

Responding to Climate Change in Education Settings

Purpose: To provide an overview of current plans and proposals for DfE and provide a baseline understanding of the need to address Climate Change and deliver Net Zero across the education estate.

SPACES Network

14:00 – 15:00

26th January 2022



Department
for Education



“

I have always been the type of person that likes to solve problems. I like to make the impossible, possible – and that's why I'm an engineer

”

The Design Team

G1

Design Research Unit

Environment, Energy and Construction Unit

Capital Programme Advisory Unit

Safety, Safeguarding and Security

G2

Standardisation

Design Intelligence

Pilots and Pathfinders

OS/Technical Specification

Digital & Build Quality

Energy and performance

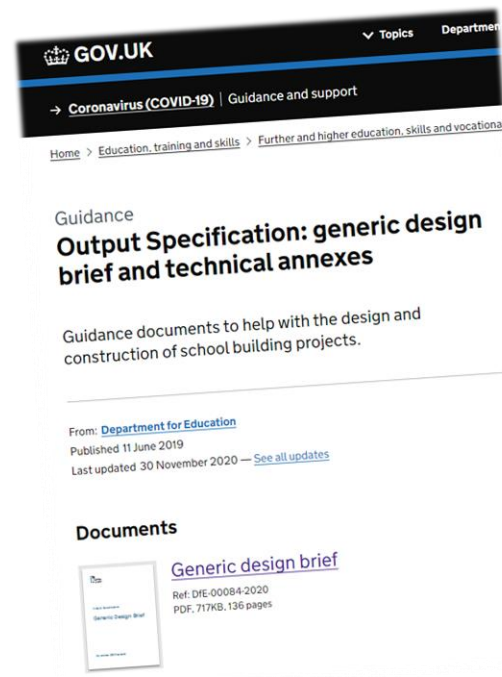
FE

SRP

FSC

SEN

SSCIB & Land Transactions



Education & Skills Funding Agency

Building Bulletin 101

Guidelines on ventilation, thermal comfort and indoor air quality in schools

Version 1

August 2018

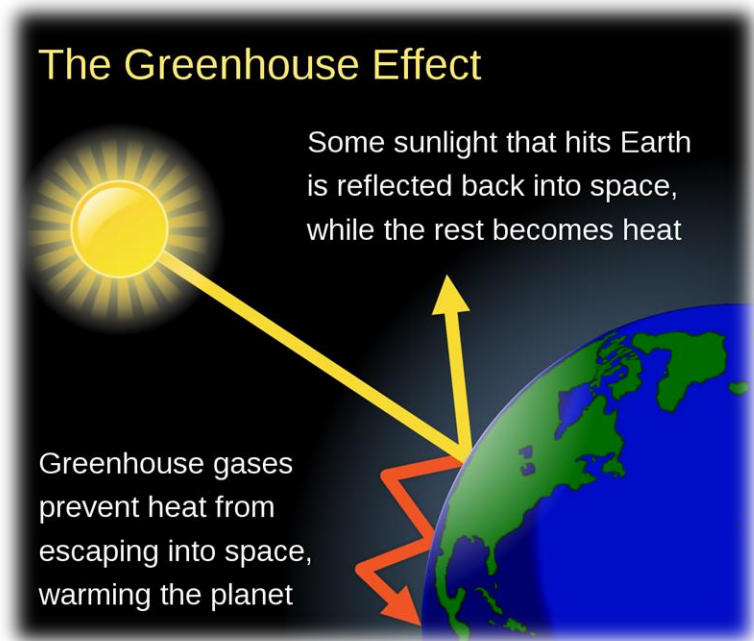
For technical professionals involved in the design, specification and construction of new school buildings and the refurbishment of existing buildings



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What is Climate Change?

Scientists attribute the global warming trend observed since the mid-20th century to the human expansion of the "greenhouse effect"



Greenhouse gases are gases in Earth's atmosphere that trap heat. They let sunlight pass, but prevent heat that the sunlight brings from leaving the atmosphere



The Earth operates as a balanced eco-system. Without any greenhouse gases, our planet would be too cold and life as we know it would not exist.



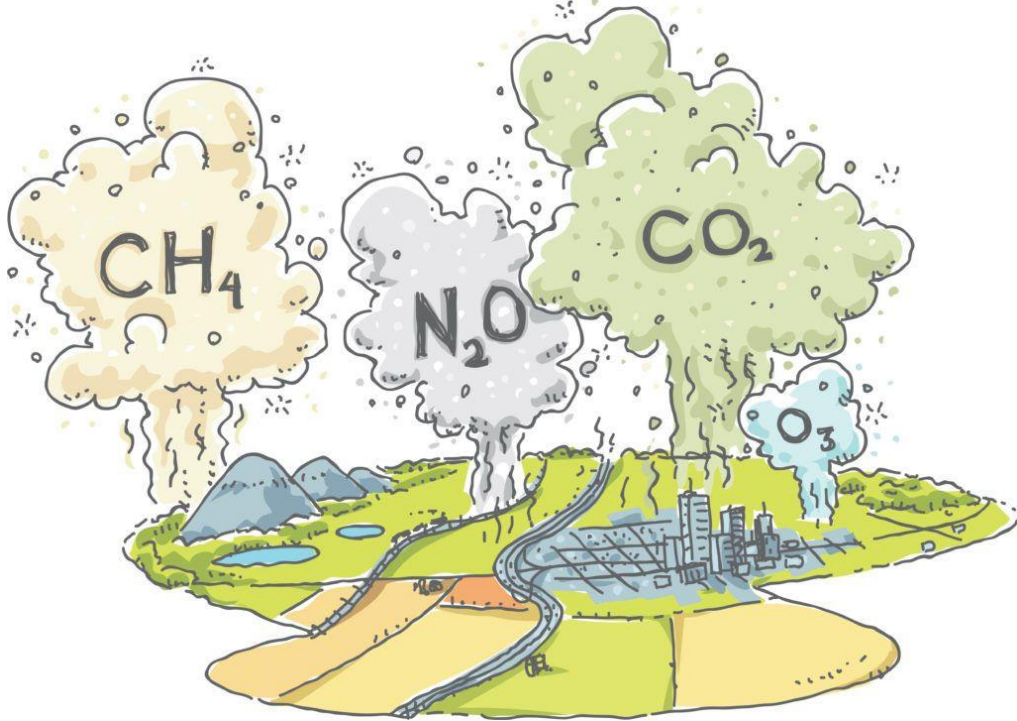
However human activity is adding **too many** greenhouse gases into the atmosphere, causing the eco-system to become off-balance



The temperature of the earth is rising to dangerous levels, which is having adverse impacts on our eco-system and the planet.



What are the Greenhouse Gases?



Water Vapour

Water vapour increases as the Earth atmosphere warms, so does cloud cover and precipitation.



Nitrous Oxide

Produced by the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.



Methane

Released through the decomposition of wastes in landfills, agriculture, and mature management in domestic livestock.



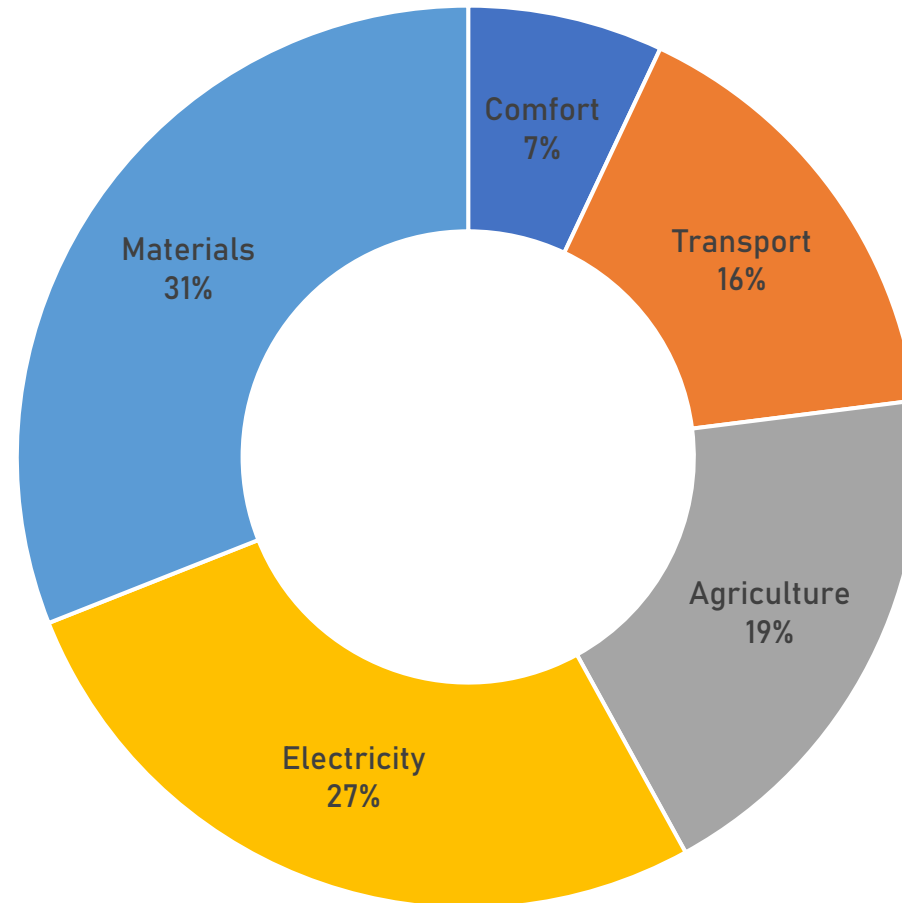
Carbon Dioxide

Humans have increased CO_2 concentration by 47% through deforestation, land use changes, and burning fossil fuels.



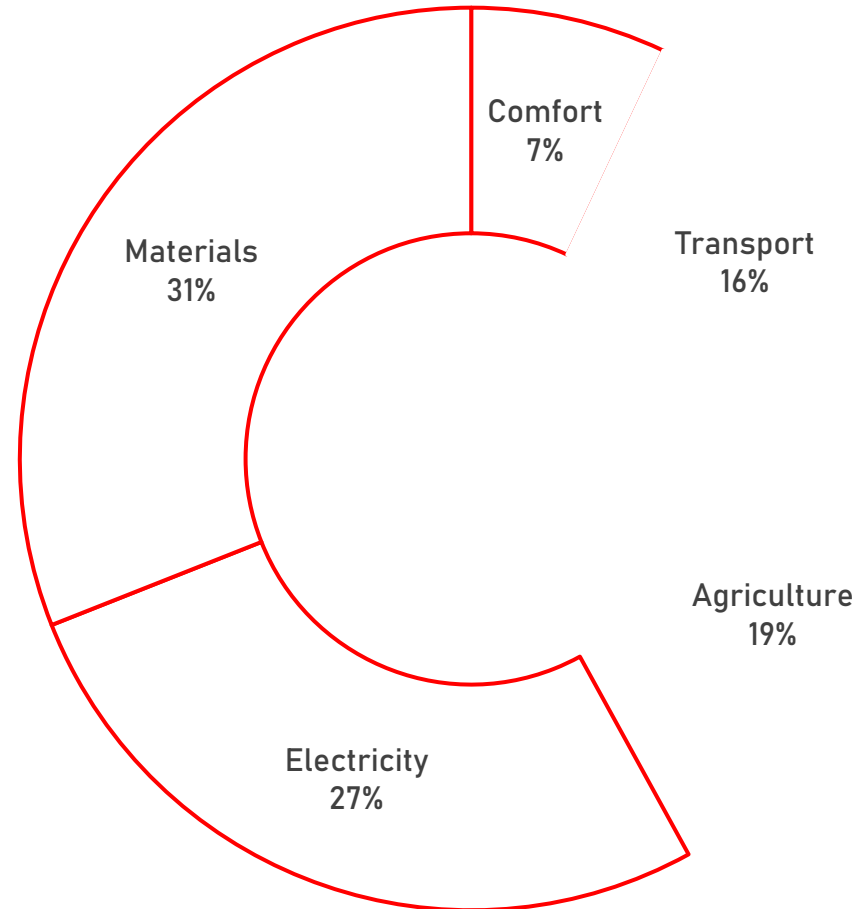
What causes Climate Change?

The Worlds 5 Worst Polluters

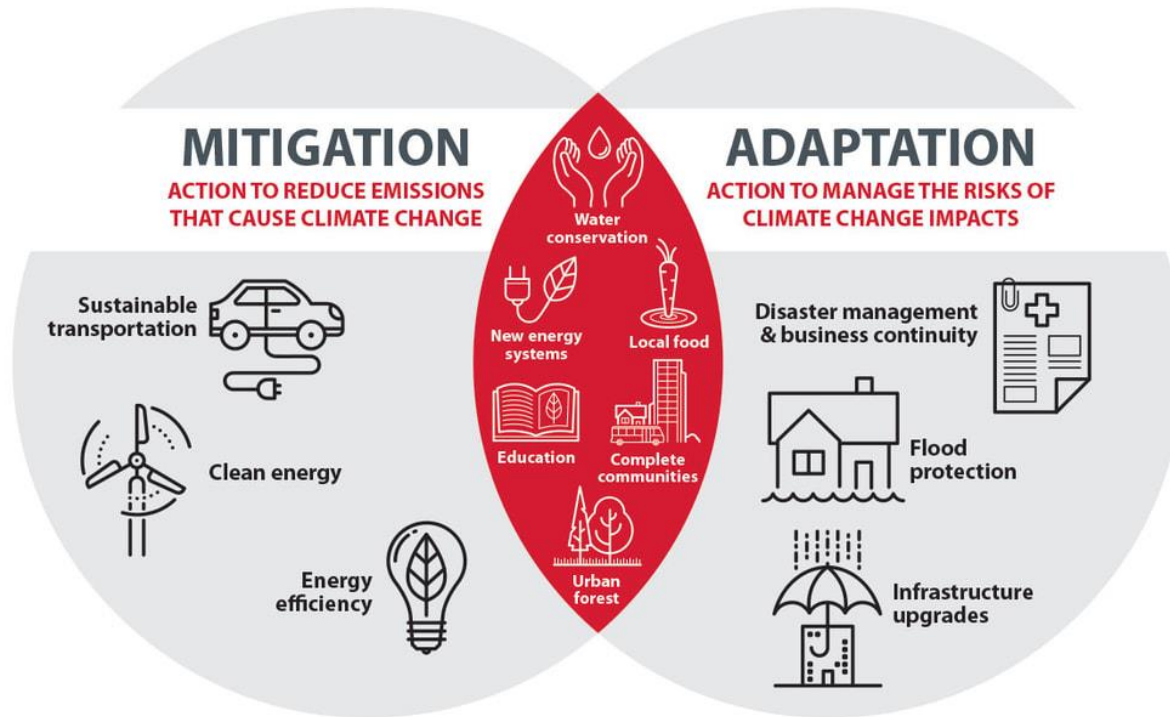


Where do School Buildings come into all of this?

The Worlds 5 Worst Polluters



How can we tackle Climate Change?



Mitigation

Measures or strategies that aim to limit or prevent emissions of greenhouse gases that **cause** climate change

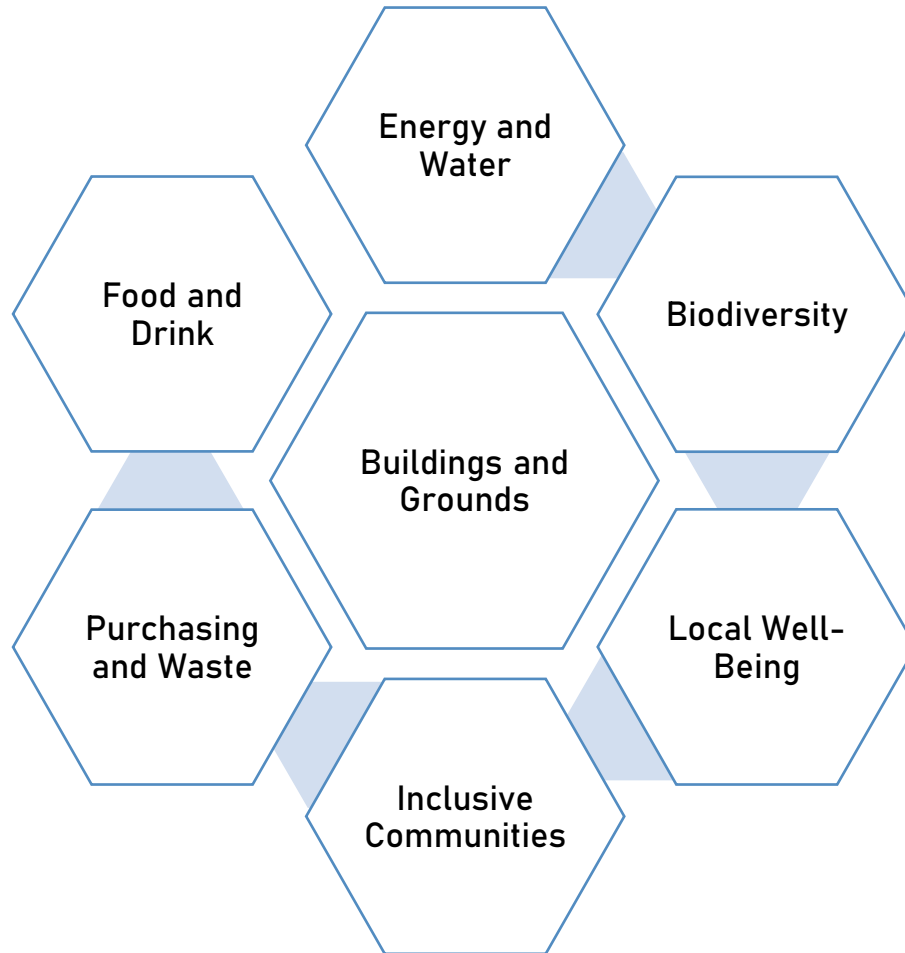
Adaptation

Measures or strategies that aim to limit the negative **impacts** of climate change



What impact can Schools have?

To meet national climate-change targets, the energy efficiency of *new and existing school buildings* needs to improve.



UK Carbon Emissions

Schools contribute to 2% of total UK carbon emissions^[1]

Public Sector Carbon Emissions

Education contribute to 40% of total UK public sector building emissions^[2]

Schools Carbon Emissions

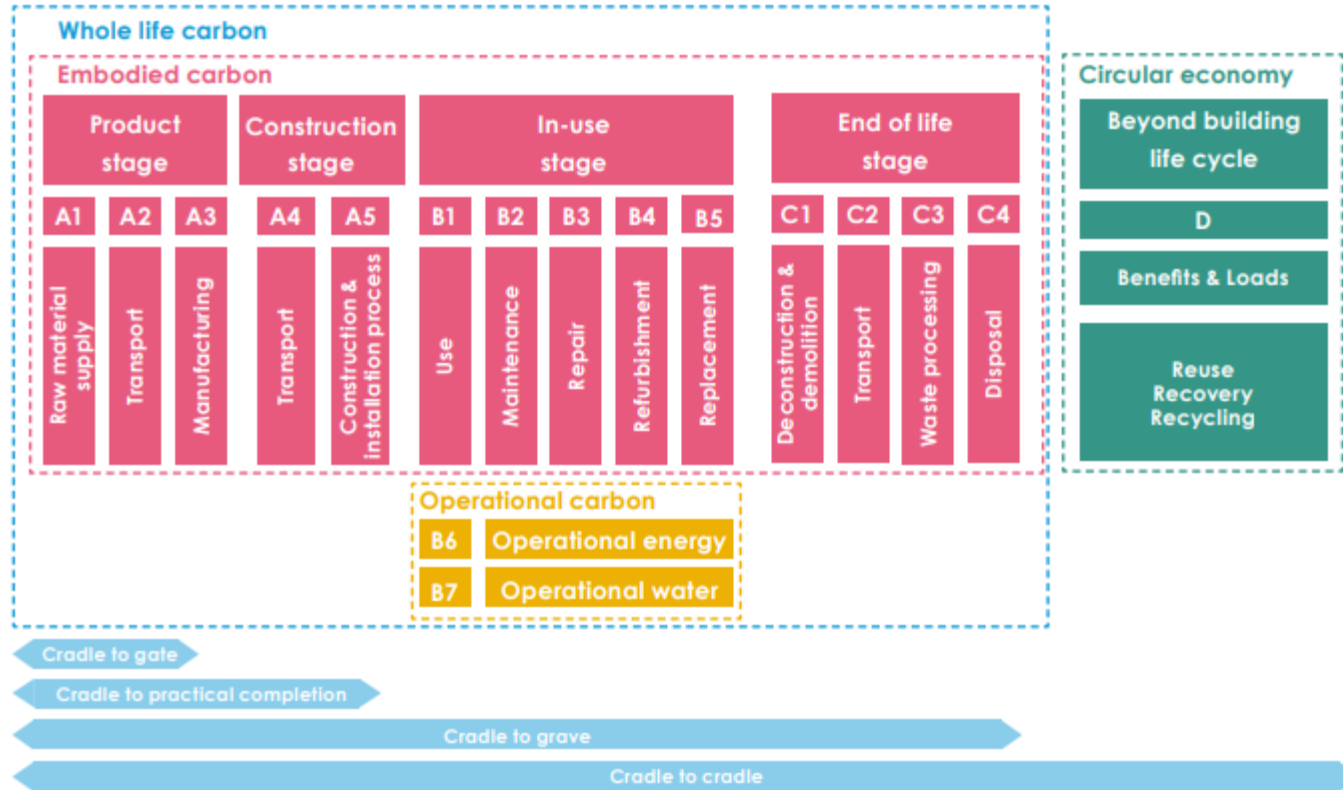
Schools contribute to 25% of total UK public sector building emissions^[3]

Buildings and Grounds

The school estate is twice the size of the Isle of Wight at 710km² ^[4]



Carbon in Buildings



Operational Carbon

is the **carbon** load created by the use of energy to heat and power a building

Embodied Carbon

the **carbon** released in the manufacturing, production, and transportation of our building materials

Whole Life Carbon

carbon emissions resulting from the construction and the use of a building over its entire **life**, including its demolition and disposal.

Mitigation



UK Built Environment Risks and Opportunities

Committee on Climate Change Report 2017 details risks and opportunities attributed to the Built Environment.

The CCRA Evidence Report highlights the **need for additional action in the next five years in England** to address the risks to health and wellbeing from heat, cold, and flooding.

[UK-CCRA-2017-England-National-Summary-1.pdf \(theccc.org.uk\)](#)

RISKS

Health and Wellbeing from high temperatures

Flood Risk for peoples communities and buildings

Risks to building envelopes from increase extreme weather

Health risk from changes in Air Quality

OPPORTUNITIES

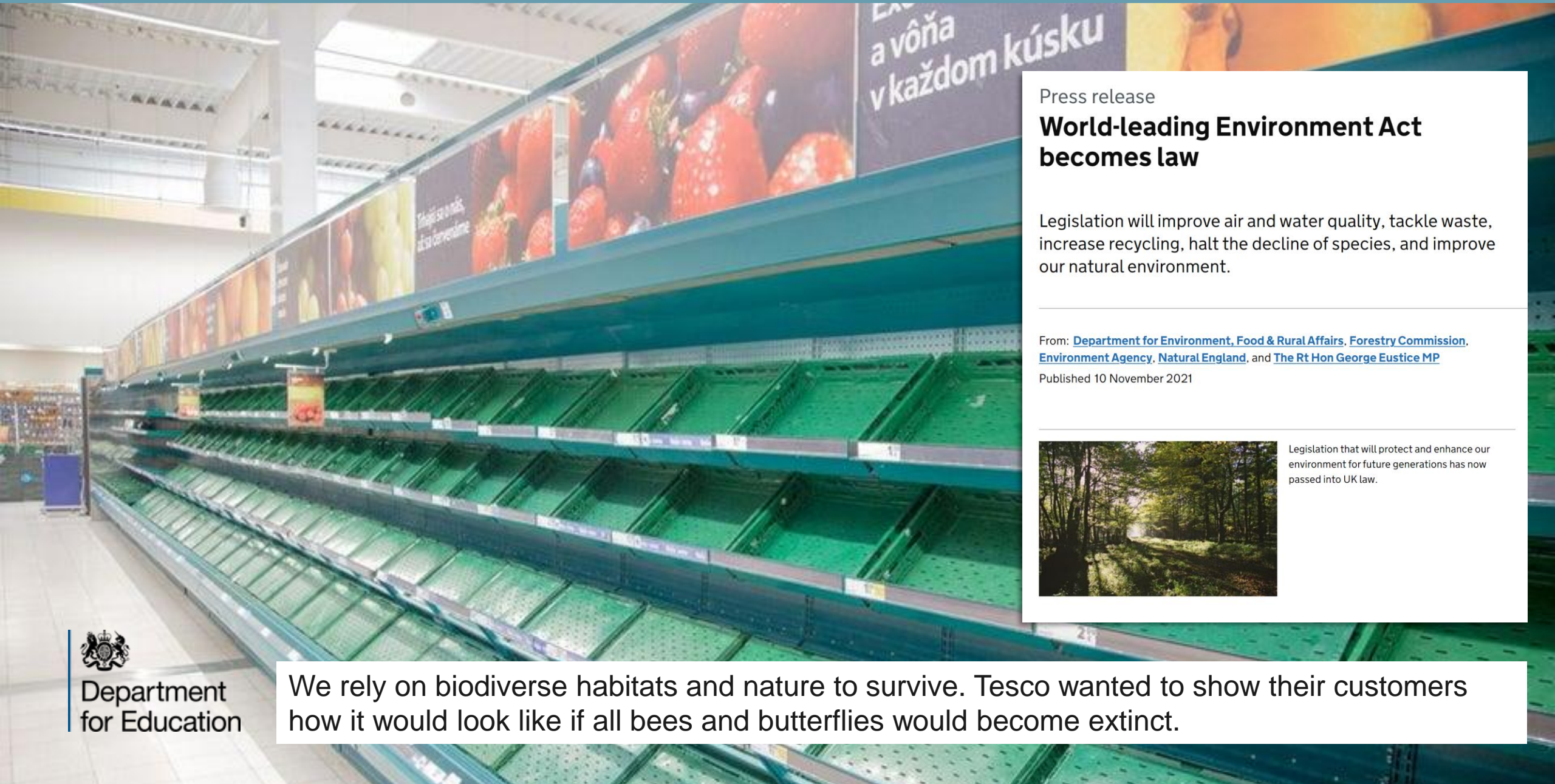
Increased outdoor activities from higher temperatures

Adaptation



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Why is Adaptation so important?



Press release

World-leading Environment Act becomes law

Legislation will improve air and water quality, tackle waste, increase recycling, halt the decline of species, and improve our natural environment.

From: [Department for Environment, Food & Rural Affairs](#), [Forestry Commission](#), [Environment Agency](#), [Natural England](#), and [The Rt Hon George Eustice MP](#)

Published 10 November 2021



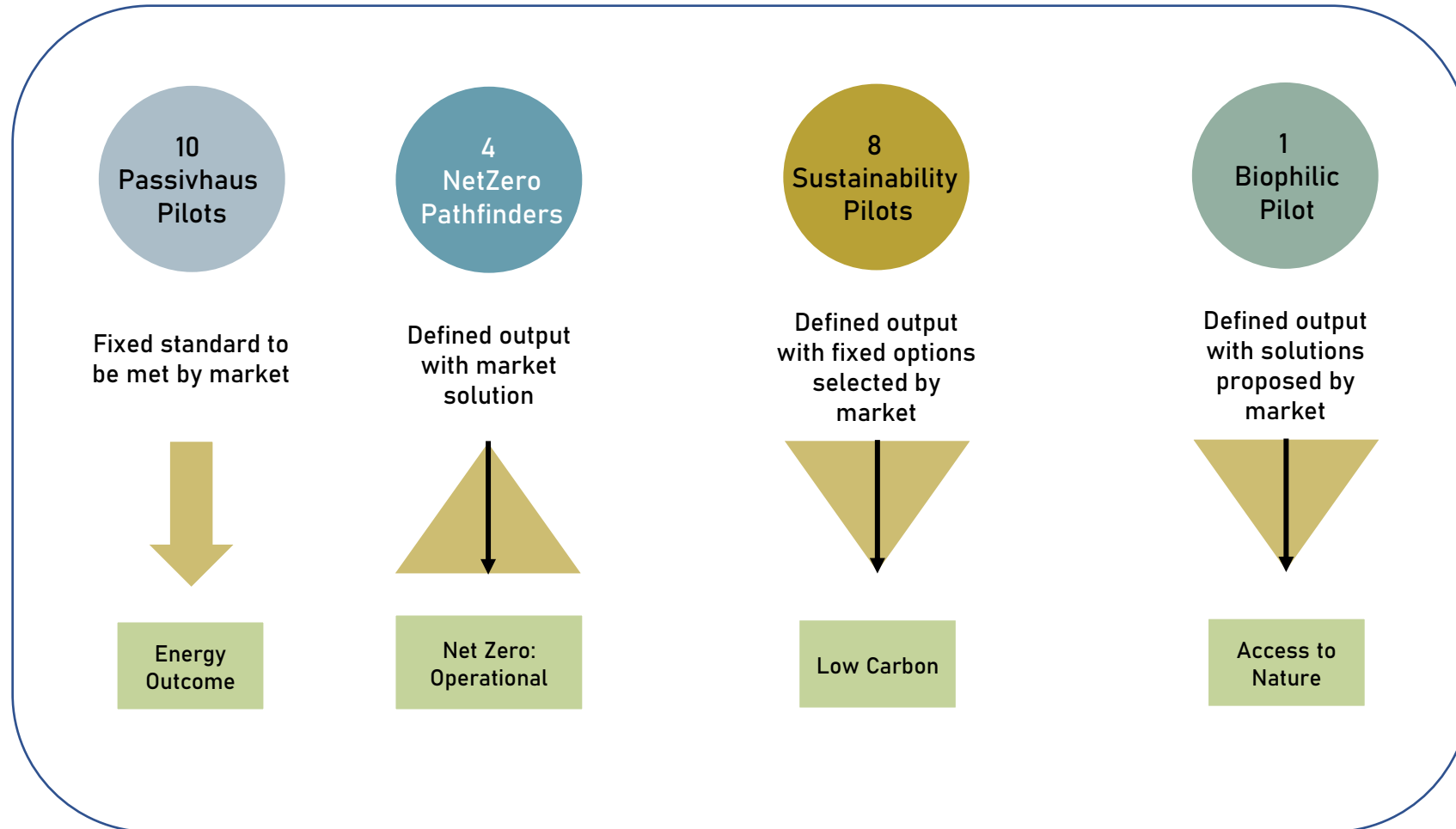
Legislation that will protect and enhance our environment for future generations has now passed into UK law.



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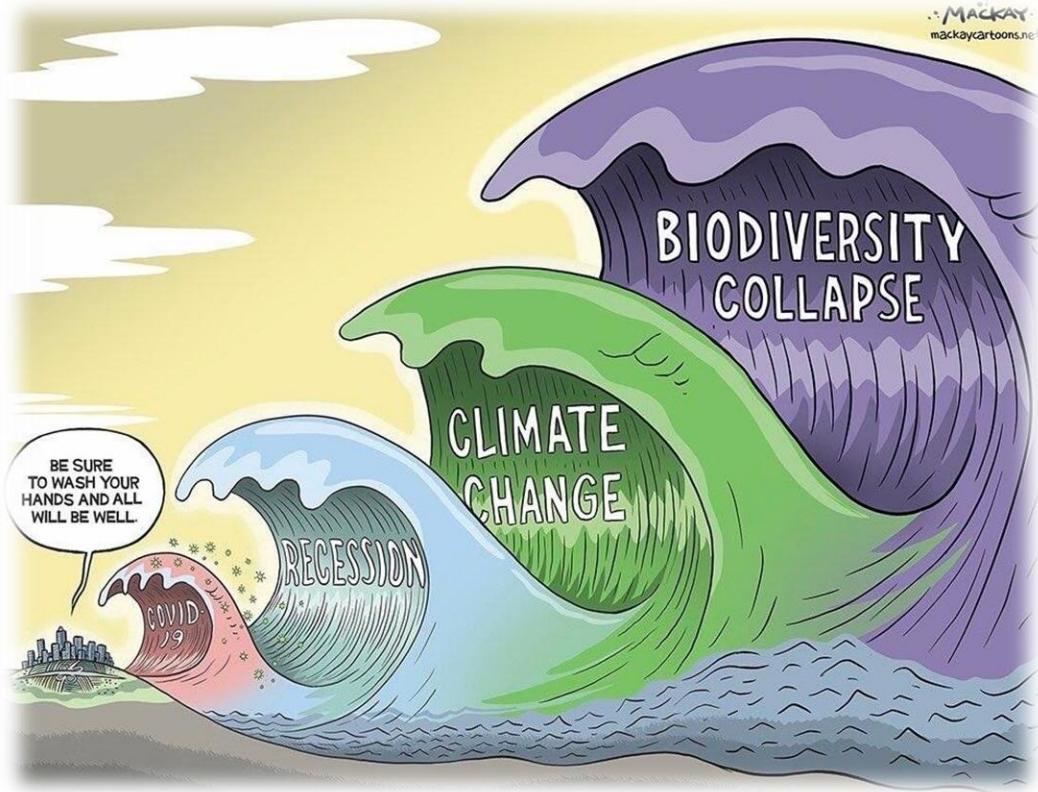
We rely on biodiverse habitats and nature to survive. Tesco wanted to show their customers how it would look like if all bees and butterflies would become extinct.

Pilots and Pathfinder Overview



Low energy, low carbon, increased biodiversity
Building evidence for better educational environments

The New Build Standards



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Operational Carbon

Low energy fossil fuel free buildings which are net zero carbon in operation, without offsite offsetting*

Embodied Carbon

Quantified impacts of embodied carbon on the school estate

CLIMATE MITIGATION

Climate Resilience

Healthy and productive buildings which are safe, long lasting and respond to user needs, now and for the future

Biodiversity Net Gain

Resilient site settings that achieve a biodiversity net gain *and* respond to the 25 Year Environment Plan^[5]

CLIMATE ADAPTATION

What does this Step Change look like for new build?

The school estate presents perfect opportunities to evoke change amongst communities. **OS21** is now live on gov.uk and is mandated across all DfE delivered schools through our frameworks including MMC and the most recently launched CF21 framework.

New Build School Specification									
Standards	Climate Change Mitigation					Climate Change Adaptation			Carbon Targets
	Thermal Performance	Heat Source	Energy Use Intensity	Generate Energy	Ventilation	Overheating Standard	Flood Resilience	Biodiversity Net Gain	
Previous Standards (OS 17)	Building Regulation	Gas Boiler	Approx 120kwh/m2/r	Planning Requirement Only	Single Sided Ventilation	2020 Weather Compliant	Planning Requirement Only	Planning Requirement Only	No Requirement
Typical New Build Scheme (OS 21)	DfE Fabric Energy Efficiency Standards	Heat Pump Application	Secondary: 67kwh/m2/yr Primary/SEN: 52kwh/m2/yr	On-site renewables to meet Operational Energy Consumption	Cross Ventilation	2080 Weather Comply with 2oC Adapt to 4oC No Cooling*	Site Specific Sustainable Drainage System (ie. Green Roofs)	Local Green Infrastructure to provide net gain	Net Zero Carbon in Operation + Quantify Embodied Carbon

What about the other 20,000 schools?

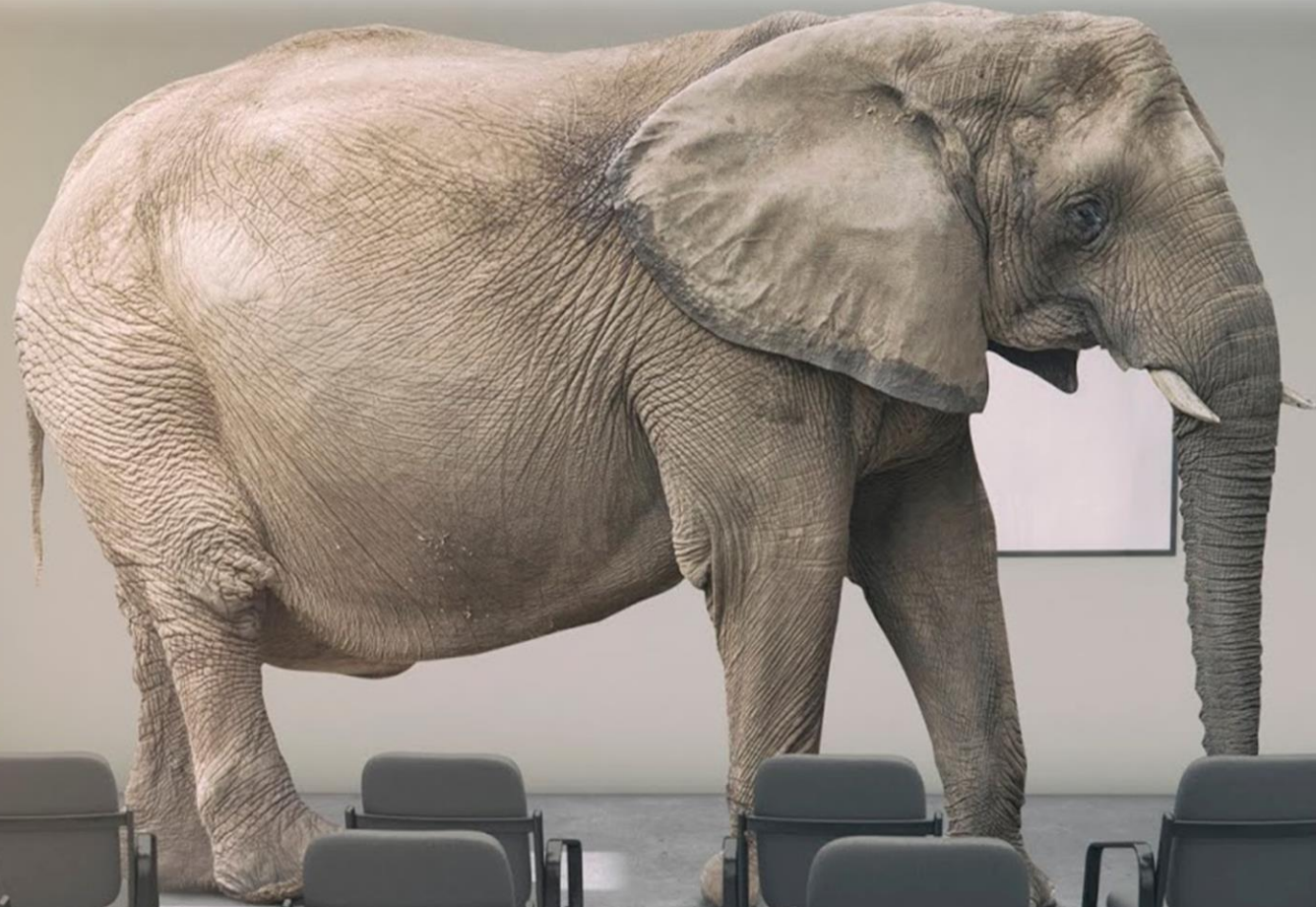
The scale of the challenge

We know the proportion of re-build and projects delivered each year, which leaves over 80% of our estate untouched before 2050. Therefore, the largest challenge in meeting 2050 legislation is the retrofit of our existing estate; the **schools that will not require re-building between now and 2050.**



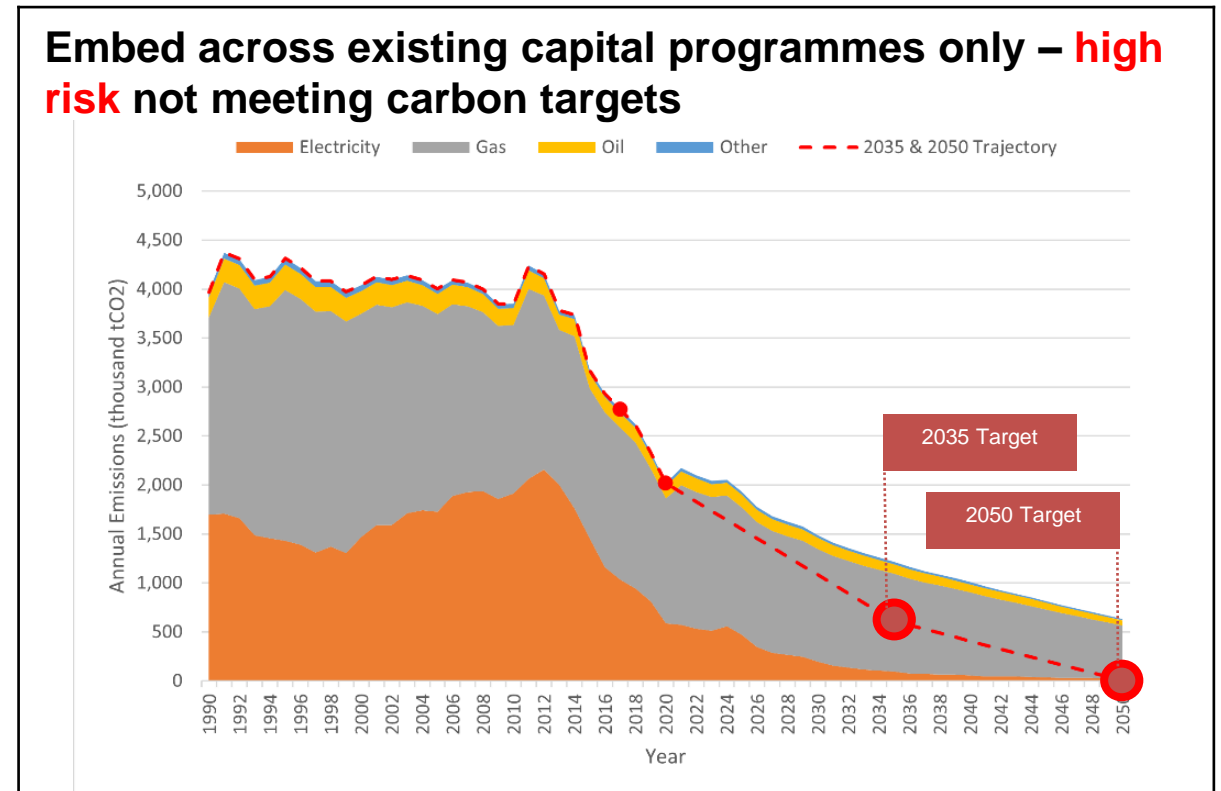
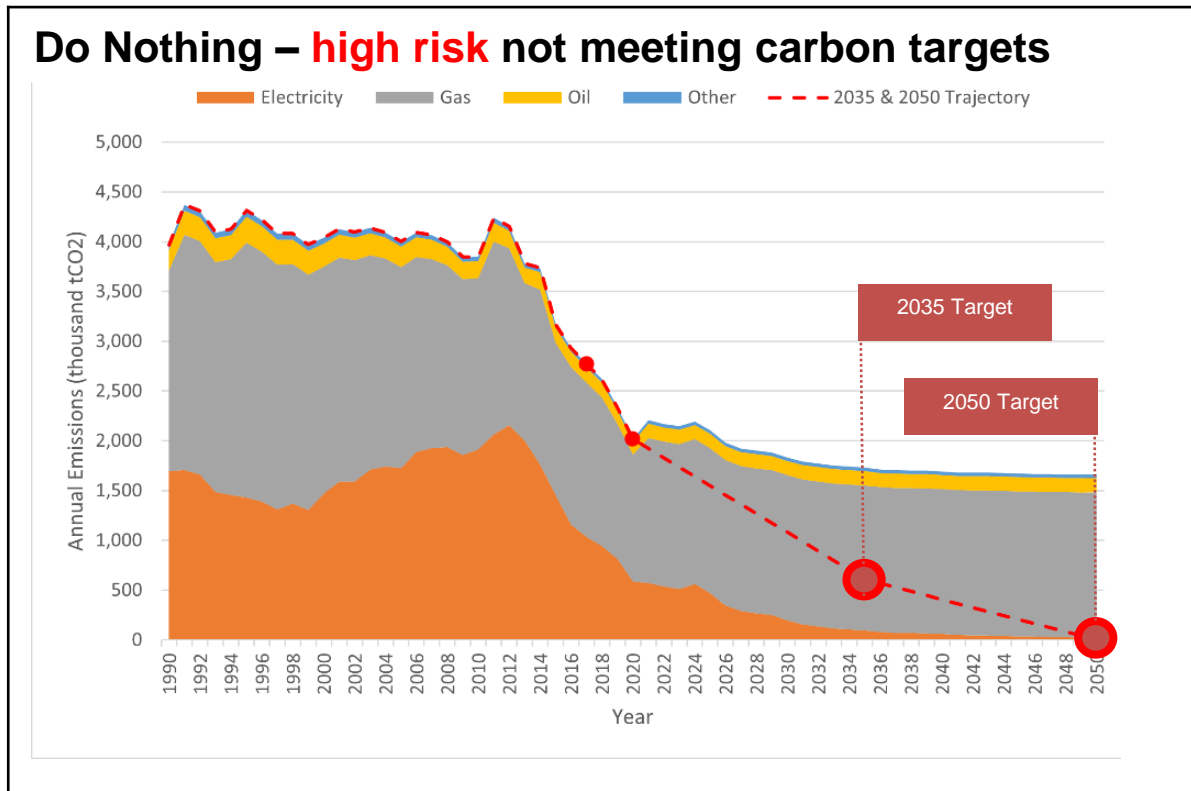
Rebuild of approximately 1/100th of internal floor area every year – extrapolated up to 2050

■ Rebuild ■ Existing



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What is the scale of the challenge we face?



What funding is available right now to support education?

- ✓ Grant funding
- ✓ Accessible to all
- ✓ Standard Methodology
- ✓ Low Carbon Skills Funding
- X Competitive Bid process
- X Oversubscribed
- X Challenging timescales
- X Lack of Strategic application

Collection

Public Sector Decarbonisation Scheme

The Public Sector Decarbonisation Scheme provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures.

From: [Department for Business, Energy & Industrial Strategy](#)

Published 1 October 2020

Last updated 6 October 2021 — [See all updates](#)



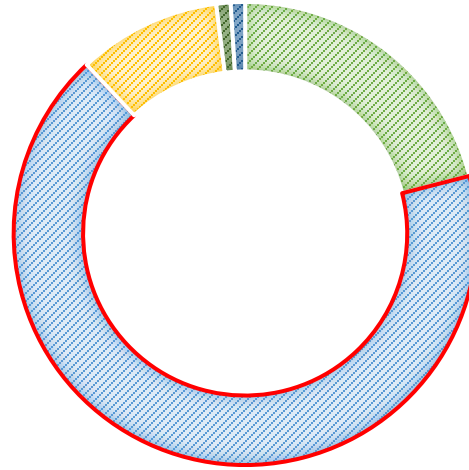
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If you have any data which you are able to share with us from successful or unsuccessful PSDS applications please drop me an email; gemma.taylor@education.gov.uk

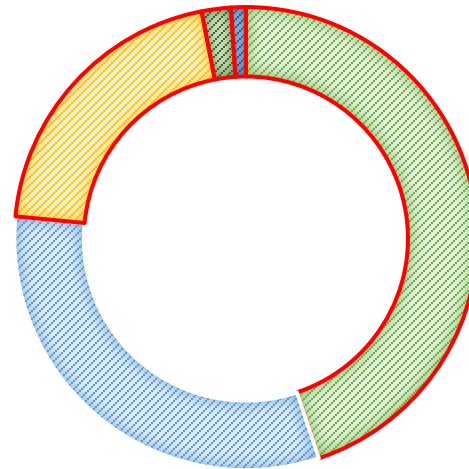
The Longer Term Vision: 2025

- Materials [A1 - A3] ●
- Operational Energy [B6] ●
- Maintenance [B1 - B5] ●
- Construction [A5] ●
- End of Life [C1 - C4] ●

New School Standards
to focus on reducing the
Operational Energy
(67%)



As Operational Energy
decreases the focus
shifts to Whole Life
Carbon (68%)



Operational Carbon

is the **carbon** load created by the use of energy to heat and power a building

Embodied Carbon

the **carbon** released in the manufacturing, production, and transportation of our building materials

Whole Life Carbon

carbon emissions resulting from the construction and the use of a building over its entire **life**, including its demolition and disposal.

Mitigation



The Longer Term Vision: 2025

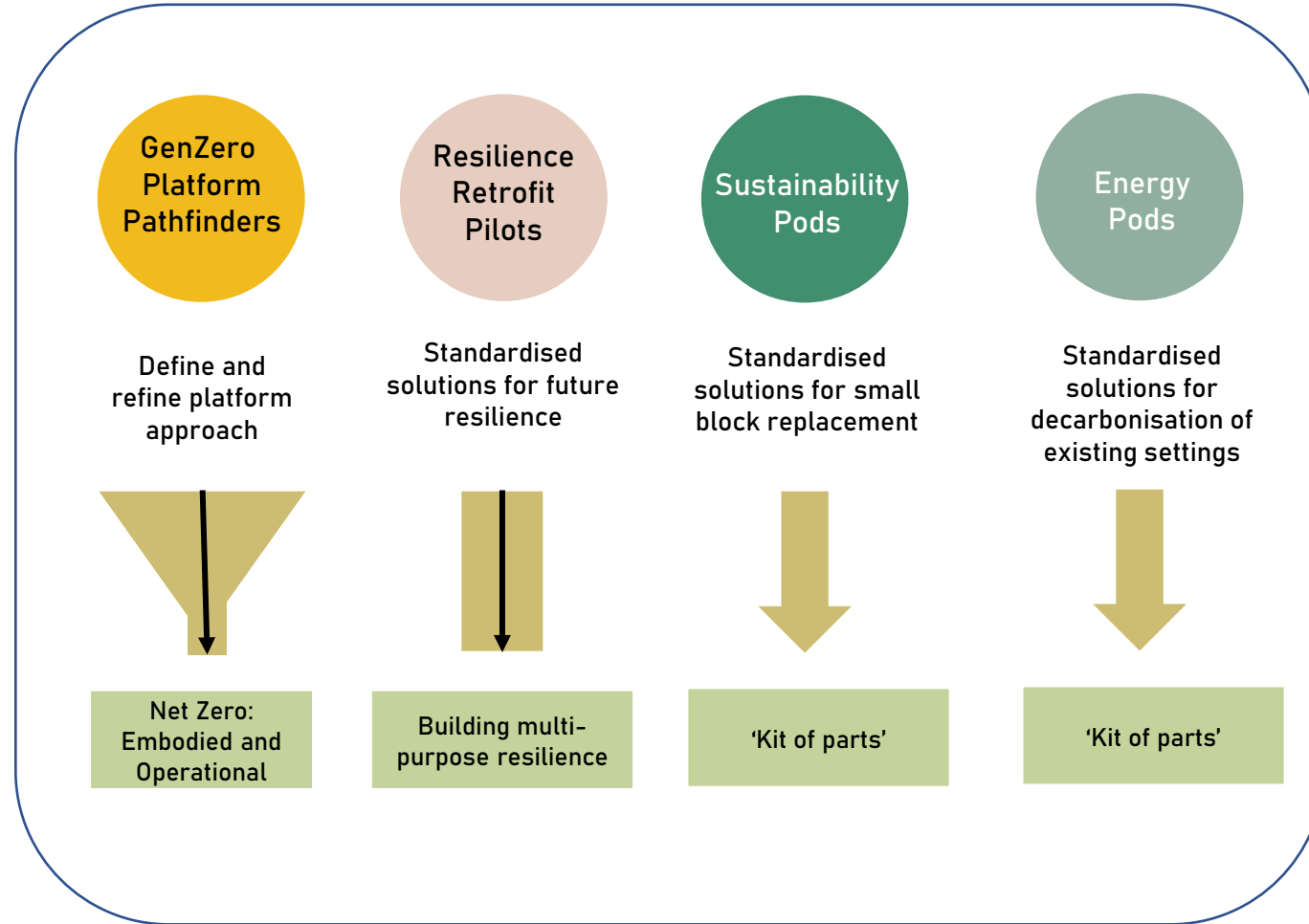
Making the most of Green Infrastructure

Using biophilic design to ensure that efforts to achieve Biodiversity Net Gain and Urban Greening Factor targets maximise the benefit to site users. The Department will achieve this by underpinning the delivery of green infrastructure with 7 core principles in the biophilic brief:

1. Play and Adventure
2. Learning in the landscape
3. Materials
4. Natural World
5. Connecting buildings to nature
6. Sanctuary
7. Sensory



The Longer Term View: Research, Test, Develop



Low energy, low carbon, increased biodiversity
Building evidence for better educational environments

Thank you for your time.

Please contact me at the following email address:

Gemma.taylor@education.gov.uk



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