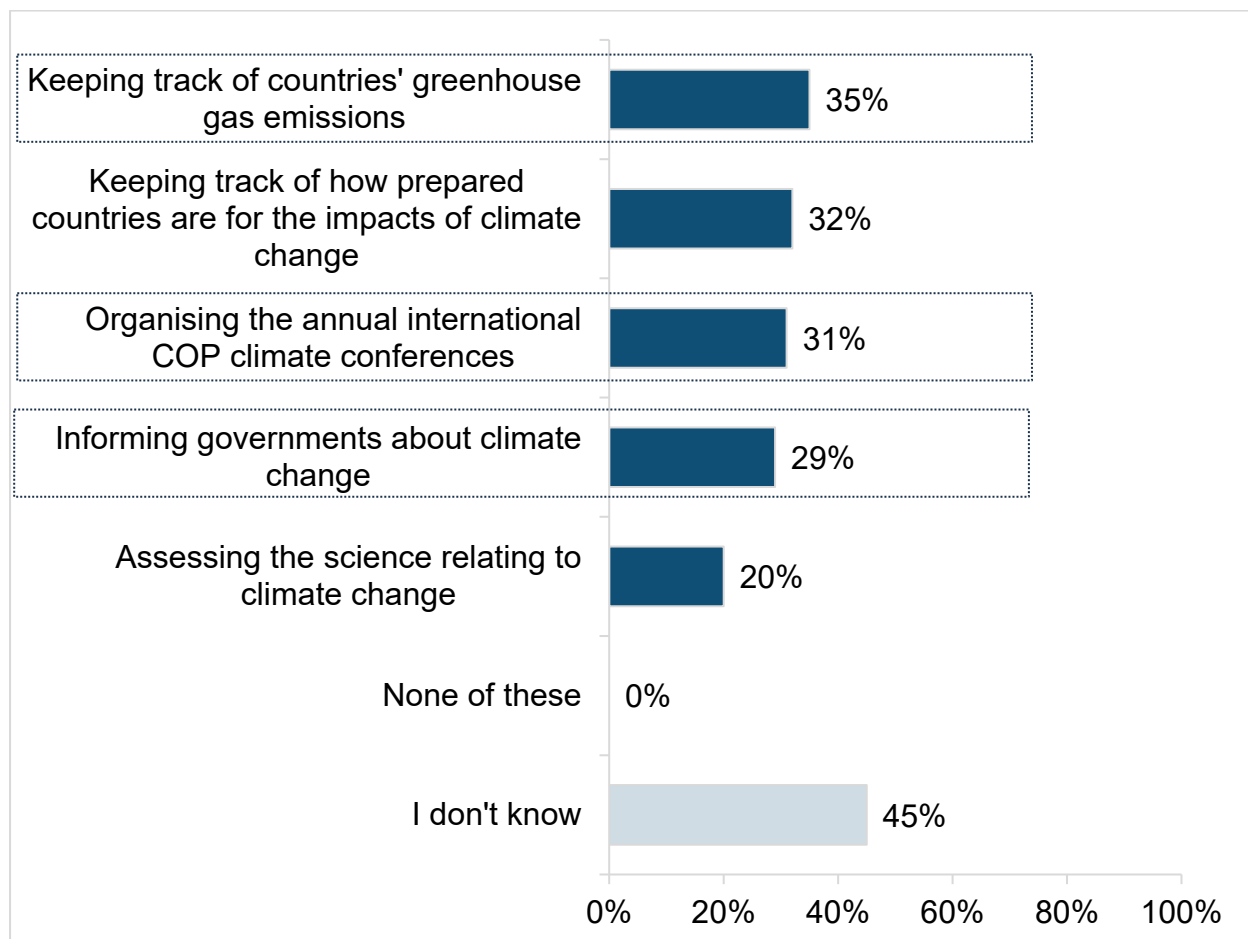
Source: DfE_UNFCCC – What important role does the United Nations Framework Convention on Climate Change (UNFCCC) play in global climate policy? Base: n=94*. *Caution: small base size of less than 100 school leavers. The dotted boxes denote the correct answers.

Trust in information sources

The data collected indicates that science teachers played a noteworthy role as a trusted source of information about global warming for school leavers, with 76%

indicating that they trust science teachers (31% indicating 'a lot' and 45% 'a little'). Another trusted source of information is the BBC, with 58% of school leavers trusting information received from this source (27% 'a lot', 31% 'a little'). The Intergovernmental Panel on Climate Change (IPCC) are the third most trusted source of information with (31% 'a lot', 14% 'a little'), despite the fact that this survey has revealed poor awareness amongst school leavers about the role of the IPCC. The least trusted sources of information include the Prime Minister[6] (54% 'not really' and 'not at all' combined) and tabloids (51% 'not really' and 'not at all' combined).

Table 11. Trust in sources of information about global warming

| Source	A lot	A little	Not really	Not at all	Haven't heard of this source	Don't know / don't want to say
Science teachers	31%	45%	13%	2%	2%	7%
The IPCC	31%	14%	11%	7%	23%	14%
The BBC	27%	31%	23%	9%	2%	9%
The UNFCCC	27%	16%	8%	14%	23%	13%
The WMO	26%	19%	10%	8%	24%	13%
The Met Office	25%	21%	16%	13%	12%	13%
Google	22%	38%	13%	11%	5%	11%
Parents or guardians	19%	32%	23%	10%	6%	10%
TV news	14%	46%	17%	9%	2%	12%
The government	11%	32%	26%	17%	3%	11%
Prime Minister	10%	16%	24%	30%	3%	18%
YouTube	9%	36%	18%	24%	3%	10%
Social media	9%	24%	32%	17%	4%	13%
A tabloid newspaper	6%	15%	15%	36%	11%	17%

Source: DfE_SOURCES – How much do you trust the following as a source of information about global warming? Base: n=89* and 90* for The BBC. *Caution: small base size of less than 100 school leavers.

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[6] There has been a change in Prime Minister since the survey was conducted

The role of the Intergovernmental Panel on Climate Change (IPCC) in Global Climate Policy

Just over half of school leavers (53%) noted that they did not know the role of the IPCC. Around one in five (22%) school leavers correctly identified the IPCC's role in 'assessing the science and informing governments about climate change'. Almost one in four schools leavers (24%) incorrectly thought the IPCC's role was 'keeping track of countries' greenhouse gas emissions' or 'keeping track of how prepared countries are for the impacts of climate change' (21%). This indicates lack of awareness about the specific roles of the IPCC in global climate policy.

Figure 49   The role of the IPCC in global climate policy
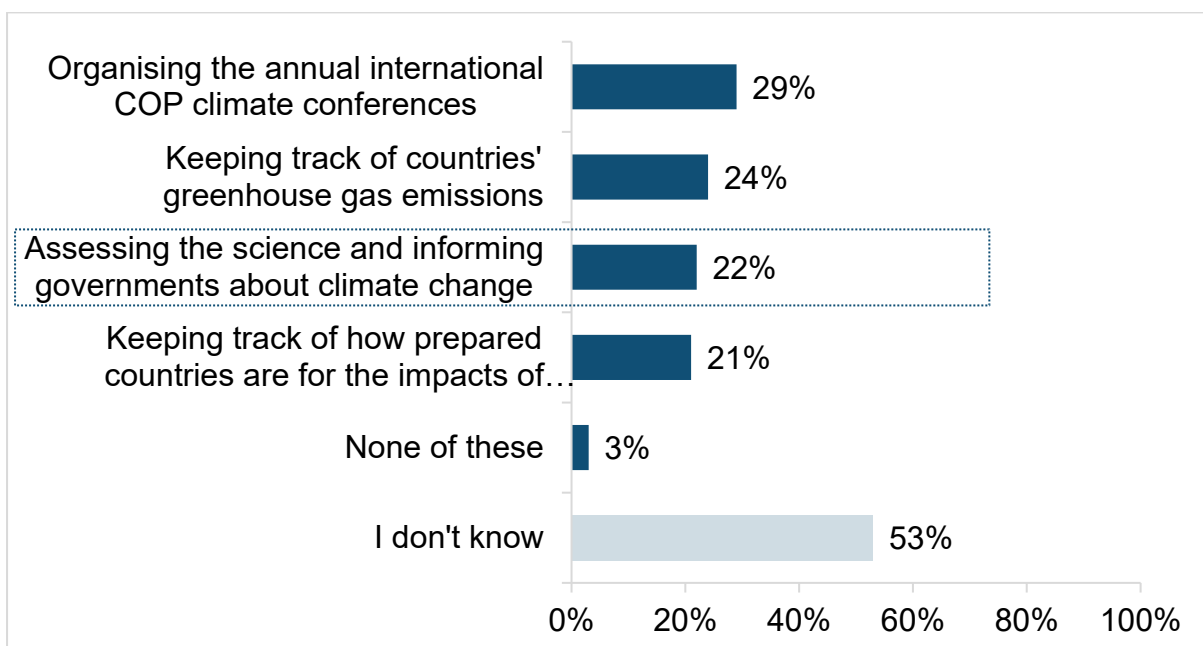
Source: DfE_IPCC – What important role does the Intergovernmental Panel on Climate Change (IPCC) play in global climate policy? Base: n=91*. *Caution: small base size of less than 100 school leavers. The dotted box denotes the correct answer.

Summary

- Only 22% of school leavers correctly thought that between 80-100% of scientists agree on human-caused climate change and 35% thought that fewer than 60% of scientists are in agreement on climate change.

- The data shows that 35% of school leavers correctly identified the UNFCCC's role in global climate policy and 22% correctly identified the IPCC's role.

School leavers place a comparatively high level of trust in science teachers (76%) and news sources such as the BBC (58%) for information about global warming, while expressing lower trust in sources including social media (33%), the Prime Minister[7] (26%) and tabloid newspapers (21%).

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[7] There has been a change in the Prime Minister since the survey has been conducted.

Chapter 8: Conclusions

Through asking a selected sample of Year 11 school leavers in England a broad range of questions, this survey presents a nuanced view of climate literacy amongst school leavers. While there is a general awareness of anthropogenic global warming as a cause of climate change and its global impacts, there are several knowledge gaps and misconceptions demonstrated by the responses collected.

Basic knowledge:

While most school leavers recall having been taught about climate change, only just over half remember having covered it in their last year at school.

There is a general understanding that the climate has warmed, but many overestimate the extent of warming since 1850. This specifically highlights a poor understanding of messaging related to limiting climate change to within 1.5°C/ 2°C, as many school leavers thought that the climate had already warmed more than this.

Most school leavers are 'fairly concerned' about climate change but, for those communicating on climate change, it is worth noting that more are 'not very' or 'not at all' concerned about climate change than are 'very concerned'.

Unsurprisingly, there is a correlation between those school leavers who think that climate change will affect them directly and those who are concerned about climate change.

A substantial proportion do not appreciate that future global warming can still be limited or avoided

Causes of climate change:

Most school leavers can identify carbon dioxide and methane as greenhouse gases and recognise that greenhouse gases affect the temperature of the Earth, but there are misconceptions regarding their respective sources. Similarly, whilst understanding of fossil fuels as a source of carbon dioxide is generally good, in general, the impact of natural causes of changes in the Earth's climate and, in particular, orbital changes, are overstated. There is a lack of awareness of the contribution of cement to greenhouse gas emissions and uncertainty around wider sustainability issues relating to the production and use of plastics.

As school leavers indicated a good awareness of which countries are currently emitting most greenhouse gas, but less awareness of per capita or historical emissions, this could be linked to a poor understanding of issues related to climate justice.

Evidence for and impacts of climate change:

Many school leavers are aware of some indicators of a warming climate such as melting glaciers and rising sea levels, as well as of the impact of climate change on extreme weather events. However, there is limited understanding of the geographical distribution of future temperature changes and their impacts.

Mitigation and Adaptation:

In general, the survey indicated low awareness of these two aspects of climate action, and in particular of climate mitigation strategies. Furthermore, there is a varied understanding between these two approaches, with school leavers often misinterpreting mitigation strategies as adaptation. The impacts of keeping pets and eating meat are generally underestimated whereas the impact of switching lights off and recycling (from the point of view of greenhouse gas emissions) is overestimated.

Concepts such as the 1.5°C and 2°C targets, and net zero, are very poorly understood. With 'net zero' in particular being a phrase which is in widespread use, from the Department for Education's Climate Change and Sustainability Education Strategy[8], to employers and the media, lack of understanding of it is both surprising and concerning.

If climate education is to raise awareness of green careers and, more generally, to increase hope in our ability to take collective climate action, increased awareness of mitigation and adaptation strategies is vitally important.

Climate Change in the UK:

In general, there is very poor awareness of the projected impacts of climate change in the UK, the need to adapt, mitigation strategies already in place and of the cost benefits of mitigation rather than adaptation. This will be directly relevant to school leavers' awareness of the green careers available to them. Whereas school leavers were aware of the contribution of melting ice to sea level rise in the UK, they were less aware of the contribution of the expansion of sea water as it warms, which has made an approximately equal contribution historically. It could be argued that this reflects a need for science teachers to be able to demonstrate that learning in the sciences has applications and contexts relevant to climate change.

Communication:

There is a substantial knowledge gap regarding the level of scientific consensus on climate change, with most thinking agreement amongst scientists is notably lower than it is. This potentially relates to past and present education policy related to presenting

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[8] https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy

a 'balanced' argument for global warming. Knowledge of international organisations such as the United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC) is also limited. Trust in climate information from science teachers and the BBC is high, but lower for politicians and tabloid newspapers.

Appendix

Climate Literacy Survey 2023

In 2023 young people's responses were collected via the Ipsos Young People Omnibus survey, the Ipsos Knowledge Panel survey and the Ipsos IIS survey. Findings were from a sample of 361 school leavers who were in, or having just completed, Year 11 (aged 15 to 17 years old) across England. Online based self-completion sessions were conducted with school leavers in their classes and administered by school staff or completed by participants at home.

Methodology

Young People Omnibus

The Young People Omnibus is a survey of school leavers attending independent schools, state secondary and middle schools in England, Scotland and Wales. Fieldwork for the study was conducted between 6th March and 21st July 2023. In total, 3,453 school leavers participated from 69 schools across England, Scotland and Wales. Of these, 58 schools were in England and six of those offered sessions with Year 11 school leavers. A total of 64 completed questionnaires were obtained. Ipsos recruiters provided each school with a unique link to access an online survey. In each school two mixed ability classes were asked to take part.

In advance of the survey taking place, each school was sent an introductory leaflet providing full details of the project for both the school and participating school leavers. A parent letter was sent out in advance of the survey taking place, providing information about the Young People Omnibus. Class teachers were asked to complete a short survey to provide information about the class completing the survey. Young people were given the choice to take part in the survey.

Knowledge Panel

The Ipsos Knowledge Panel is an online random probability panel of people aged over 16 and over in the UK. Fieldwork for the study was conducted across two waves, between 17th August and 23rd August 2023, and 13th September to 28th September 2023. In total, 37 young people in England and Wales aged 16 and over whose birth dates meant they had just completed the year 11 school year were asked to participate. Of those, 13 in England and none in Wales participated.

Ipsos Interactive Services (IIS) survey

The IIS panel includes individuals who have agreed to participate in online surveys. Panel members are selected to match the demographic distribution of the population

in terms of age, gender, location, and other factors. Members of the panels are contacted to participate in individual studies. Fieldwork for the study was conducted between 20th and 30th October 2023. In total, 284 young people in England participated. Panellists contacted for the research were aged 16 and over whose birth dates meant they had just completed the year 11 school year.

Key insights

Key insights from the 2023 data were:

- Most young people said they had been taught about climate change in a lesson during their school years, and over half had been taught about it in the last year.

- Despite this, understanding of how much the climate has warmed was low – with just over a quarter not being sure.

- Eight in 10 school leavers were concerned about climate change and around seven in 10 believed that they will be impacted by it during their lifetime.

Results

Over half of school leavers said they had been taught about climate change in the last year - although one in 10 (10%) couldn't' remember when they were taught about it.

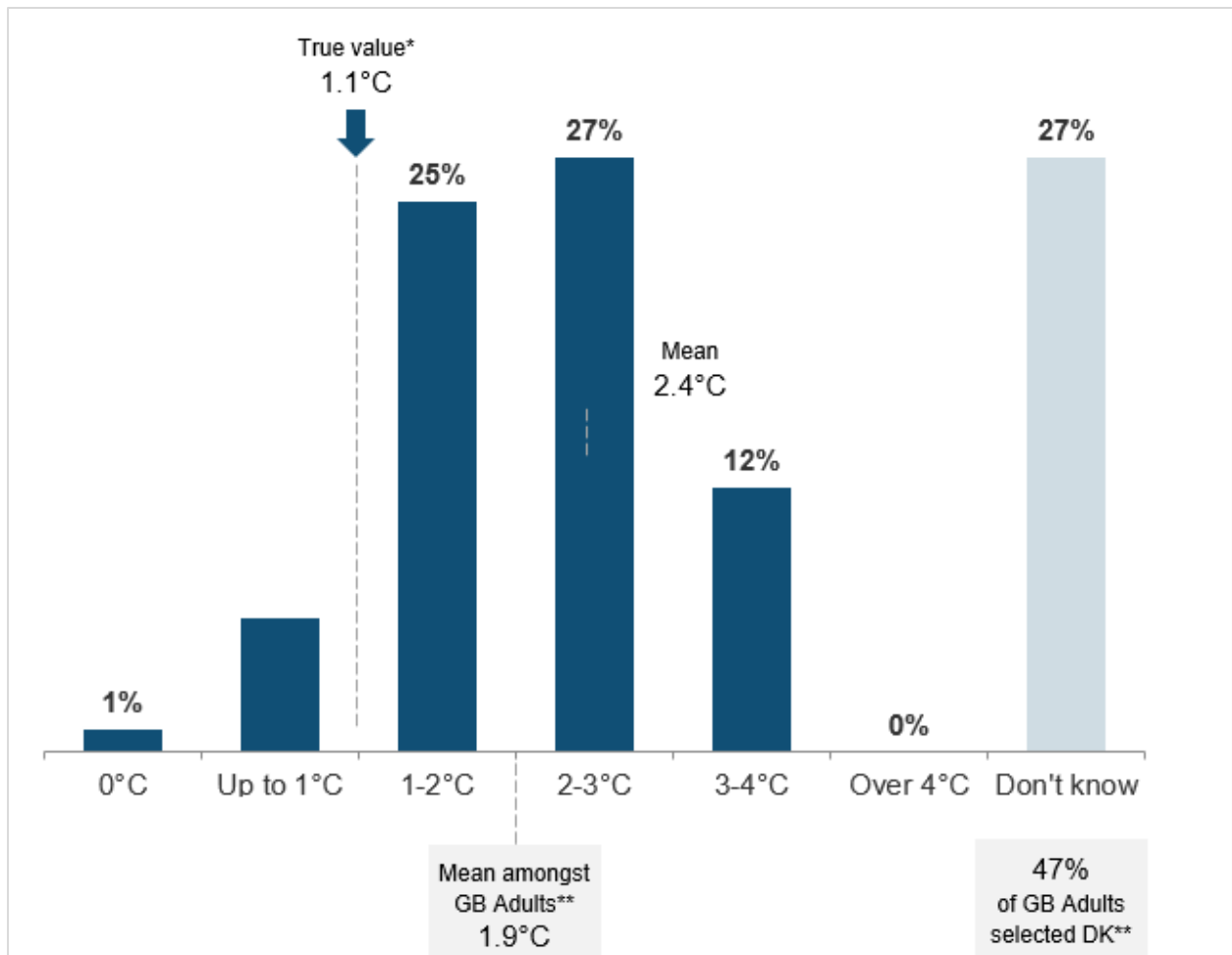**Figure 50   How old were you when you were last taught about climate change in a lesson at school?**
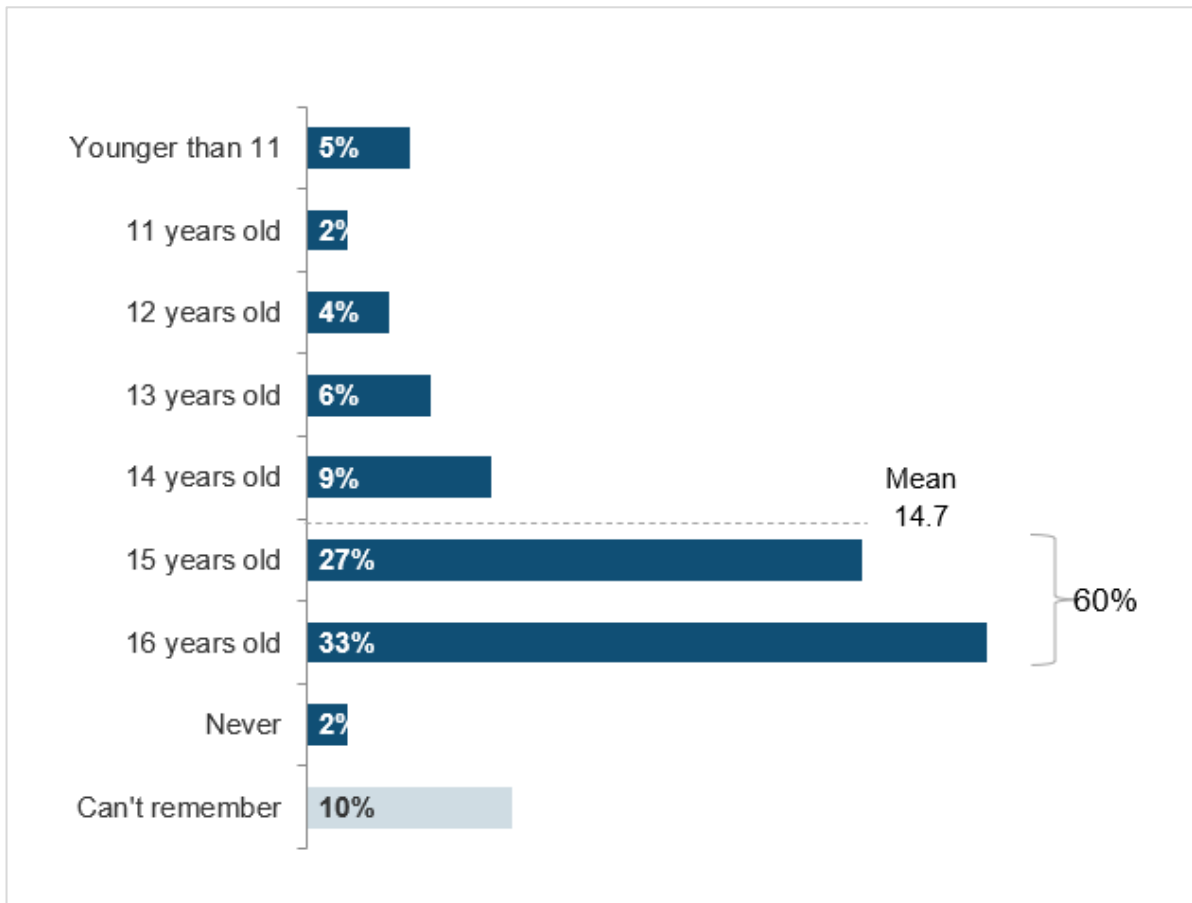
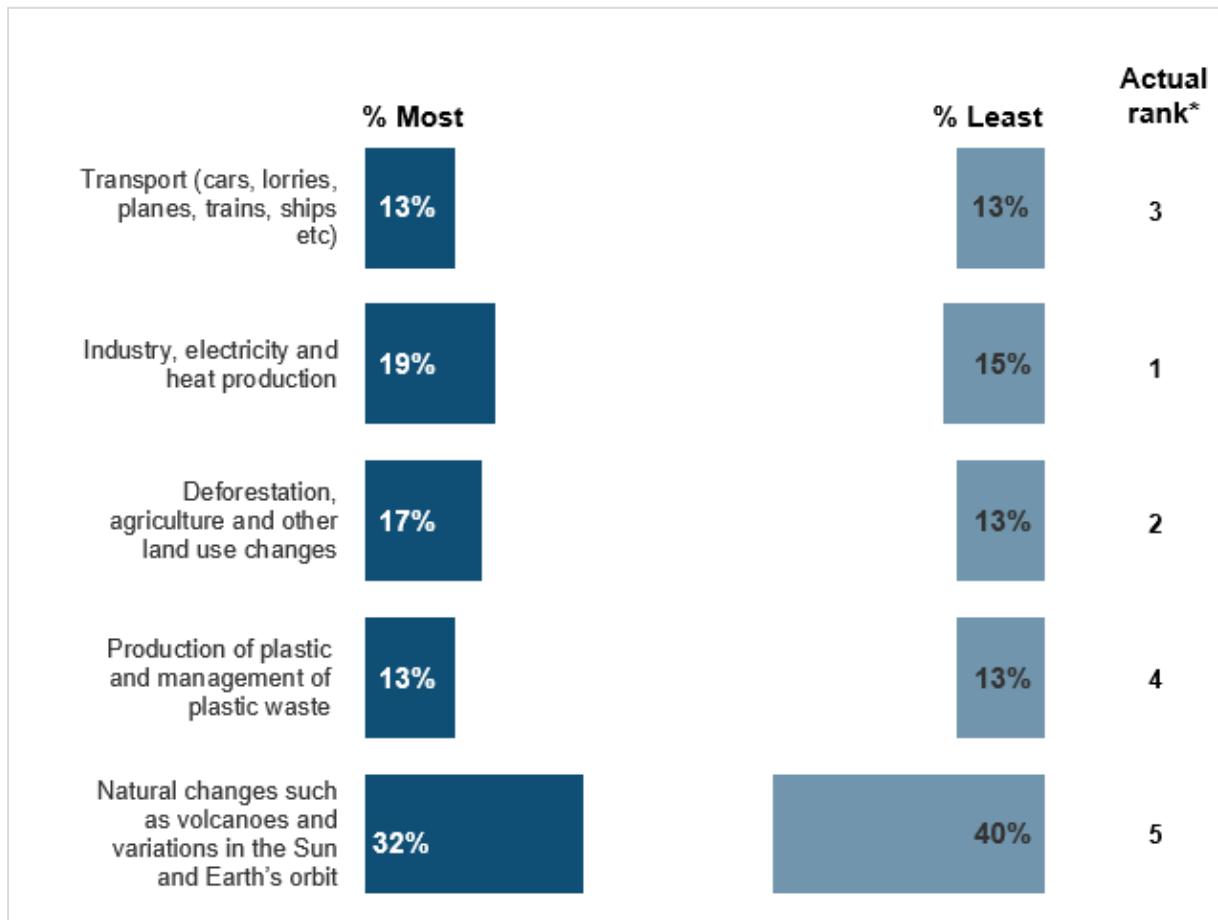Source: MS_AGECC – How old were you when you were last taught about climate change in a lesson at school?

Base: Young people in year 11 in secondary schools (excluding special schools and sixth form colleges) n=345. Note: The proportion of 'Prefer not to say' and '17 years old' have not been shown in the chart.

Just over a quarter (27%) said they did not know how much the climate has warmed, and those who think they do tended to overestimate.

Figure 51   How much do you think the climate of the Earth has warmed since 1850, if at all?

Around a fifth (19%) correctly attributed industry, electricity and heat production as the biggest contributor to global warming.

Figure 52   How much, if at all, do you think the following have contributed to global warming?


Source: MS_GLOBAL – How much, if at all, do you think the following have contributed to global warming? (Rank selection, most to least).

Base: Young people in year 11 in secondary schools (excluding special schools and sixth form colleges) n=345.

*Source: IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Figure 2.13. Available here: https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf

The majority of young people (79%) were concerned about climate change, with almost eight in 10 very or fairly concerned.

Figure 53   How concerned are you about climate change, if at all?
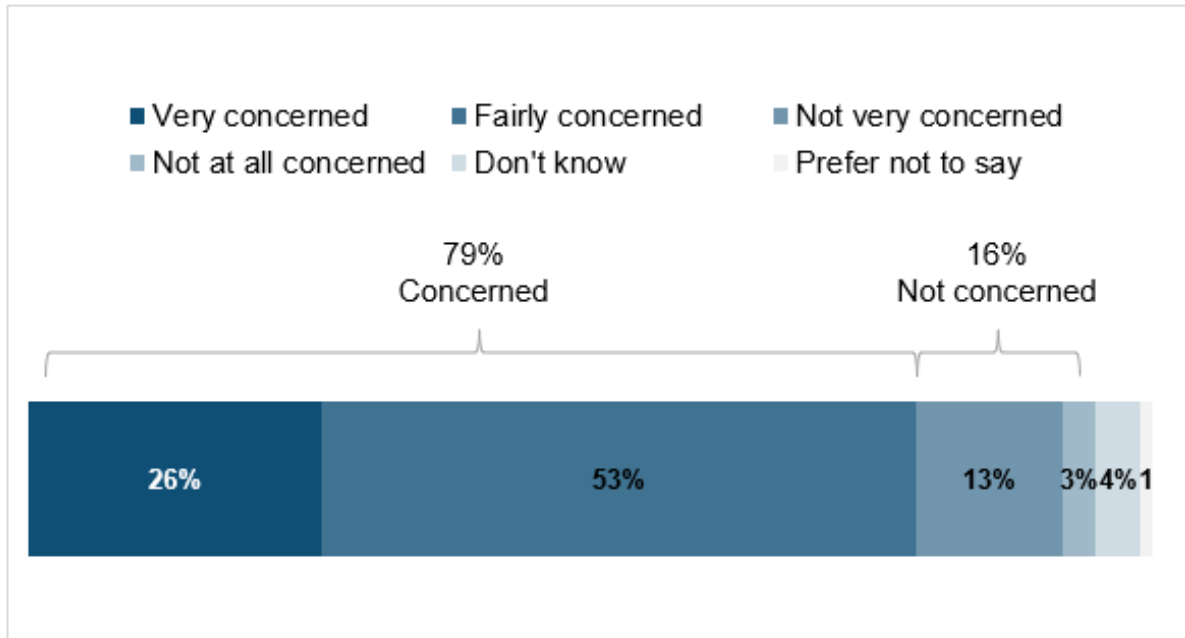
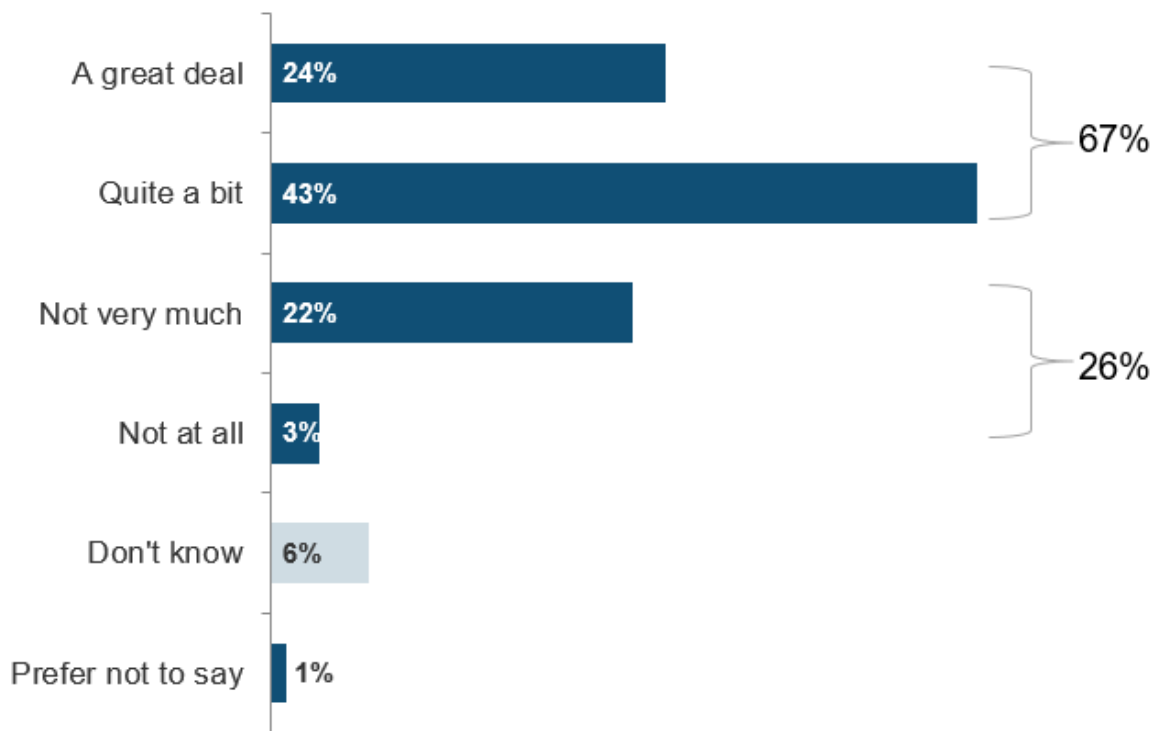Around a quarter (24%) believed that they will be impacted greatly by climate change, whilst only 3% did not think that they will be affected at all.

Figure 54   In your lifetime, to what extent do you think climate change will affect you personally, if at all?

Questionnaire

DEMOGRAPHICS PART 1 (Section A)

TOPIC BANNER: About you

ASK ALL
AGE
How old are you?
Insert Numeric box (minimum 10 – maximum 18)

[Numeric box] years old

ASK ALL
GENDER
Which of the following describes your gender?
Single code

1. Boy
2. Girl
3. Non-binary
4. My gender is not listed
5. Prefer not to say

ASK ALL
ETHNICITY
Which of the following best describes you?
Single code

A	White
1	White British
2	White Irish
3	Other White European background
4	Any other White background
B	**Black or Black British**
5	Black Caribbean
6	Black African

7	Any other Black background
C	**Asian or Asian British**
8	Indian
9	Pakistani
10	Bangladeshi
11	Chinese
12	East African Asian
13	Any other Asian background
D	**Mixed**
14	White and Black Caribbean
15	White and Black African
16	White and Asian
17	Any other Mixed background
E	**Other**
18	Arab
19	Other: [Insert open text box]
20	Prefer not to say

ASK ALL IN ENGLAND AND WALES
YEARQ QUESTION FOR ENGLAND AND WALES ONLY
Which year are you now in at school?
Single code

1. Year 7
2. Year 8
3. Year 9
4. Year 10
5. Year 11
6. Year 12

ASK ALL IN SCOTLAND
YEARQSCOT QUESTION FOR SCOTLAND ONLY

Which year are you now in at school?
Single code

7. S1
8. S2
9. S3
10. S4
11. S5
12. S6

HOME
Who lives in your home?
Multi-code

1. My mother
2. My stepmother
3. My foster mother
4. My father
5. My stepfather
6. My foster father
7. My brother(s)
8. My sister(s)
9. Other relative(s)
10. Prefer not to say

MOTHER
What does your mother/stepmother/foster mother do?
Multi-code – excl. combinations of code 1 and 3 or 2 and 3

1. Works full-time
2. Works part-time
3. Is unemployed
4. Looks after house/family
5. Something else [Insert text box]
6. Don't know/Not applicable
7. Prefer not to say

FATHER

What does your father/stepfather/foster father do?
Multi-code – excl. combinations of code 1 and 3 or 2 and 3

1. Works full-time
2. Works part-time
3. Is unemployed
4. Looks after house/family
5. Something else [Insert text box]
6. Don't know/Not applicable
7. Prefer not to say

FSM

Some young people are eligible to have free school meals at school if their parent(s) or carer(s) receives a type of benefit or benefits. This means they do not have to pay for their school meals.

Do you currently get free school meals or vouchers for free school meals?
Single-code

1. Yes
2. No
3. Don't know
4. Prefer not to say

ROYAL METEOROLOGICAL SOCIETY / DEPARTMENT FOR EDUCATION (Section B – England, Scotland and Wales in years 11)

ASK ALL IN YEARS 11 England and Wales or S4 / S5 in Scotland
MS_AGECC
How old were you when you were last taught about climate change in a lesson at school?
Single-code.

1. 17
2. 16
3. 15
4. 14
5. 13
6. 12
7. 11
8. Younger than 11
9. Never
10. Can't remember
11. Prefer not to say

ASK ALL IN YEARS 11 England and Wales or S4 / S5 in Scotland
MS_WARM
How much do you think the climate of the Earth has warmed since 1850, if at all?

Please write in your answer in degrees Celsius below. Your answer can include up to two decimal points ranging from zero (0) to 4 degrees Celsius.

Single-code.

 Celsius

Don't know

Prefer not to say

ASK ALL IN YEARS 11 England and Wales or S4 / S5 in Scotland

MS_GLOBAL

Global warming is the gradual increase in the Earth's overall temperature.

Below is a list of global factors that have been mentioned as possible contributors to global warming.

How much, if at all, do you think the following have contributed to global warming?

Select 5 for the option that you think has contributed MOST to global warming, down to 1 for the option that you think has contributed the LEAST to global warming. You have to give a different number for each factor listed below, from 5 (MOST) to 1 (LEAST).

ROTATE CODES 1-5. MULTICODE 1-5

1. Industry, electricity and heat production
2. Deforestation, agriculture and other land use changes
3. Transport (cars, lorries, planes, trains, ships etc)
4. Production of plastic and management of plastic waste
5. Natural changes such as volcanoes and variations in the Sun and Earth's orbit
6. Don't know **EXCLUSIVE**
7. Prefer not to say **EXCLUSIVE**

ASK ALL IN YEARS 11 England and Wales or S4 / S5 in Scotland
MS_CONCC
How concerned are you about climate change, if at all?
FLIP SCALE 1-4.-Single-code.

1. Very concerned
2. Fairly concerned
3. Not very concerned
4. Not at all concerned
5. Don't know
6. Prefer not to say

ASK ALL IN YEARS 11 England and Wales or S4 / S5 in Scotland
MS_PERSONCC

In your lifetime, to what extent do you think climate change will affect you personally, if at all?

1. A great deal
2. Quite a bit
3. Not very much
4. Not at all
5. Don't know
6. Prefer not to say

Department for Education (Section C – Year 11 in England)

The following questions are grouped into five blocks of 10. Please could the blocks be set to rotate so that each participant should only be asked one block of ten, not all 50.

BLOCK ONE:

ASK ALL ENGLAND YEAR 11
DfE_GHGASES
Which of the following are greenhouse gases?
Select as many as you want:

1. Water vapour (H_2O)
2. Methane (CH_4)
3. Carbon dioxide (CO_2)
4. Oxygen (O_2)
5. Nitrous oxide (N_2O)
6. Sulphur dioxide (SO_2)
7. Carbon Monoxide (CO)
8. I don't know EXCLUSIVE
9. None of these EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_TEMPERATURE
How would temperatures around the world respond over the next few decades if people were to stop greenhouse gas emissions today?
Select one:

1. Keep warming
2. Stay about the same
3. Start cooling
4. I don't know

ASK ALL ENGLAND YEAR 11
DfE_EARTHTEMP
How much can each of the following affect the average temperature of the Earth?

Select one for each element:

How light or dark coloured the Earth's surface is	A lot	A little	Not at all	I don't know
How much cloud there is	A lot	A little	Not at all	I don't know
How much dust there is in the atmosphere	A lot	A little	Not at all	I don't know
Changes in the Earth's orbit around the sun	A lot	A little	Not at all	I don't know

ASK ALL ENGLAND YEAR 11
DfE_BURNINGFOSSILFUELS
Which of the following countries emits the largest amount of greenhouse gas each year from the burning of fossil fuels?
Select one:

1. China
2. USA
3. Canada
4. Australia
5. Saudi Arabia
6. UK
7. I don't know
8. All the same

ASK ALL ENGLAND YEAR 11
DfE_UKWINTER
As the global climate warms, how will the climate of the UK change during the winter?
Select one:

1. Warmer and wetter
2. Warmer and drier
3. Cooler and wetter
4. None of these
5. I don't know

ASK ALL ENGLAND YEAR 11
DfE_UKSUMMER
As the global climate warms, how will the climate of the UK change during the summer?
Select one:

1. Hotter and drier

2. Hotter and wetter
3. Cooler and drier
4. None of these
5. I don't know

DfE_EMISSIONS
Which of the following reduces greenhouse gas emissions more?
Select one:

1. a) Buying green (renewable) energy/
2. b) Recycling/
3. c) The reduction is the same for options a & b
4. d) I don't know

DfE_NETZERO
Net zero means…
Select one:

1. There is no carbon dioxide in the atmosphere
2. There are no carbon dioxide emissions
3. There are no human emissions of carbon dioxide
4. Balancing human emissions and removals of carbon dioxide from the atmosphere
5. The amount of carbon dioxide emitted by people doesn't increase from one year to the next
6. None of these
7. I don't know

DfE_CCMITIGATION
What is meant by climate change mitigation?
Select one:

1. Minimising the potential impacts of climate change
2. Minimising the increase in the concentration of greenhouse gases in the atmosphere
3. I don't know the answer
4. I don't know what mitigation is

DfE_TEMPINCREASE
In which of these countries is the temperature projected to increase fastest?
Select one:

1. UK
2. Canada
3. Bangladesh

4. China
5. I don't know

ASK ALL ENGLAND YEAR 11
DfE_CARBONDIOXIDE
Which of the following processes are sources of carbon dioxide, a greenhouse gas?
Select as many as you want:

1. Respiration
2. Decomposition
3. Volcanoes, geological sources
4. Burning fossil fuels
5. Nuclear power
6. Deforestation
7. Melting of permafrost
8. Producing cement
9. Rock weathering
10. Wild fires
11. Rice farming
12. Landfill and waste
13. Wetlands
14. Livestock (e.g. cows)
15. I don't know EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_CLIMATECHANGE
What is the best definition of climate change?
Select one:

1. An increase in global temperature because of changing greenhouse gas concentrations in the atmosphere
2. A large-scale, long-term shift in the Earth's weather patterns and average temperatures
3. An increase in global temperature because of human activity
4. A short term change in the weather
5. I don't know

ASK ALL ENGLAND YEAR 11
DfE_EMITSCARBONDIOXIDE
Which of the following countries emits the most carbon dioxide per person from the burning of fossil fuels?
Select one:

1. China
2. USA
3. Canada
4. Australia

5. Saudi Arabia
6. UK
7. All the same
8. I don't know

DfE_WARMINGCLIMATE
Which of the following are indicators of a warming climate?
Select as many as you want:

1. Rising sea level
2. Ozone hole
3. Changing seasons
4. Migrating species
5. Melting glaciers
6. Melting sea ice
7. More frequent hurricanes
8. Ocean acidification
9. I don't know EXCLUSIVE

DfE_ELECTRICITYSOURCES
Which of the following sources of electricity does the UK currently use?
For each, select an option:

Sources of electricity	A lot	A little	None	I don't know the answer	I don't know what this is
Off shore wind					
On shore wind					
Solar					
Nuclear fission (conventional nuclear power)					
Nuclear fusion					
Geothermal					
Tidal					
Hydroelectric					
Biomass					
Wave					

DfE_TREE

When a tree grows, it removes carbon dioxide from the atmosphere. If a tree grows, falls down and is then burned locally there will be…

Select one:

1. More greenhouse gas in the atmosphere than before the tree grew
2. Approximately the same amount of greenhouse gas in the atmosphere than before the tree grew
3. Less greenhouse gas in the atmosphere than before the tree grew
4. I don't know

DfE_REDUCES

Which of the following reduces greenhouse gas emissions more?

Select one:

1. a) Living without using a car
2. b) Buying green (renewable) energy
3. c) The reduction is the same for options a & b
4. d) I don't know

DfE_TARGET

2°C target means?

Select one:

1. Everywhere warms by 2°C above today's temperature
2. Everywhere warms by 2°C above the pre-industrial (around 1850) temperature
3. Nowhere warms by more than 2°C above today's temperature
4. Nowhere warms by more than 2°C above pre-industrial (around 1850) temperatures
5. On average the world warms by 2°C above today's temperature
6. On average the world warms by 2°C above pre-industrial (around 1850) temperatures
7. None of these
8. I don't know

DfE_ADAPTATION

What is meant by adaptation to climate change?

Select one:

1. Minimising the potential impacts of climate change
2. Minimising the increase in the concentration of greenhouse gases in the atmosphere
3. I don't know the answer
4. I don't know what adaptation is

DfE_COUNTRIES
Which of these countries is projected to be most vulnerable to climate change in the future?
Select one:

1. UK
2. China
3. Sudan
4. Brazil
5. I don't know

BLOCK THREE:

ASK ALL ENGLAND YEAR 11
DfE_METHANE
Which of the following processes are sources of methane, a greenhouse gas?
Select as many as you want:

1. Respiration
2. Decomposition
3. Volcanoes, geological sources
4. Producing fossil fuels
5. Burning fossil fuels
6. Nuclear power
7. Deforestation
8. Melting of permafrost
9. Producing cement
10. Rock weathering
11. Wild fires
12. Rice farming
13. Landfill and waste
14. Wetlands
15. Livestock (e.g. cows)
16. I don't know EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_ZEROCARBON
Which of the following has a zero carbon footprint?
Select as many as you want:

1. A journey taken in an electric car
2. A bottle made out of recycled glass
3. A Christmas tree bought from a garden centre
4. A cotton shopping bag
5. An egg from a free range chicken
6. Walking to school
7. An apple you've just picked from a tree
8. None of these EXCLUSIVE

9. I don't know EXCLUSIVE
10. I don't know what a zero carbon footprint is EXCLUSIVE

DfE_BURNING
Which of the following countries has emitted the largest amount of carbon dioxide from burning fossil fuels, land use change and forestry since 1850?
Select one:

1. China
2. USA
3. Brazil
4. Russia
5. Saudia Arabia
6. UK
7. I don't know
8. All the same

DfE_HUMANACTIVITIES
What proportion of scientists do you think agree that climate change is happening because of the activities of humans?
Select one:

1. 0-19%
2. 20-39%
3. 40-59%
4. 60-79%
5. 80-100%
6. I don't know

DfE_INDUSTRIESADAPT
Which of the following industries in the UK need to adapt because of the impact that climate change is having on their business/ operations?
Select as many as you want:

1. Healthcare
2. Agriculture
3. Food supply
4. Tourism
5. Construction
6. Fishing
7. Forestry
8. Transport
9. Telecommunications (e.g. Wifi and phone networks)
10. Education
11. Horticulture (gardening)
12. I don't know what adapt is EXCLUSIVE
13. I don't know the answer EXCLUSIVE

DfE_ELECTRICITY
Approximately what proportion of electricity used in the UK was generated by fossil fuels last year?
Select one:

1. 90%
2. 60%
3. 50%
4. 40%
5. 30%
6. 20%
7. I don't know

DfE_REDUCEEMISSIONS
Which of the following reduces greenhouse gas emissions more?
Select one:

1. a) Living without a pet dog
2. b) Living without using a car
3. c) The reduction is the same for options a & b
4. I don't know

DfE_UKMITIGATION
Which of the following climate change mitigation strategies are already being used in the UK?
Select as many as you want:

1. Tree planting
2. Switching from fossil fuel based to renewable electricity generation
3. Promoting the use of electric cars
4. Running aircraft partly from biofuels
5. Providing incentives for home owners to increase insulation
6. Providing incentives for home owners to install solar panels
7. Providing incentives for home owners to install heat pumps
8. Engineered removal of greenhouse gases from the atmosphere
9. Providing incentives for people to eat less meat
10. Restoring peatlands
11. Providing incentives for businesses to develop wind farms
12. None of these
13. I don't know what mitigation is EXCLUSIVE
14. I don't know the answer EXCLUSIVE

DfE_UNFCCC
What important role does the United Nations Framework Convention on Climate Change (UNFCCC) play in global climate policy?
Select as many as you want:

1. Organising the annual international COP climate conferences
2. Assessing the science relating to climate change
3. Informing governments about climate change
4. Keeping track of countries' greenhouse gas emissions
5. Keeping track of how prepared countries are for the impacts of climate change
6. None of these EXCLUSIVE
7. I don't know EXCLUSIVE

DfE_SEALEVEL
Which of the following contribute to relative sea level rise around the UK?
Select as many as you want:

1. Melting sea ice
2. Melting glaciers and ice sheets
3. Expansion of sea water as it warms
4. Sinking land
5. Higher annual rainfall
6. Coastal erosion
7. Changing oceanic circulation
8. The sea level isn't rising in the UK
9. I don't know EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_AVERAGETEMP1850
The average global temperature has increased since 1850. What proportion of this temperature increase have humans caused?
Select one:

1. 0-19%
2. 20-39%
3. 40-59%
4. 60-79%
5. 80-100%
6. I don't know

ASK ALL ENGLAND YEAR 11
DfE_GLOBALCLIMATE
The global climate mainly varies from year to year because of…
Rank from biggest to smallest:

1. Changes in the Sun
2. Changes to Earth's orbit
3. Large scale weather patterns (such as El Niño)
4. Changes in the concentration of greenhouse gases in the atmosphere
5. I don't know

ASK ALL ENGLAND YEAR 11
DfE_FOSSILFUELS
Which of the following are "fossil fuels"?
Select as many as you want:

1. Coal
2. Oil
3. Natural gas
4. Nuclear power from uranium
5. Bioenergy from crops or wood
6. Wind
7. I don't know EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_CLIMATECHANGEWILL
Complete the following sentence: Climate change will make…
Select one:

1. Some extreme weather events more frequent, intense and impactful
2. All extreme weather events more frequent
3. All extreme weather events more impactful
4. All extreme weather events more frequent, intense and impactful
5. Little or no difference to extreme weather events in most places
6. I don't know

DfE_ADAPTING
Which of the following are strategies for adapting to climate change?
Select as many as you want:

1. Building flood barriers
2. Using less plastic
3. Introducing clean air zones in towns and cities
4. Installing window shades
5. Installing solar panels
6. Installing heat pumps
7. Planting trees in towns and cities
8. Planting trees in the countryside
9. Developing salt marshes
10. Restoring peatland
11. Switching to electric vehicles
12. I don't know what adapting is EXCLUSIVE
13. I don't know the answer EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_COST
Will it cost more for…
Select one:

1. The UK to adapt to the impacts of climate change
2. The UK to implement globally agreed policies to limit climate change, for example by limiting greenhouse gas emissions
3. They cost about the same
4. I don't know EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_REDUCESMORE
Which of the following reduces greenhouse gas emissions more?
Select one:

1. a) Recycling
2. b) Eating a vegan/plant-based diet
3. c) The reduction is the same for options a & b
4. d) I don't know

DfE_CARBONCAPTURE
What is carbon capture and storage?
Select as many as you want:

1. A way of adapting to climate change
2. A way of mitigating climate change
3. The process of trapping carbon dioxide as it is emitted and storing it in a deep and secure location
4. A way of capturing the methane emitted by agriculture and storing it in a deep and secure location
5. Part of the UK's net zero strategy
6. Large scale removal of carbon dioxide from the atmosphere
7. I don't know EXCLUSIVE

DfE_SOURCES
How much do you trust the following as a source of information about global warming?
For each, select an option:

Source of information	A lot	A little	Not really	Not at all	I haven't heard of this source	I don't know how much I trust this source	I don't want to say
The Prime Minister							
Your science teacher							
The BBC							
The Met Office							
YouTube							
A tabloid newspaper							
TV news							
Your social media							

The government							
Your parents of guardians							
The Intergovernmental Panel on Climate Change							
Google							
The World Meteorological Association							
The United Nations Framework Convention on Climate Change							

DfE_INDUSTRIES
Which of the following industries could help mitigate climate change?
Select as many as you want:

1. Agriculture
2. Building (construction)
3. Gaming
4. Car manufacture
5. Tourism
6. Healthcare
7. Telecommunications
8. Transport
9. Finance
10. Education
11. Media or social media
12. I don't know the answer EXCLUSIVE
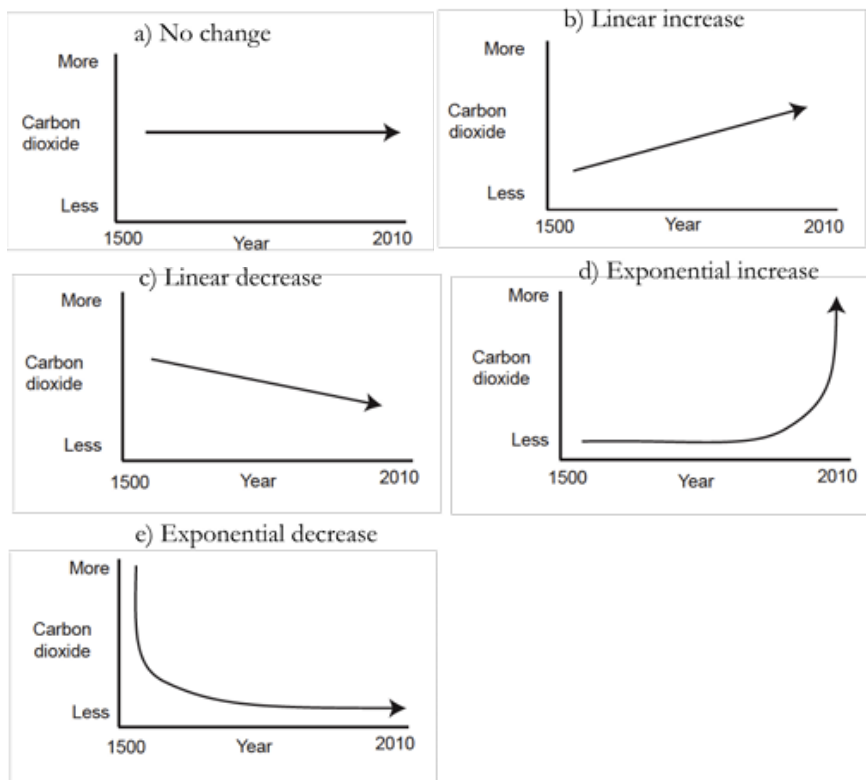13. I don't know what mitigate means EXCLUSIVE

BLOCK FIVE:

ASK ALL ENGLAND YEAR 11
DfE_500YEARS
Which picture best represents your understanding of how the amount of carbon dioxide in the atmosphere has changed over the past 500 years?
Select one:

a) No change

b) Linear increase

c) Linear decrease

d) Exponential increase

e) Exponential decrease

None of these/ I don't know

ASK ALL ENGLAND YEAR 11
DfE_AVERAGETEMP
How much could each of the following affect the average temperature of the Earth?
For each, select one option:

	A lot	A little	None	I don't know
Greenhouse gases in the atmosphere				
Earthquakes				
Sunspots				
Volcanic eruptions				
The phases of the moon				

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DfE_WEATHER
Put the words weather and climate in the correct places in this phrase:
The words weather or climate can be selected for each gap. There is no limit to how often each word is used.

"[insert text box] is the average [insert text box] conditions for a particular place. [insert text box] varies a lot from year to year."

DfE_RISK
In the UK, what level of risk will climate change cause to the following?
For each, select one option:

	High Risk	**Low Risk**	**No Risk**	**I don't know**
Coastal flooding				
River flooding				
Extreme summer heat				
Hurricanes				
Tsunamis				
Wild fires				
Vector-borne diseases (e.g. ticks and mosquitoes)				
Sea level rise				

DfE_MITIGATION
Which of the following are mitigation strategies?
Select as many as you want:

1. Building flood barriers
2. Using less plastic
3. Introducing clean air zones in towns and cities
4. Installing window shades

5. Installing solar panels
6. Installing heat pumps
7. Planting trees in urban areas
8. Planting trees in rural areas
9. Developing salt marshes
10. Restoring peatland
11. Switching to electric vehicles
12. None of these EXCLUSIVE
13. I don't know the answer EXCLUSIVE
14. I don't know what mitigation is EXCLUSIVE

ASK ALL ENGLAND YEAR 11
DfE_RENEWABLE
Approximately what proportion of electricity used in the UK was generated by renewable sources in the last calendar year?
Select one:

1. 5%
2. 10%
3. 20%
4. 30%
5. 40%
6. 50%
7. 60%

ASK ALL ENGLAND YEAR 11
DfE_REDUCESEMISSIONS
Which of the following reduces greenhouse gas emissions more?
Select one:

●
1. a) Eating a vegan/plant based diet
2. b) Using low energy light bulbs
3. c) The reduction is the same for options a&b
4. d) I don't know

DfE_FASTEST
Which of these areas has seen the fastest climate change?
Select one:

1. Antarctic (South Pole)
2. Arctic (North Pole)
3. The Tropics (near the Equator)
4. The sub-Tropics including the Sahel region in Africa
5. All of these places equally
6. None of these places
7. I don't know

DfE_IPCC
What important role does the Intergovernmental Panel on Climate Change (IPCC) play in global climate policy?
Select as many as you want:

1. Organising the annual international COP climate conferences
2. Assessing the science and informing governments about climate change
3. Keeping track of countries' greenhouse gas emissions
4. Keeping track of how prepared countries are for the impacts of climate change
5. None of these
6. I don't know

DfE_EARTHSCLIMATE
Earth's climate is…
Select one:

1. **Gradual:** Slow to change. Global warming will slowly lead to large changes in the climate
2. **Stable:** Very stable. Global warming won't change the climate much.
3. **Random:** Changes unpredictably. We don't know how the climate will change in the future.
4. **Fragile:** Delicately balanced. Small amounts of global warming will lead to rapid and large changes in the climate.
5. **Threshold:** Stable within certain limits. If global warming is small, it is easy for the climate to return to how it was before. If global warming is large, the climate changes significantly.
6. I don't know the answer