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LONDON CLIMATE
ACTION WEEK

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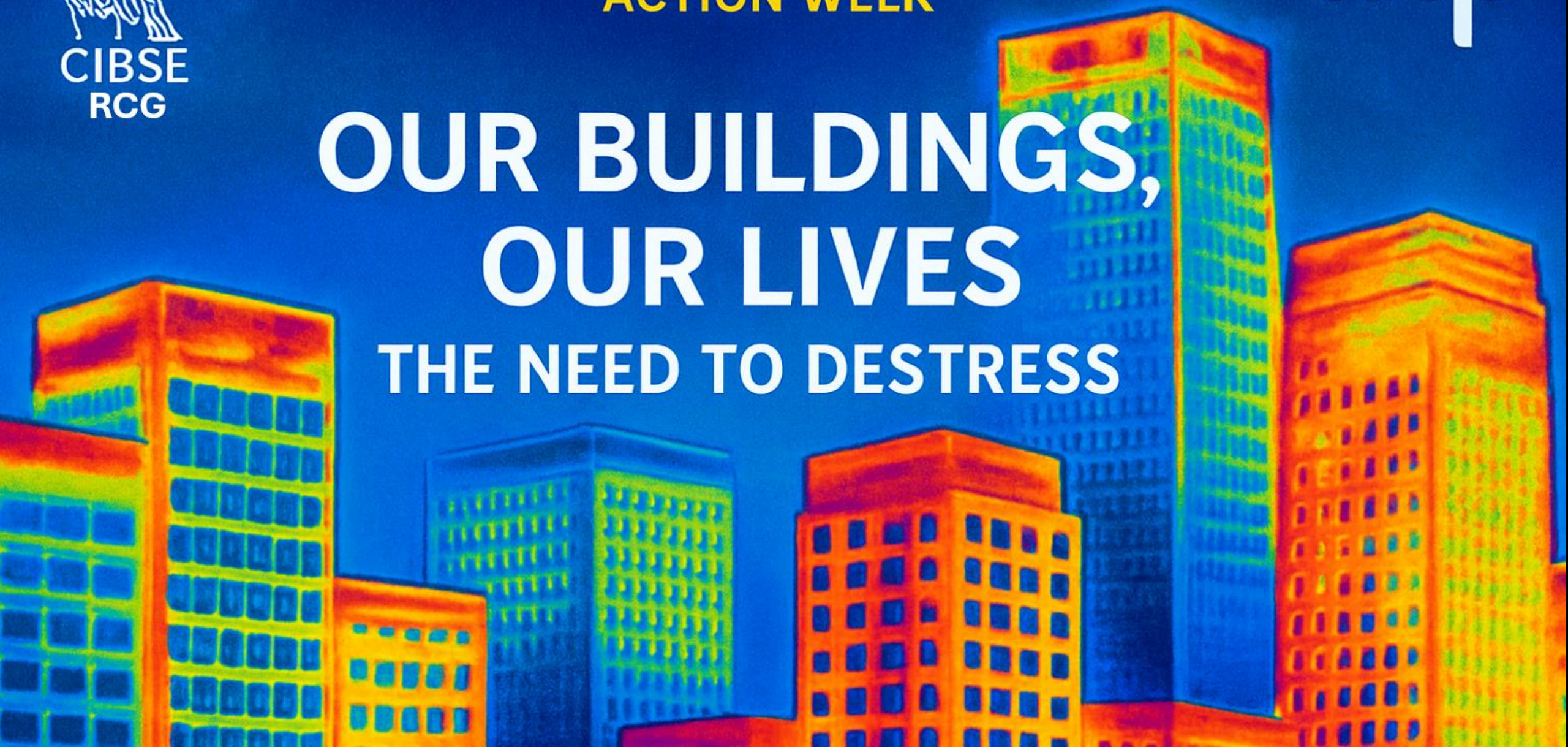
OUR BUILDINGS, OUR LIVES

THE NEED TO DESTRESS



CIBSE Resilient City Group

Chair: Darren Woolf

Vice Chair: Bahareh Salehi

Link: **Resilient Cities Group**

Subgroup: **UK Urban Environmental Quality (UKUEQ)**

CIBSE Resilient Cities

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LONDON CLIMATE ACTION WEEK

Our Buildings, Our Lives: The Need to Destress

Speaker

Michael Trousdell
Head of Sustainability – Property & Buildings, WSP UK

Speaker

Christine Wissink
Technical Director, Climate Resilience & Adaptation – WSP UK

Host

Dr Bahareh Salehi
Senior Energy & Sustainability Engineer – WSP UK

What is Climate Resilience?

Climate change is something that will happen in the future, not something I have to worry about now.

Climate change is Net Zero, right?

I can build my way out of climate change.

One or two degrees doesn't sound like much

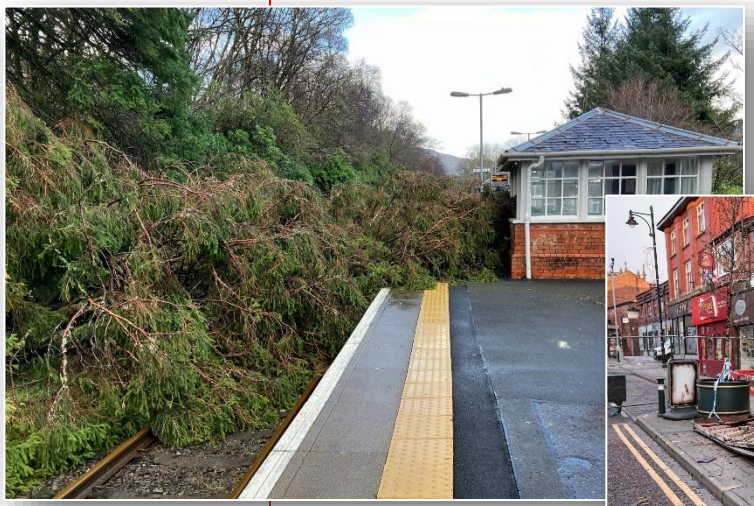
With the ongoing cost of living crisis, who has time to think about the environment - there are more important things to deal with!

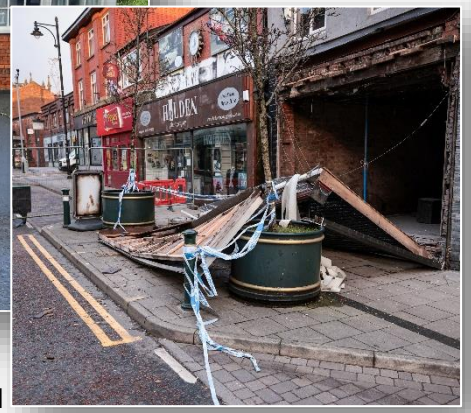
Record breaking cold temperatures? So much for climate change!

Our climate is already changing

Storm Frank (2019)
Image source: BBC News (2019)

Heatwave (2022)
Image source: Guardian (2022)

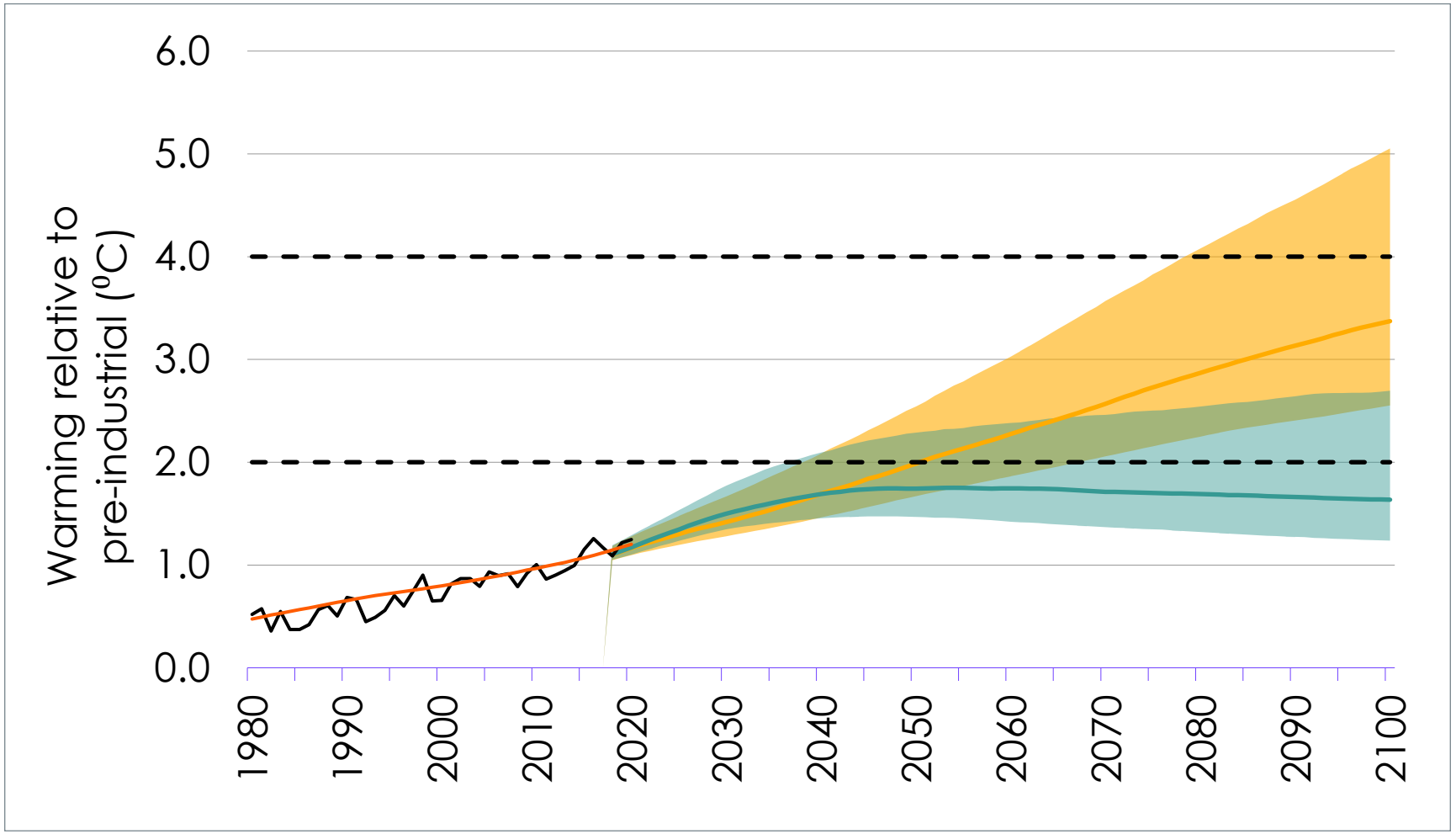




Storm Isha (2024)
Image source: New Civil Engineer (2024, The Sun (2024)

Storm Babet (2023)
Image source: SkyeNews (2023), The Guardian (2023)

How will it change?



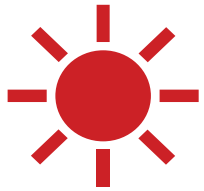
What?

When?

Where?

How much?

How much will it change?



The average summer day could be up to

6.8°C hotter

Increased winter rainfall by

over 39%

An increase in the number and severity of wildfires

By the end of the 21st century,

lying snow decreases by almost 100%

A shift in the growing season

An increased likelihood of surface water and river flooding, influenced by tides and extreme rainfall

Heatwaves occurring **four times** more often

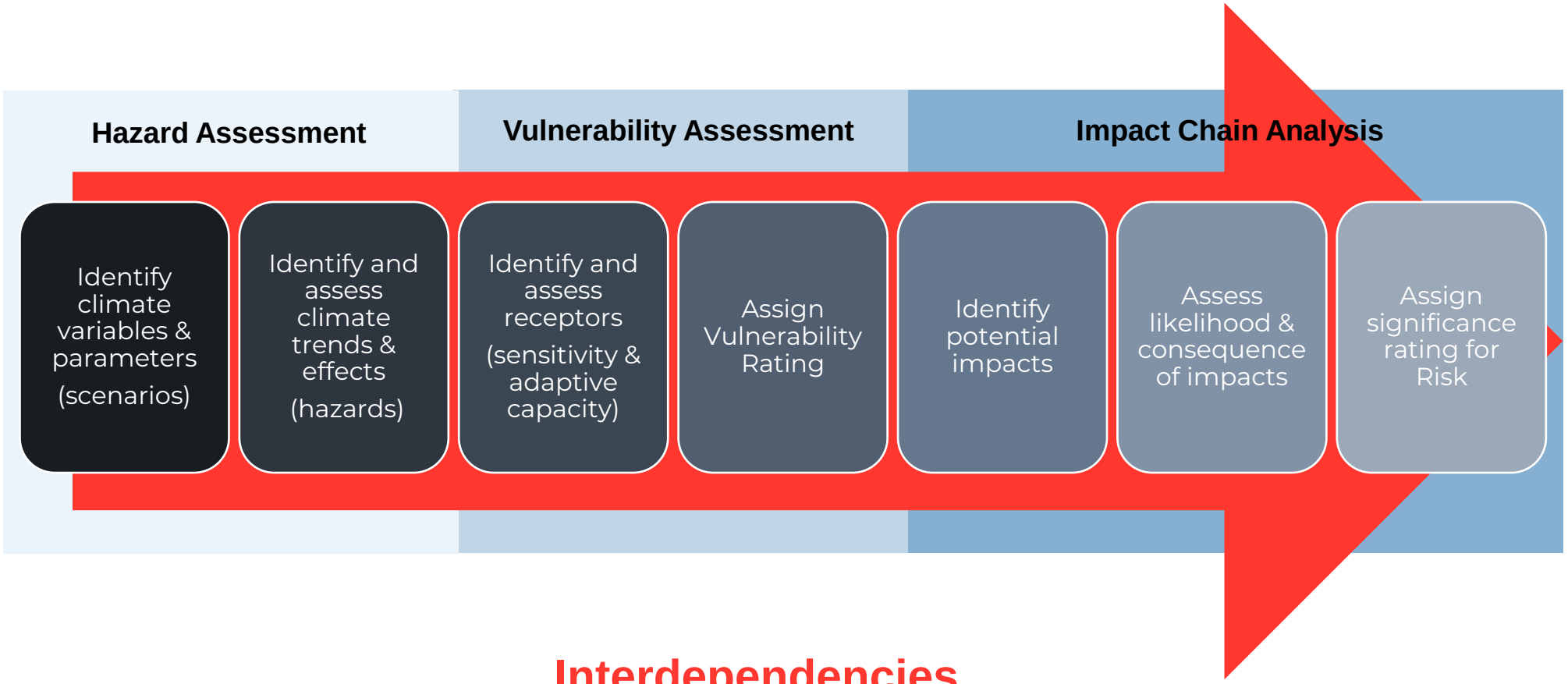
Reduced summer rainfall by

over 45%

An increase in the frequency and intensity of storms

Source: UK Climate Projections

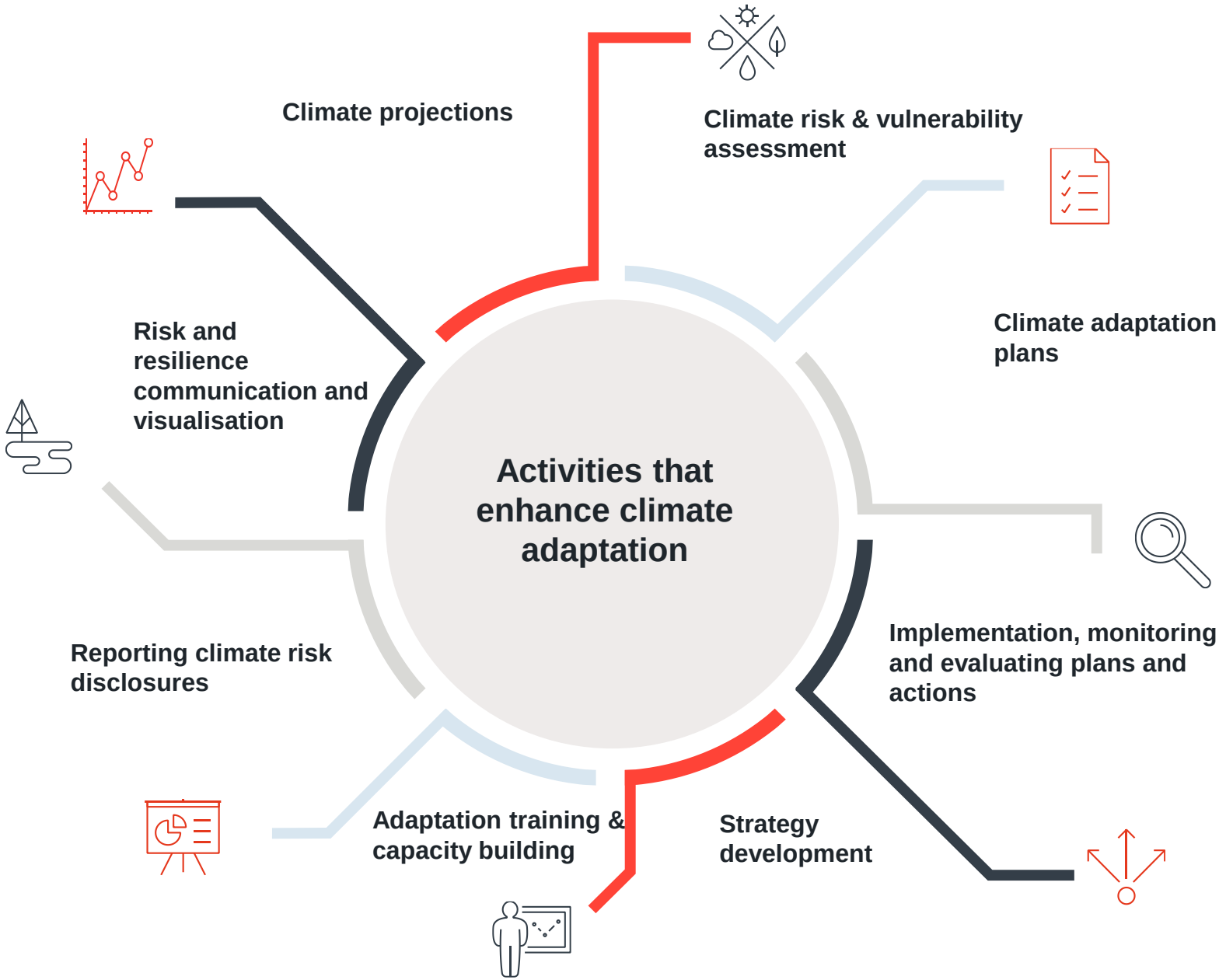
Evolution of Climate Risk Assessment



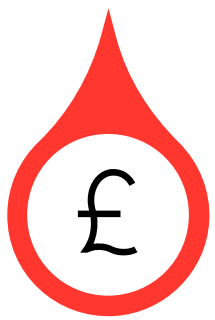
Interdependencies

Cascading Risk

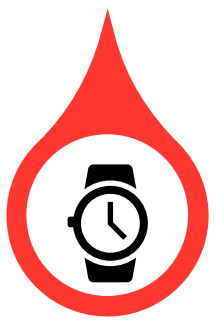
Managing Climate Risk



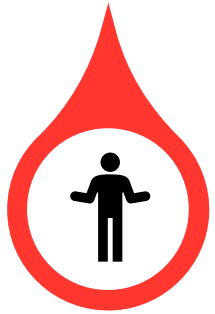
Adaptation Barriers



Percieved High costs



Capacity constraints



Lack of support

Funding Sources

Cross-cutting priorities

Transformational Change

Partnerships and collaboration

Reliance on Engagement

What are key challenges for our built environment?

- We have an old and aging infrastructure that has suffered from decades of under investment
- Assets are already in need of general maintenance and repair to keep them ‘as is’ and lacking budgets to do so
- Emergency works to fix failures divert existing funds, meaning even less budget to adapt
- This fragmentation makes the identification of risks, prioritisation of works and allocation of funding difficult
- Other strategic drivers add to the complexity, including Net Zero and Biodiversity Net Gain
- In the face of this complexity struggling to make proactive, informed decisions around adaptation

What are the benefits of adaptation?

£1 spend on adaptation can bring up to £10 benefit (CCRA, 2021)

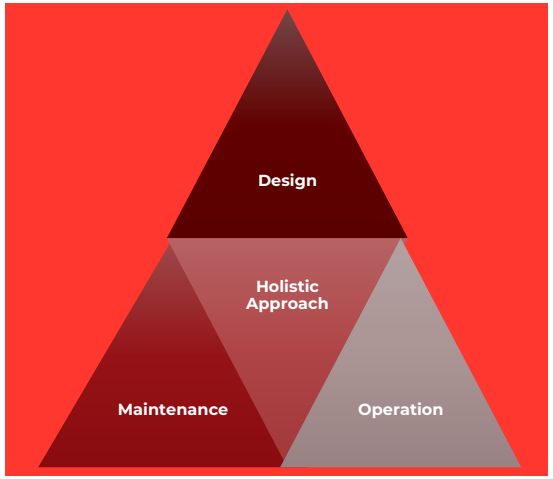
- **Achieving strategic objectives** – resilience planning helps to strengthen the ability to achieve objectives over the long-term.
- **Reducing impacts on service demand and delivery** – ensures continued delivery of key services
- **Reduced financial costs** – adaptation action is generally cheaper, and more effective over time than the costs incurred responding to the impacts over time.
- **Delivering co-benefits** – improving health and wellbeing, skills and employment, reducing emissions and supporting biodiversity.

Adaptation Measures and Planning

Solution

Effect

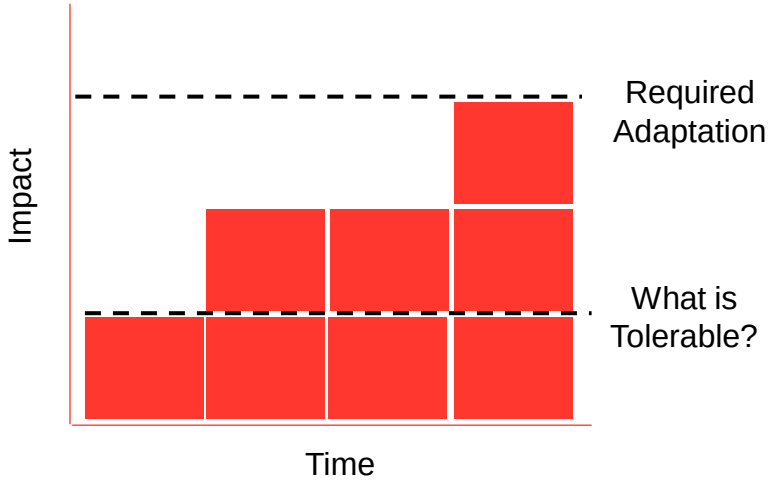
Timing

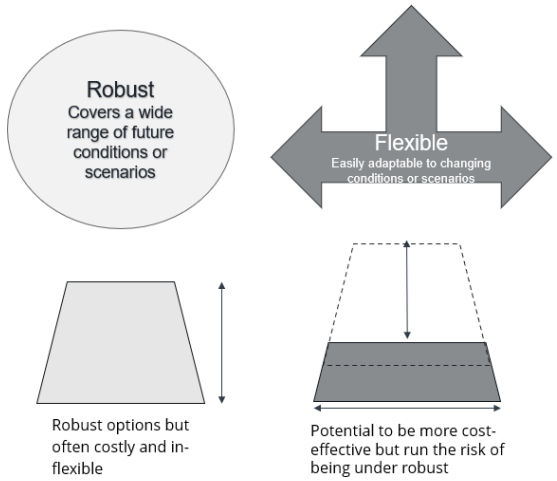


Action

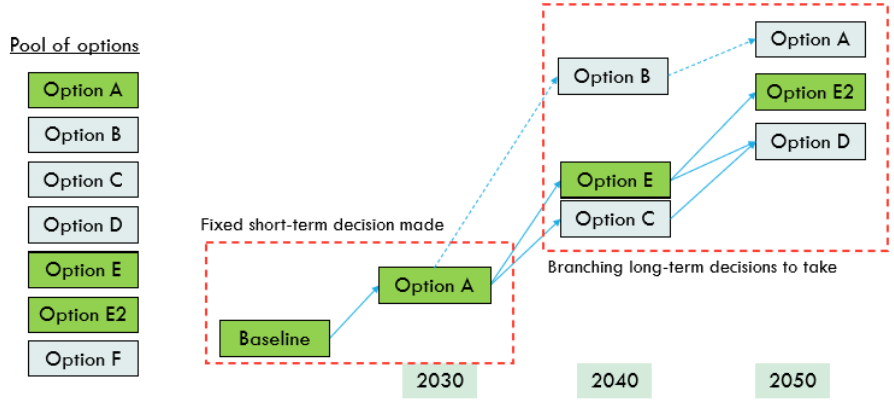
Adaptation Planning and Pathways

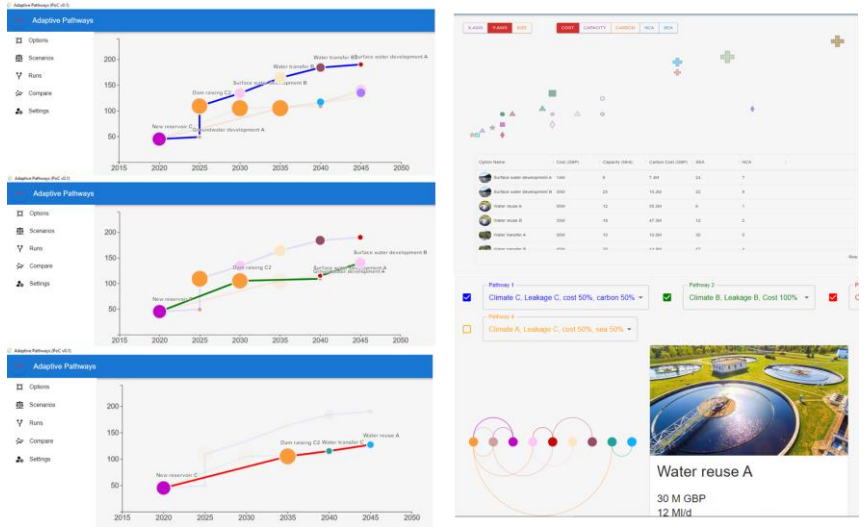
Adaptation Capacity Considerations





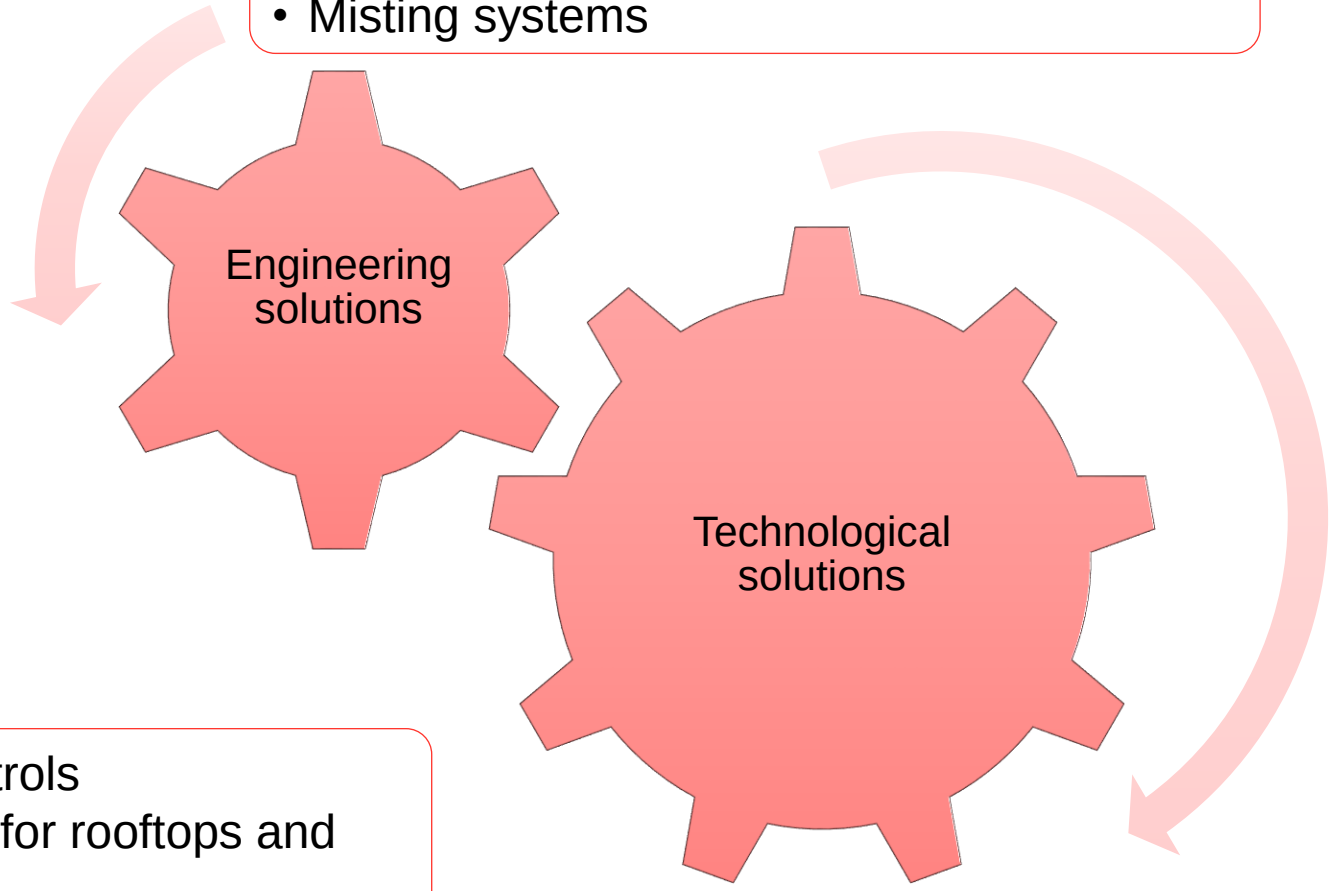
Adaptation Planning and Pathways





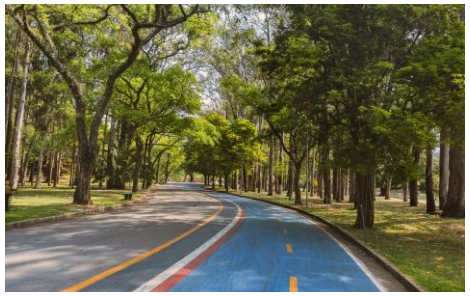
Grey Solutions

- Shutters
- Triple glazed windows
- Ventilation and passive cooling design
- Misting systems



- Integrated controls
- New materials for rooftops and pavements
- Electrochromic Glass

Green Solutions



Tree Planting

Benefits: Dissipates heat, provides shading, cools temperatures, improve water quality, reduces flood risk, provides habitat.

Green corridors and green spaces

Benefits: cools temperatures, provide natural ventilation, reduce UHI, carbon sequestration, attenuation of surface runoff, physical and mental health benefits, biodiversity and habitat maintenance and creation, social benefits.

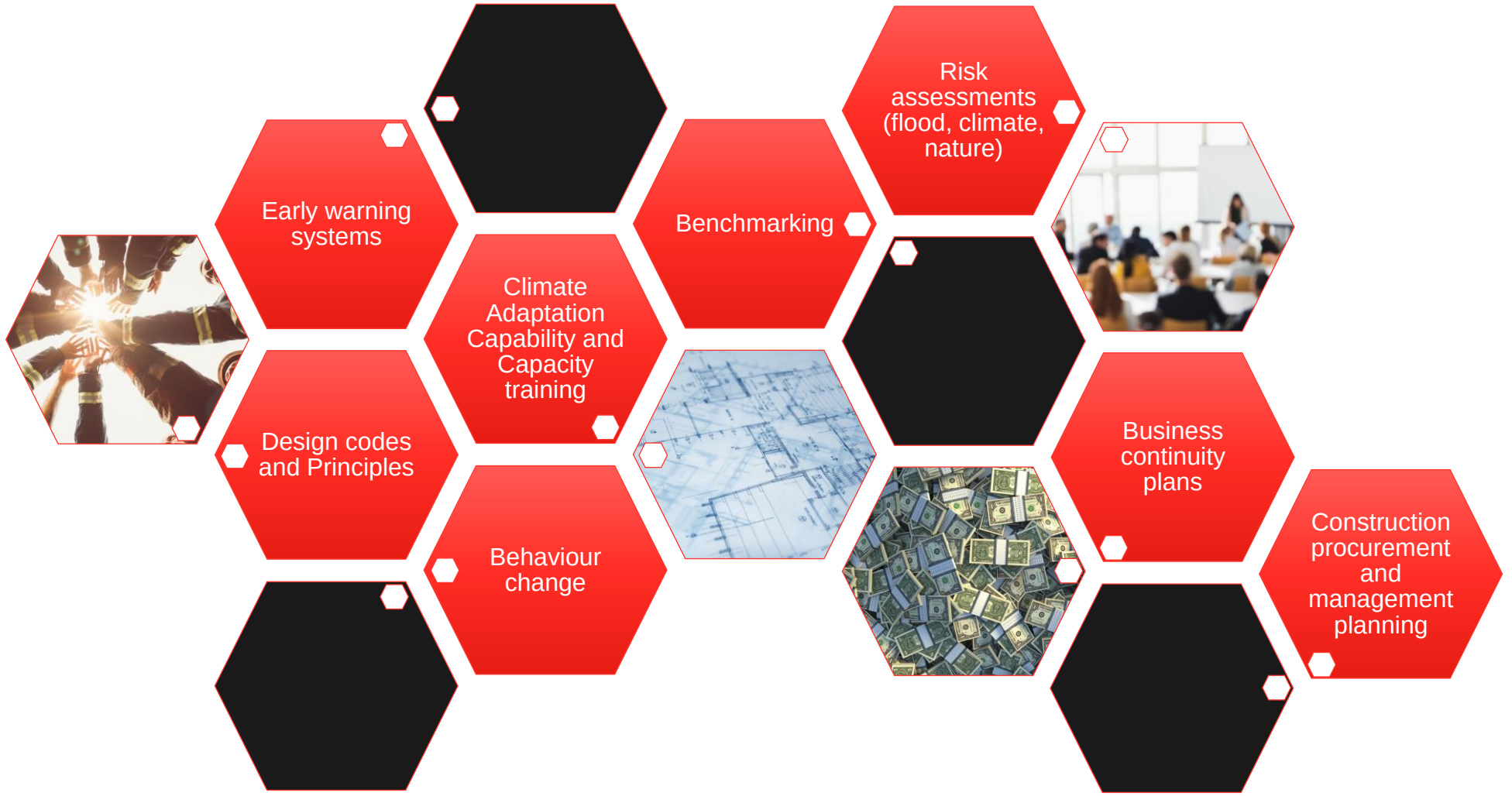
Water features

Benefits: physical and mental health benefits, attenuates extra water, energy, slow water transfer, helps soil stability, increase infiltration, improves biodiversity and habitat creation.

Greening linear transport infrastructure

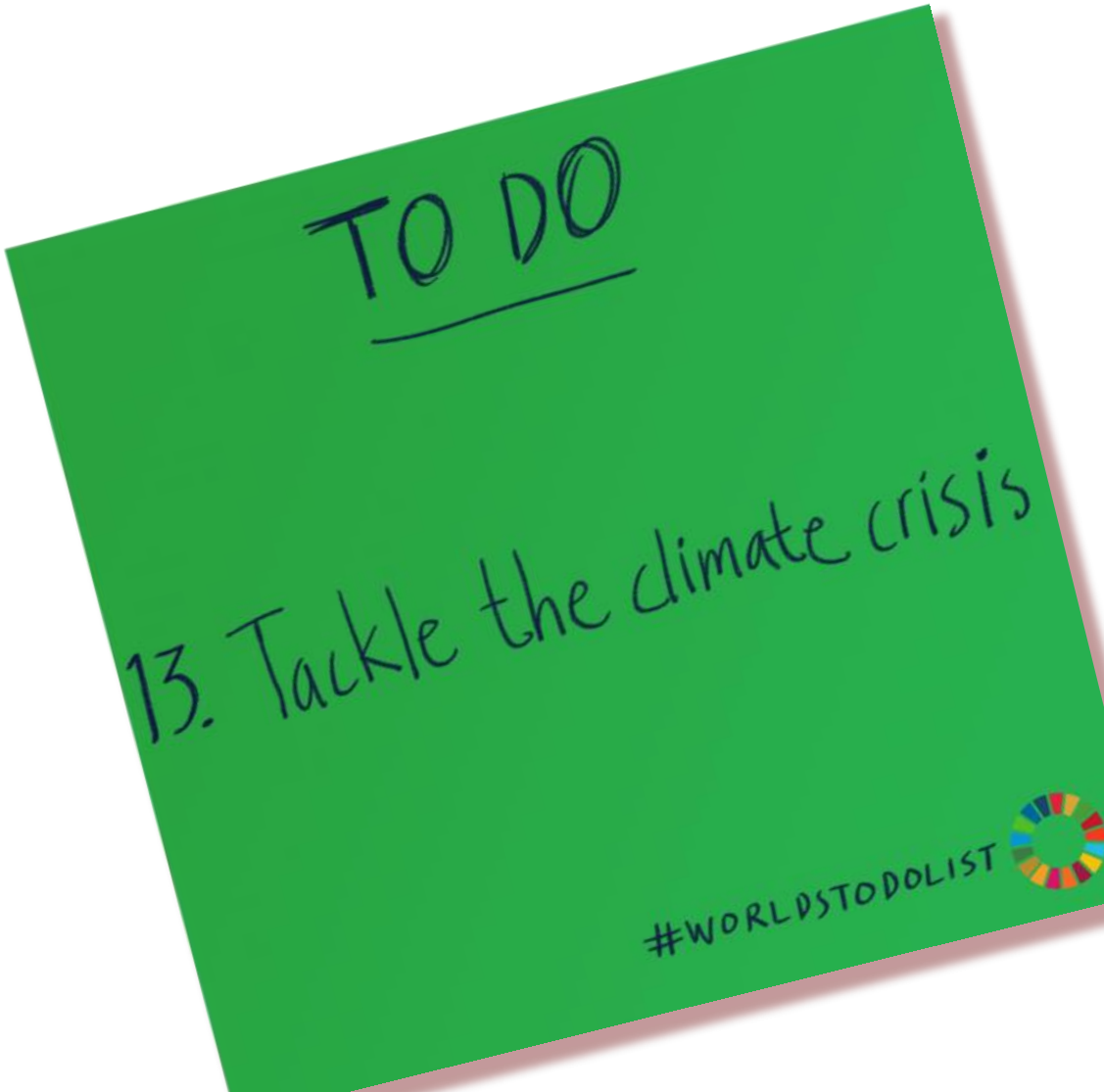
Benefits: Reduce urban heat island, reduce noise, addresses surface water flooding, improves ecological connectivity, carbon storage.

Soft Solutions



The Value of Adaptation

1. Climate change is already happening
2. We need to better understand risks, scenarios and uncertainties
3. Proactive action will reduce impacts and costs
4. Resilient Built Environments have a leading role in preparing for and adapting to climate change



OVERHEATING CHALLENGES IN HEALTHCARE

- ✓ Building Resilience in a Changing Climate
- ✓ Managing Overheating Risks in Critical Infrastructure
- ✓ Focus on Healthcare Facilities

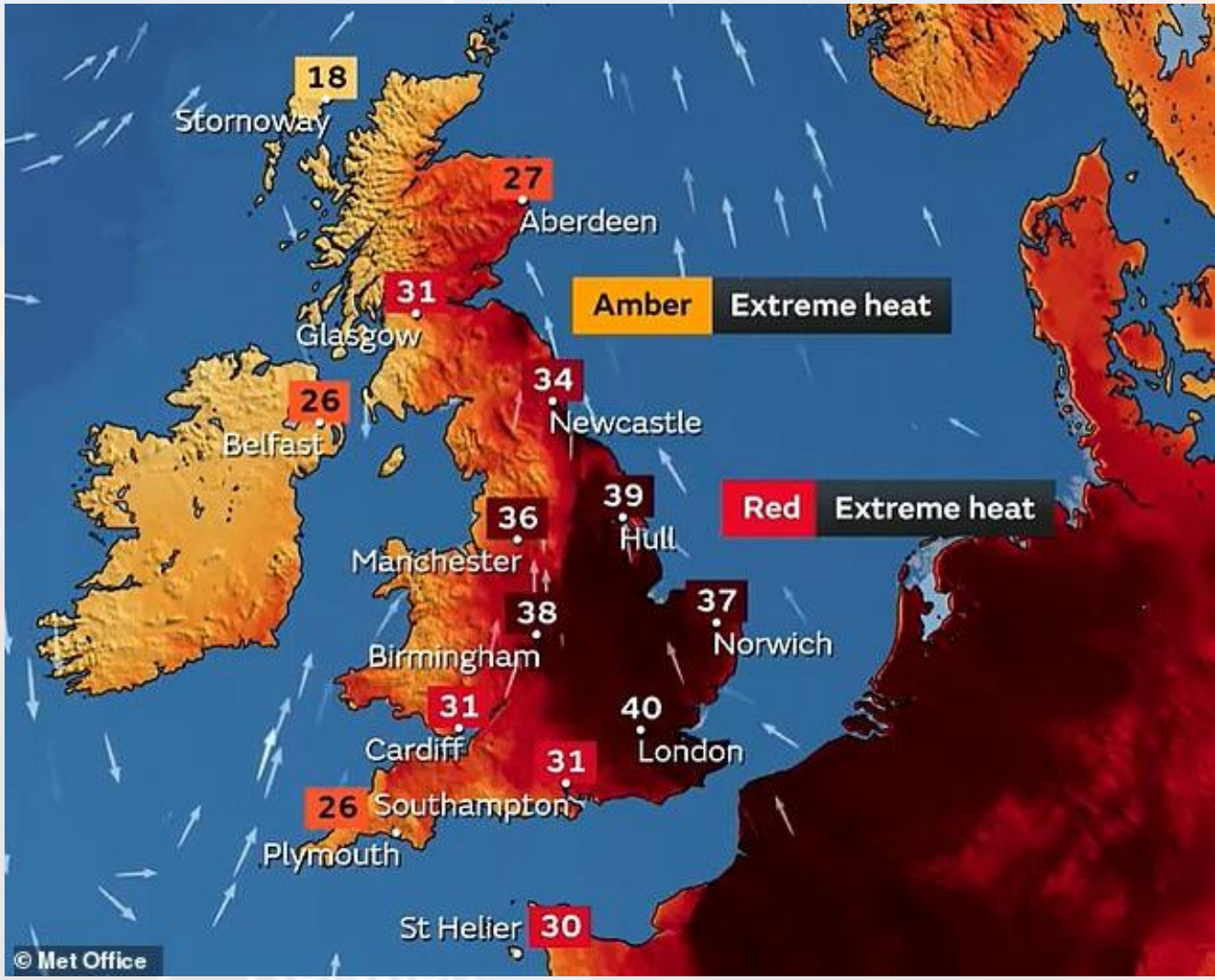
Speaker: Michael Trousdell, WSP
Date: 23.06.2025

The New Reality

- ✓ The 2024 Climate Resilience Review, summarises very well the challenges faced in London but also experienced in cities around the UK and beyond.

The New Reality

- ✓ July 2022: UK recorded 40°C for first time
- ✓ Climate projections suggest 6 to 7 times increase in >32°C days by 2070s
- ✓ Europe warming at twice the global rate
- ✓ Extreme heat events becoming business-as-usual



Impact on Building Systems

- Traditional HVAC is designed for a max 30°C operation
- 90% of hospital wards are at risk of overheating
- Cascading failures: IT systems, lifts, medical equipment
- Guy's and St Thomas' servers failed in the 2022 heatwave

Central Plant Vulnerability

- ✓ Chillers lose efficiency above design temperatures
- ✓ Cooling towers struggle with high wet-bulb temperatures
- ✓ Air conditioning systems over 10 years old are designed for 30°C max
- ✓ Peak demand coincides with reduced capacity

Power Grid Dependencies

- ✓ 50% increase in energy demand during heatwaves
- ✓ Grid instability affects cooling systems
- ✓ Backup generators also vulnerable to overheating
- ✓ Critical services at risk during power fluctuations

Water Management Crisis

- 24% of the Thames Water supply is lost to leakage
- 50% increase in consumption during 40°C temperatures
- Reduced pressure affects cooling system performance
- Forecast shortfall of 1 billion litres by 2050

Concurrent System Failures

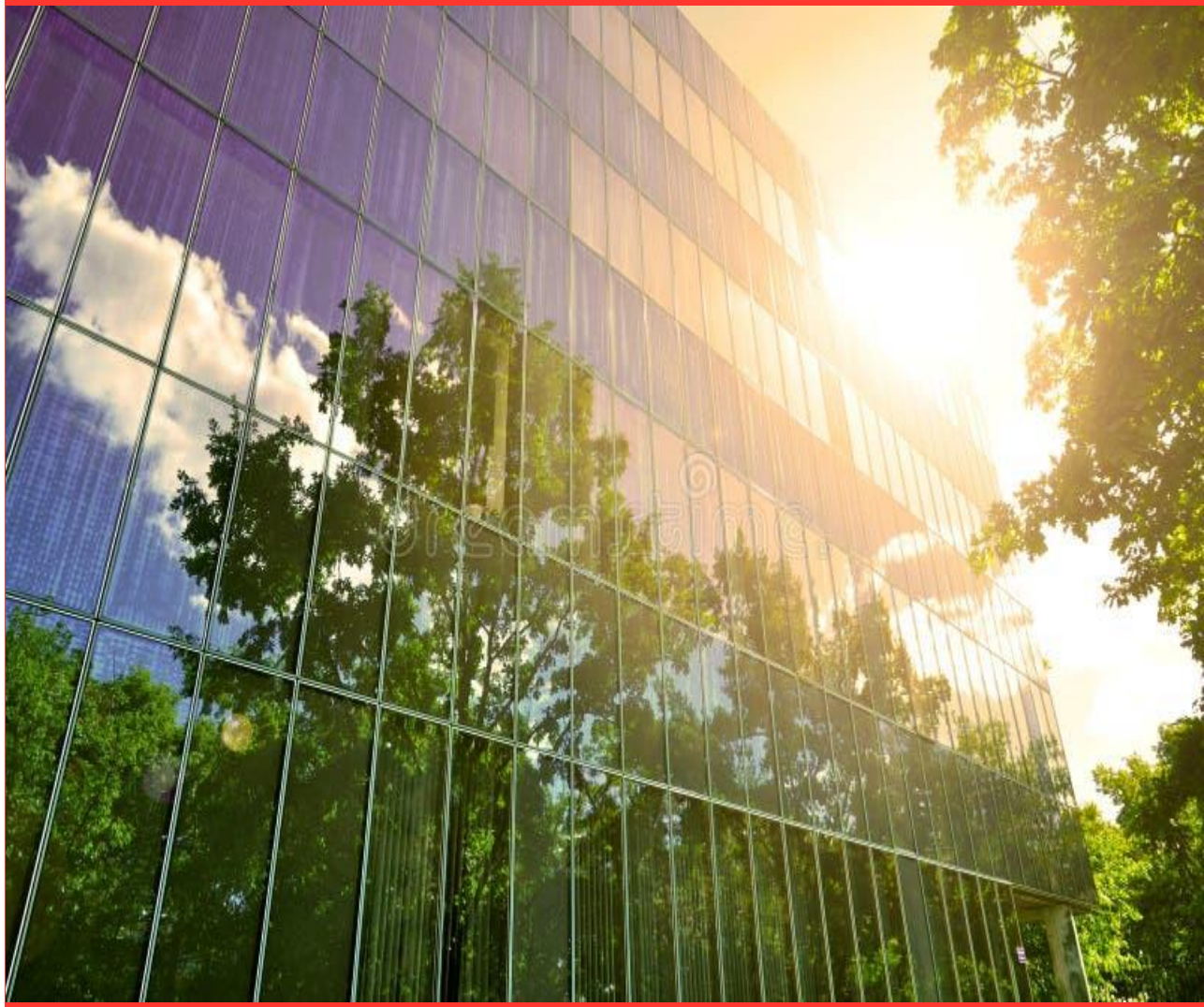
- ✓ Water pressure reduction impacts firefighting capability
- ✓ Subsidence affecting 43% of London properties by 2030
- ✓ Pipe movement and cracking from soil moisture deficit
- ✓ Multiple infrastructure systems failing simultaneously

Existing Building Challenges

- ✓ 80% of the 2050 building stock already exists
- ✓ Half of UK homes suffer from overheating risk
- ✓ Retrofit complexity in occupied buildings
- ✓ Heritage building constraints limiting interventions

Poor Adaptive Design

- Thermal mass working against cooling needs
- Insufficient external shading systems
- High internal gains from equipment/occupancy
- Limited night-time purge ventilation

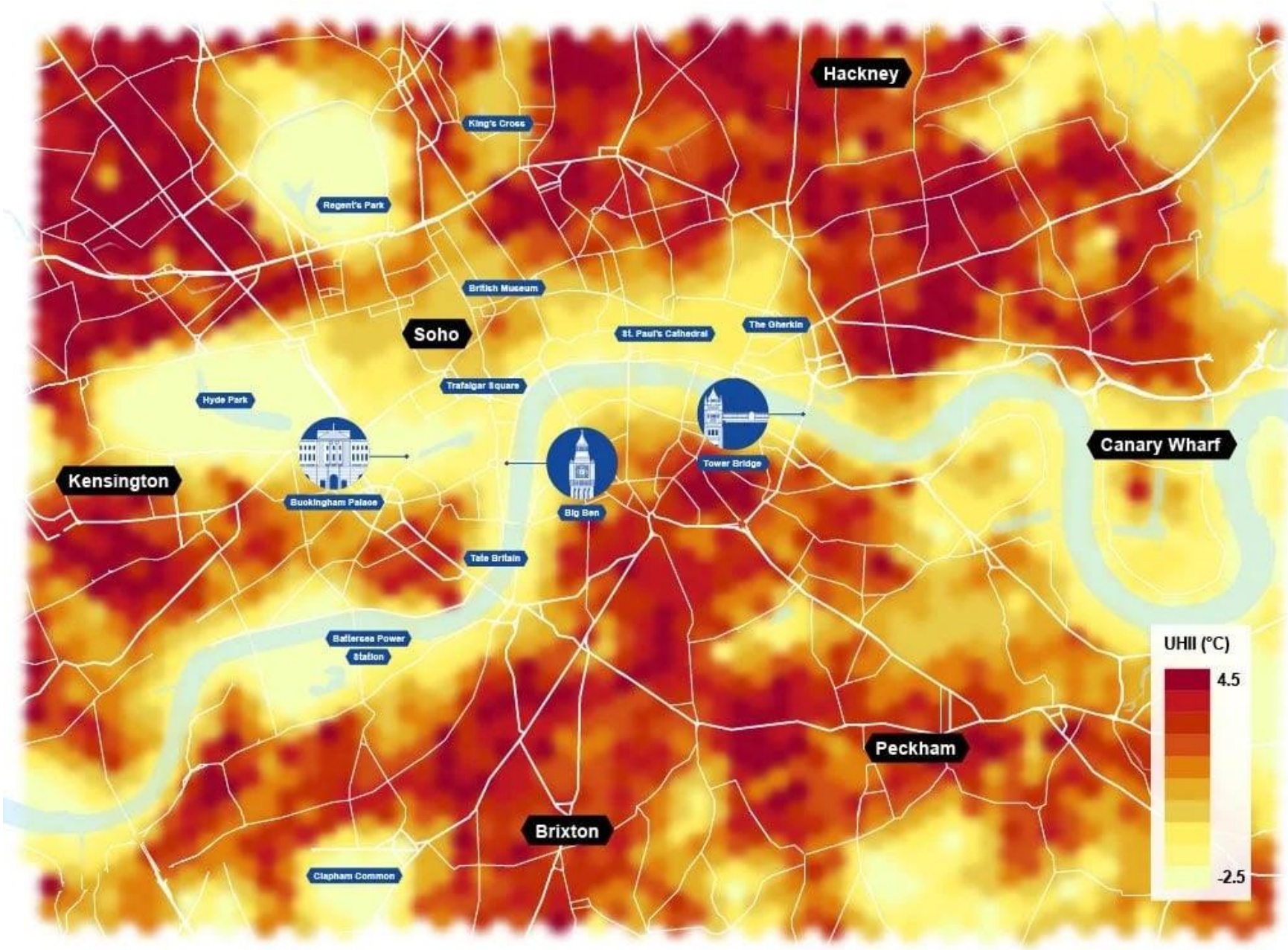


Ventilation Inadequacies

- **Natural ventilation is insufficient in heat islands**
- **Mechanical systems undersized for new extremes**
- **Air quality deteriorates with high temperatures**
- **Opening windows often increases heat gain**

Urban Heat Island Effects

- London can be several degrees warmer than rural areas
- Dark surfaces absorb solar radiation
- Areas with fewer trees up to 5°C hotter
- Limited green infrastructure for cooling



NHS Estate Challenges

- £11 billion maintenance backlog across the NHS
- Aging infrastructure not designed for current loads
- Multiple competing priorities for limited funds
- Emergency response vs. long-term adaptation

Medical Equipment Heat Loads

- Modern diagnostic equipment generates significant heat
- MRI, CT scanners require precise temperature control
- Server rooms and data centers in basements at flood risk
- 24/7 operation with no downtime for cooling

Patient Vulnerability

•Elderly population is most at risk from heat mortality

• Pregnant women identified as the key risk group

• Medication affects thermoregulation

• Limited mobility restricts adaptive behaviours

Overcrowding impacts

- Increased occupancy raises internal temperatures
- 100+ patients evacuated due to flooding in East London
- Emergency departments operating above capacity
- Visitor numbers add to heat loads

Staff Working Conditions

- Indoor temperatures over 30°C throughout night shifts
- No legal maximum temperature for UK workplaces
- Healthcare workers in strenuous conditions
- PPE exacerbates heat stress

Critical Service Disruption

- Operations are cancelled when IT servers fail
- Hammersmith & Fulham: 18 lifts failed in the 2022 heatwave
- Cold chain disruption for medications
- Laboratory sample integrity compromised

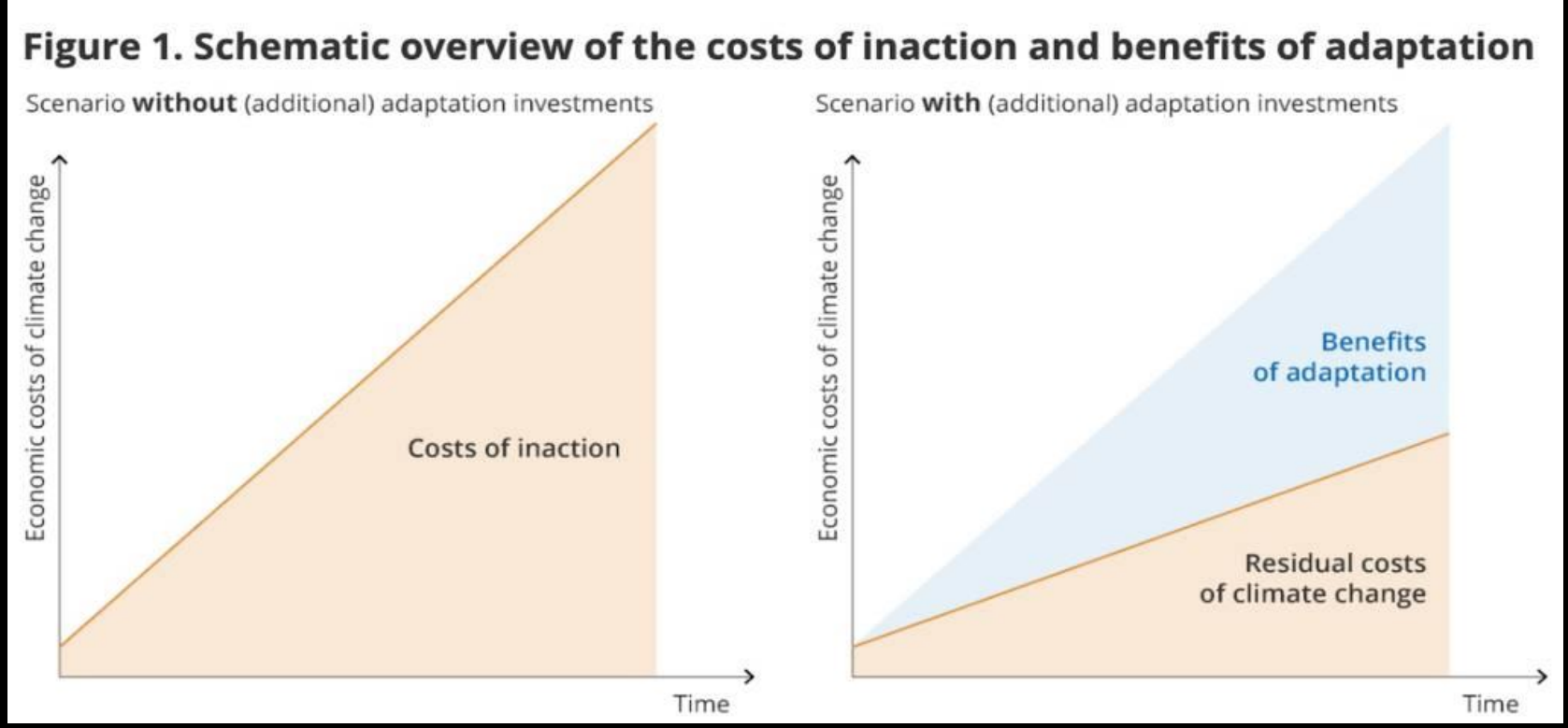
London NHS trust cancels operations as IT system fails in heatwave

Guy's and St Thomas' trust having to postpone and divert appointments, with doctors unable to see patients' notes

Both of the trust's data centres, one at Guy's hospital and the other at St Thomas', stopped working on Tuesday afternoon. Photograph: Maureen McLean/Rex/Shutterstock

Case Study – Health Asset Manager

- **Strategic Climate Risk Assessment**: WSP supported a national health asset manager to deliver a climate risk assessment. The aim was to evaluate both transition and physical climate risks across its asset portfolio.
- **Scenario-Based Strategy Development**: considering net zero transition
- **Physical Risk Profiling**: Flooding as the most immediate threat (affecting 10% of assets), with heat stress becoming dominant over time.



Adaptation Investment Case

- Returns on adaptation investment 2:1 to 10:1
- £577 million annual productivity losses from heat
- Proactive adaptation is cheaper than emergency response
- Climate impacts could reduce London's GDP by 2-3% by 2050s

Call to Action

- Integrate adaptation into all building upgrades

– **adjust design criteria!**

- Develop heat action plans for critical facilities

- Invest in a passive shading systems

- Build resilience before the next extreme event

Final word

The most successful retrofits combine multiple cooling strategies **and prioritise the basics:**

- **External shading** systems consistently rank as the most effective passive measure.
- **Cool roof coatings** offer exceptional value, reducing roof surface temperatures by up to 31°C
- **Improving control systems**, especially with the lower cost of smart building technologies.

THANK YOU

For future collaborations:

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WSP Website: Engineering Design Services | WSP

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