UK Research and Innovation

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ATTENUATE
ENABLING UK CLIMATE ADAPTATION

Accelerating investment in adaptation – The ATTENUATE Adaptation Investment Framework in practice

APSE Energy Event, Good Practice, in practice.
25 November 2026

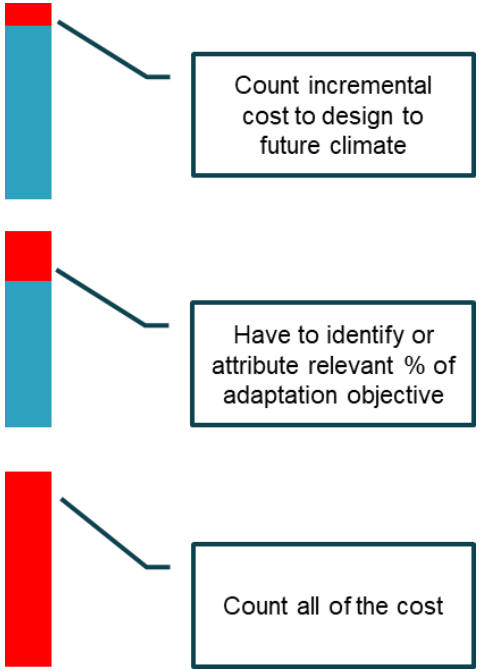
LSE The London School of Economics and Political Science
Grantham Research Institute on Climate Change and the Environment
Paul Watkiss Associates
Environment Agency
LOVE DESIGN STUDIO
University of Bath
Met Office
Green Finance Institute

Objectives

- Set out context and key issues with adaptation financing and the costs and benefits of adaptation
- Share early findings from LSE's ATTENUATE project
- Present case study examples of local authority adaptation investment

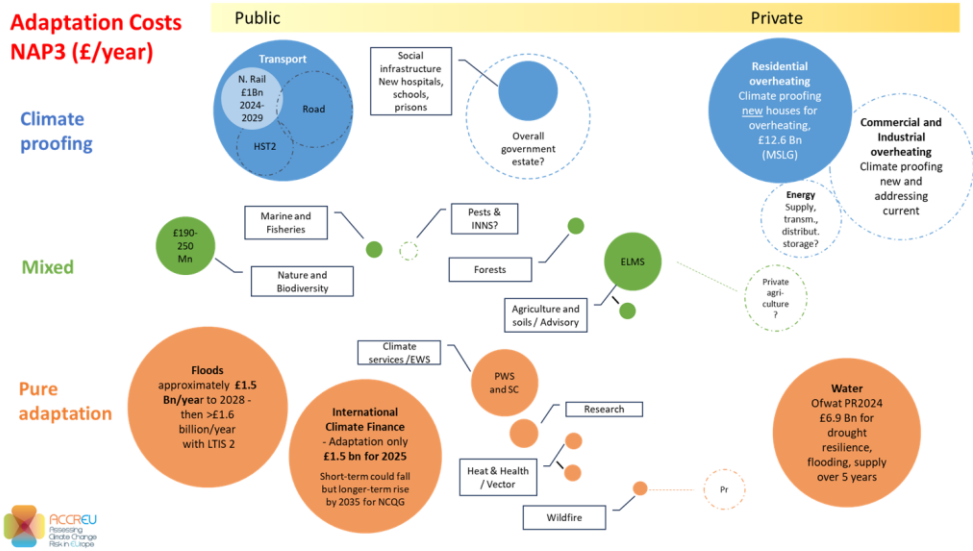
Previous work developed analysis of the costs of adaptation

- Adaptation involves different types of actions.
- Type 1) Climate proofing. Adaptation is secondary objective, incremental costs and benefits.
- Example. Climate proofing new High-Speed Rail 2
- Type 2) Mixed objectives. Adaptation is one of a number of priority objectives, level of attribution of adaptation
- Example. Peatland restoration.
- Type 3) Pure adaptation. Adaptation is the primary objective, drives the costs but also all the benefits
- Example. Coastal flood protection to sea level rise



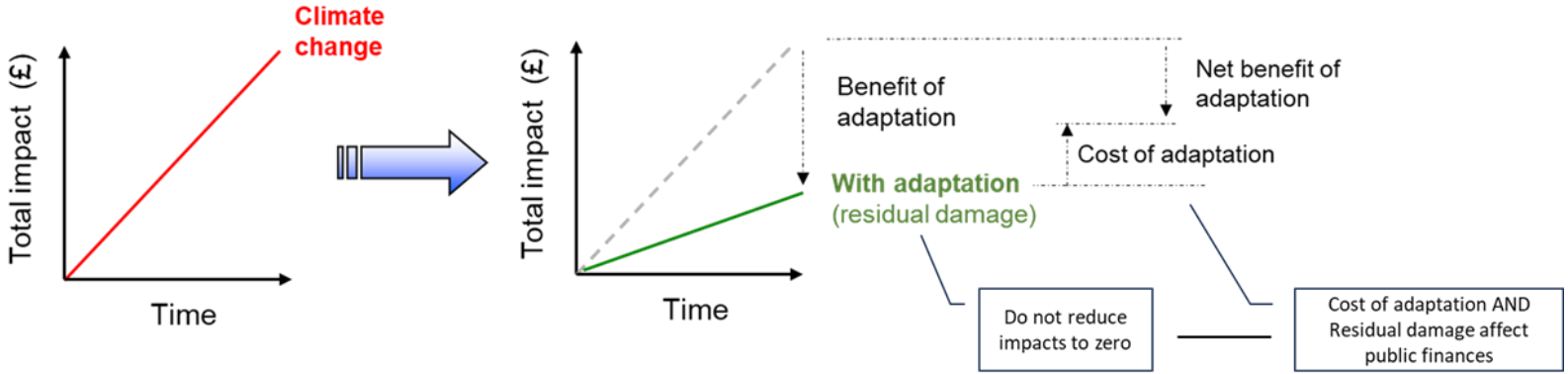
Context

- Gap between level of risk and policy and financial commitments in place to reduce risks is widening.
- Costs of adaptation are currently modest in UK (NAP3)
    - ~£11 billion/year = circa 0.4% of GDP
- Around 60% public, 40% private (including households)
- Costs likely to rise significantly in NAP4 & beyond – and in extremes - 2022 heatwave resulted in £1.8bn economic costs for London (England et al., 2026)
- Urgent need to better understand costs and benefits, unlock barriers and mobilise adaptation finance



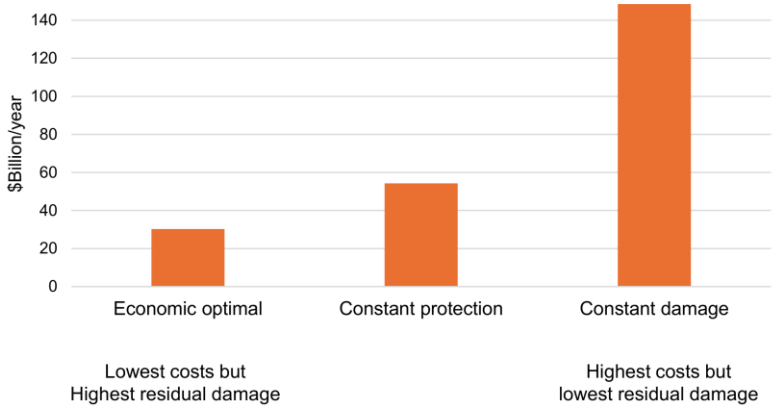
The economics and financing of adaptation

- Adaptation can reduce the impacts of climate change leading to economic benefits – but it has a cost
- And adaptation is not perfectly effective and there are residual costs after adaptation. This means there are trade-offs

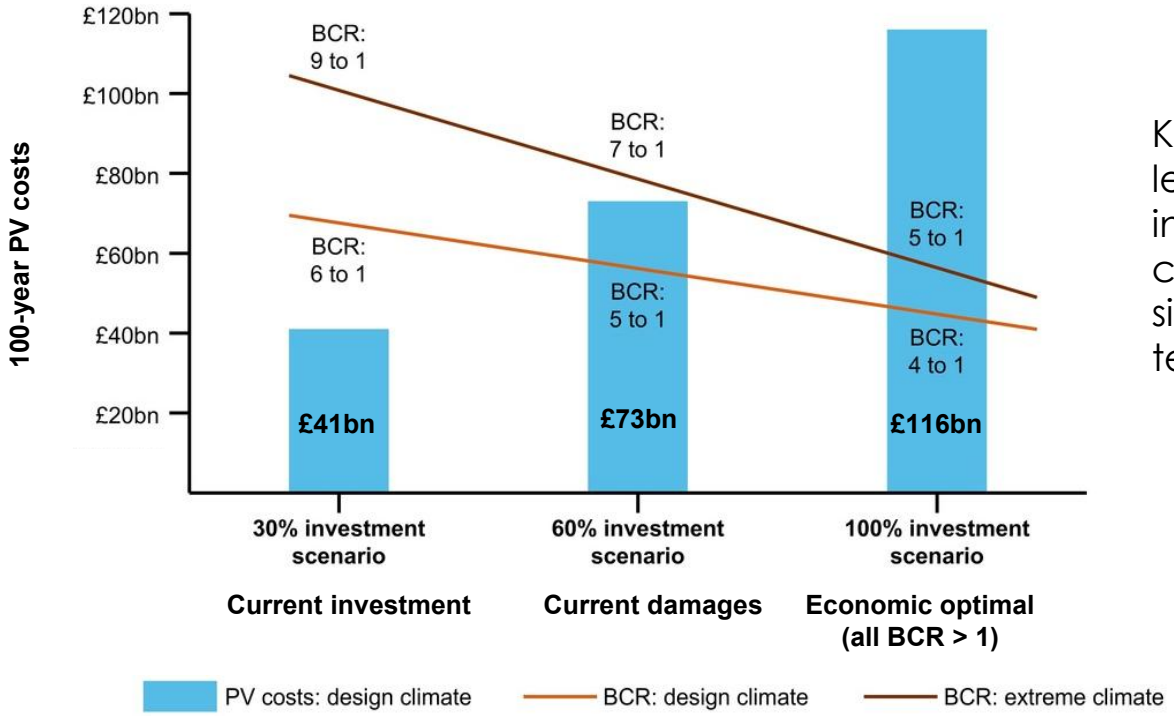


Objectives strongly influence costs, benefits and residual damage

- Example of global adaptation costs of river flood protection – constant damage many times higher than ‘economic optimal’
- Can be managed by more explicit focus on ambition, well set objectives, clear climate scenarios



UK example - Long Term Flood Investment Scenarios

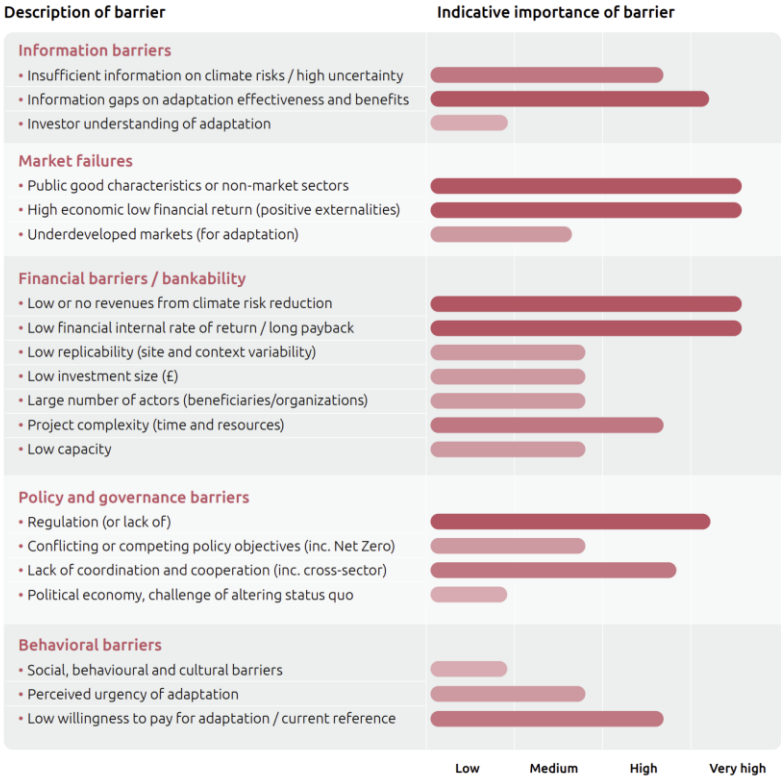


Keeping damages at today's levels requires a *doubling* of investment – affordable in context of UK, but a significant increase in policy terms.

Source: Environment Agency, 2026.

Barriers to adaptation finance

- A wide range of barriers / market imperfections in the literature identified as mobilising finance
- Market failures, information gaps, public good characteristics, low revenues and lack of regulation and willingness to pay all significantly challenging
- Research hypothesis (and emerging practice) suggests that enabling conditions can be used individually or in combination to overcome them

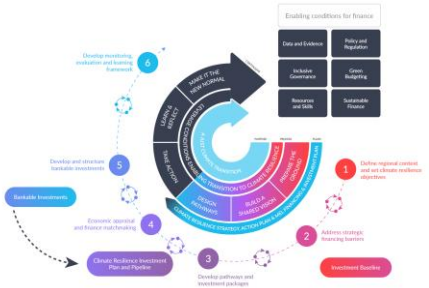


Example of barriers to adaptation finance and potential importance. Source: Watkiss (2023)

A. Adaptation actions typically funded by the public sector	B. Adaptation actions funded by a mix of public and private sectors	C. Adaptation actions funded by the private sector
Characteristics		
• Public costs and public benefits • Low or no market return	• Joint costs and joint benefits • Below-market return/market failures	• Private costs and private benefits • Commercial return
Examples		
• Adaptation public goods e.g. flood protection infrastructure • Adaptive social protection • Health for the most vulnerable	• Climate proofing critical infrastructure • Climate smart agriculture for smallholder farmers • Increasing efficiency in water use	• Climate-proofing private assets • Cooling in commercial and industry • Enhancing resilience in supply chains

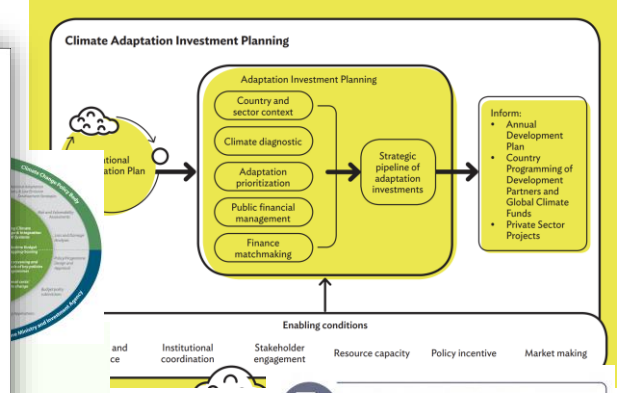
Greater role for public finance (international and national) — *Increasing role of private sector finance* — *Private sector finance*

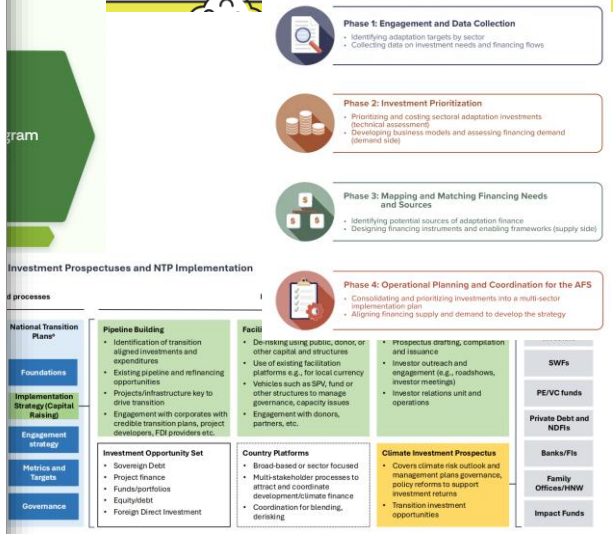
Simplified spectrum of adaptation actions and public and private roles. Source: Watkiss and England (2025), UNEP (2025)











- Many different approaches
- Different approaches and p
  elements and activities (e.g
- Agenda being led by develo
  be relevant in UK context

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Harrington-Abrams et al. (2026)

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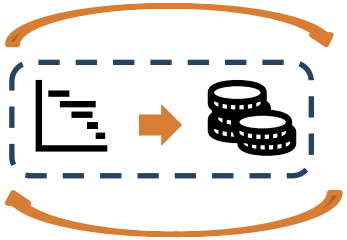
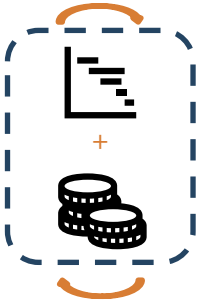
Typologies of adaptation financing approaches







Type	1. Additional step in the adaptation cycle	2. Mainstreamed in the adaptation cycle	3. Standalone process
Description	Economics and financing undertaken after adaptation planning	Economics and Financing *alongside* the adaptation planning.	Economics and financing considered within institutional context
Examples	Asia (ADB), UK (ATTENUATE), C40	Europe (Pathways2Resilience)	Europe (ClimateFIT), OECD, CAIF
Advantages	Provides clear set of adaptation priorities for economic analysis and financing.	Influences upstream design of investments. Aligns with IPCC/EC conception of finance as enabler. Relevant for transformational adaptation	Ready to use when the time arises. Can help as diagnostic for challenges in implementation.
Drawbacks	Further institutional processes required to implement. Investments may not meet financing terms.	Can be challenging to manage multiple processes in parallel	Can be challenging to anchor into wider institutional processes and decisions

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Findings from ATTENUATE



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ATTENUATE overview

ATTENUATE is a collaborative project focused on unlocking private sector funding for climate adaptation, building the case for greater public sector investment, and addressing governance barriers to investment.

Project duration: March 2025 – Sept 2027

Funded by UK Research & Innovation [grant number UKRI282].

Aims and objectives

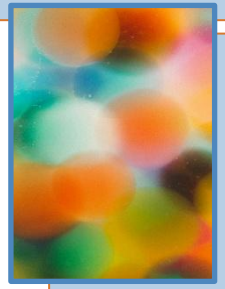
- Generate economic evidence on the costs and benefits of adaptation policies
- Assess how government can leverage enabling environments for mobilising finance
- Identify and tackle behavioural barriers to investment in adaptation.



1 - Diagnose and synthesise barriers in UK adaptation finance at different governance levels and develop and test **an integrated multi-level Adaptation Investment Framework** to address them through three case studies.

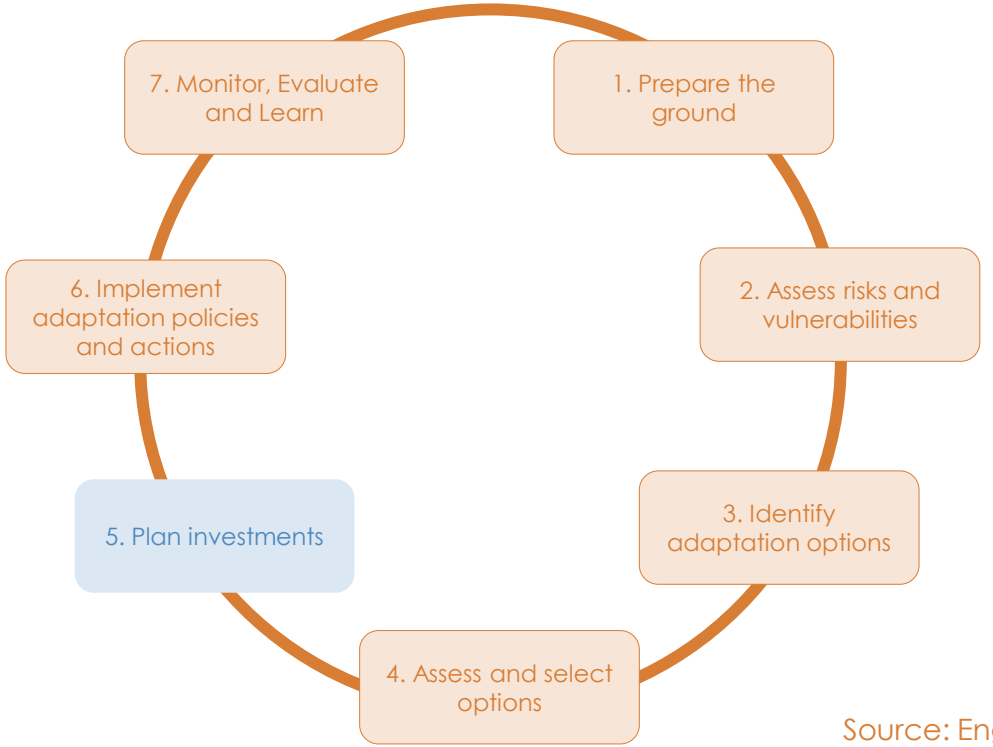


2 - Quantify the impact that changes to enabling conditions are likely to have on **mobilising adaptation investment**, and thus, future climate risk.



3 - Consider how storylines and participatory approaches may support effective communication and uptake of complex climate science and overcome behavioural barriers to adaptation finance.

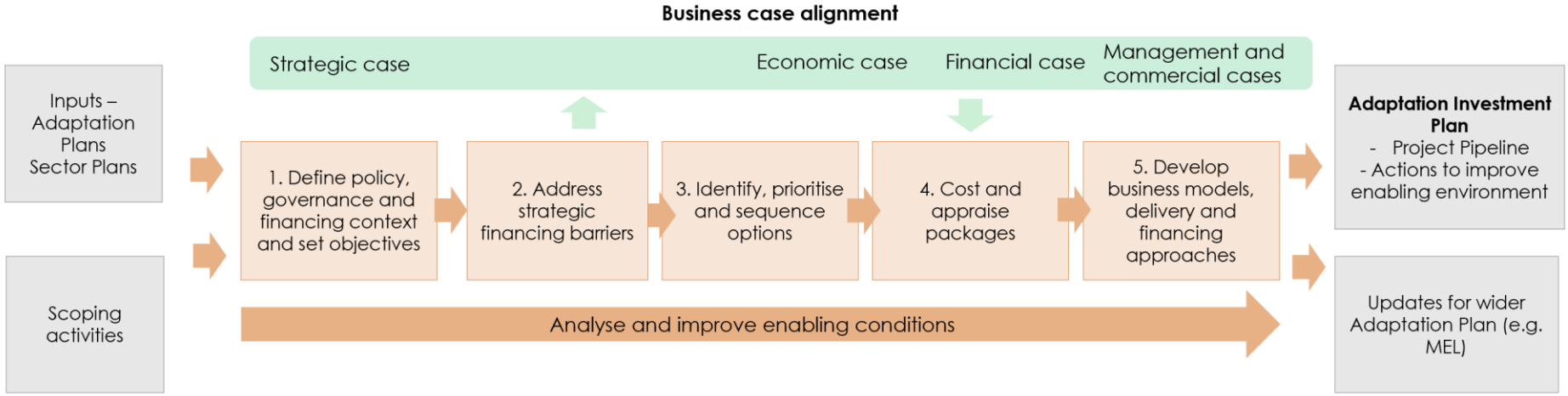
- Different approaches to integration in the literature
- Considered as additional step in adaptation cycle in ATTENUATE
- Designed to translate high level plans and strategies into pipelines of bankable investments



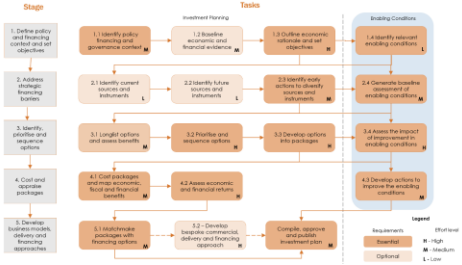
Investment Planning within the NAP Cycle

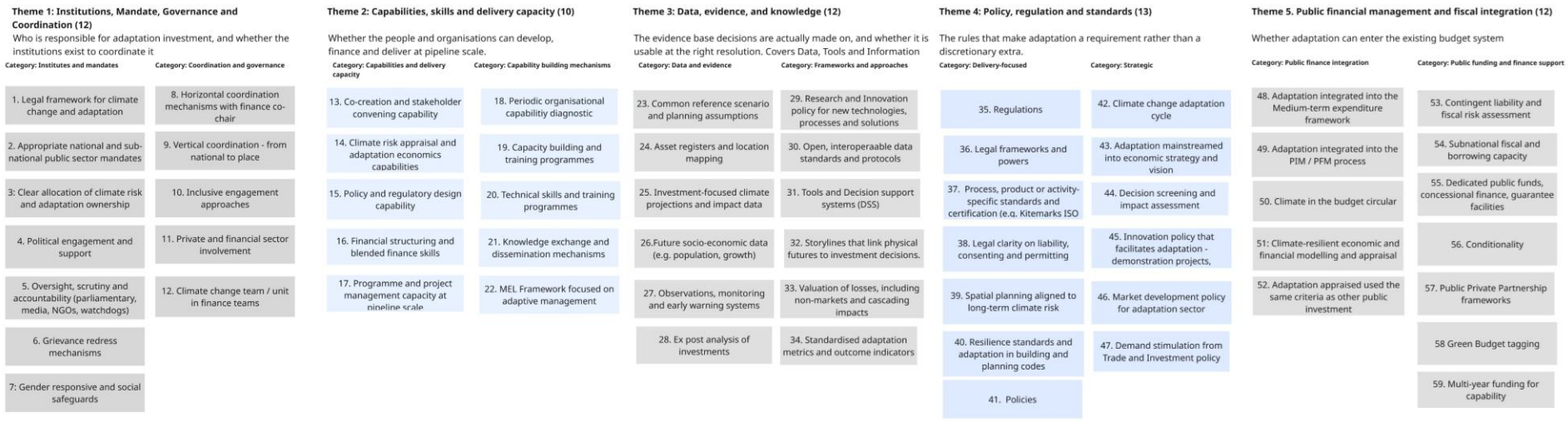
Source: England et al. 2026 (forthcoming) based on Ranger et al., 2010

Framework overview



- Five step process, with 18 tasks, tailored to specific context and users
- Public sector led, with strong involvement of real economy and financial actors.
- Equity and distributional aspects (Just Resilience) included throughout
- Develops a project pipeline and actions to improve enabling environment, whilst supporting wider market making and shaping
- Aligned to key public and private investment approaches (Green Book),





- 84 enabling conditions across 7 domains
- Designed to provide detailed toolkit for specific challenges
- Categorised by ownership, barriers tackled,
- Focus on projects and more systemic market making
- Dedicated new categories of public financial management and political economy and behaviours

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Pilot applications



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ATTENUATE pilots and early outputs of co-creation

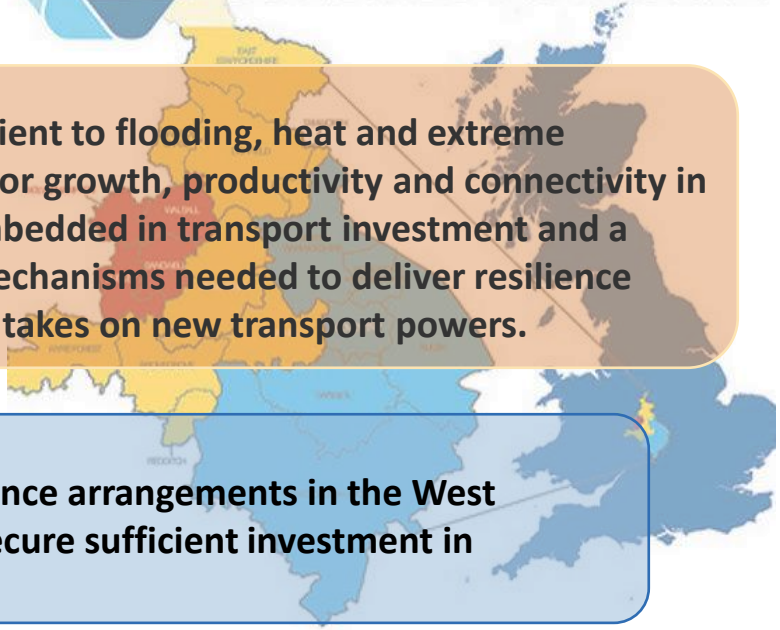
Working with our national, regional and local case study partners to move through (and test) the AIF process, from adaptation options to financing and delivery conditions;

- Understanding the policy context and challenges
- Building up packages of investment, and assessing economic, fiscal and financial benefits to identify who should pay and why;
- Focus on monetisable value to strengthen economic and investment cases; and
- Explore effects of enabling conditions on optimising investment

- Aim to build stronger links between **risks → impacts → adaptation → economics → financing**.

West Midlands pilot - Embedding Climate Adaptation into Transport Investment

WEST MIDLANDS COMBINED AUTHORITY



CHALLENGE

Ensuring the West Midlands transport infrastructure is resilient to flooding, heat and extreme weather, both now and as the climate changes is essential for growth, productivity and connectivity in the West Midlands. However, adaptation is not yet fully embedded in transport investment and a clearer approach needed on the funding and investment mechanisms needed to deliver resilience measures at the scale required, as the Combined Authority takes on new transport powers.

KEY POLICY QUESTION

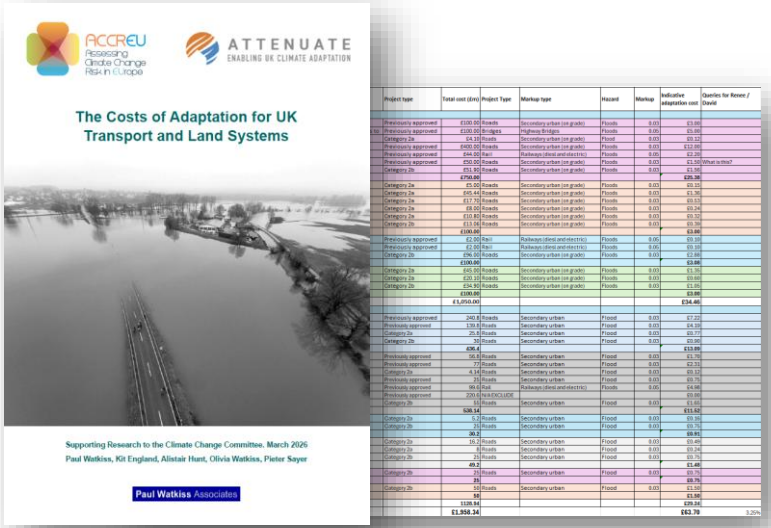
How can transport investment, delivery and governance arrangements in the West Midlands consistently account for climate risk and secure sufficient investment in resilience measures at the scale required?

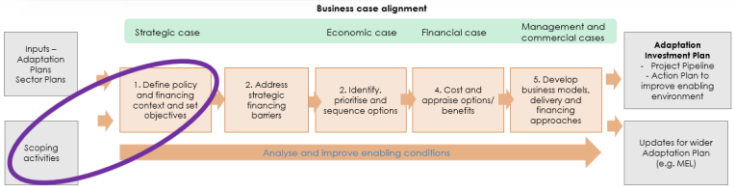
West Midlands case study - Focus /early work / results

- Through devolution, region is taking on new responsibilities for transport investment. Undertaking policy and governance review - Integrating with other WMCA activity (e.g. risk assessment of existing transport)

- Review of transport adaptation costs for UKCCRA4. Indicative estimates of £0.95bnyr – £2.57bn/yr for the 2030s – but significant gaps.

- Also indicative estimates of adaptation costs for flooding in new ~£2bn Transport City Region capital investment – review ongoing but suggested around ~£60m of additional adaptation cost – detailed screening now underway





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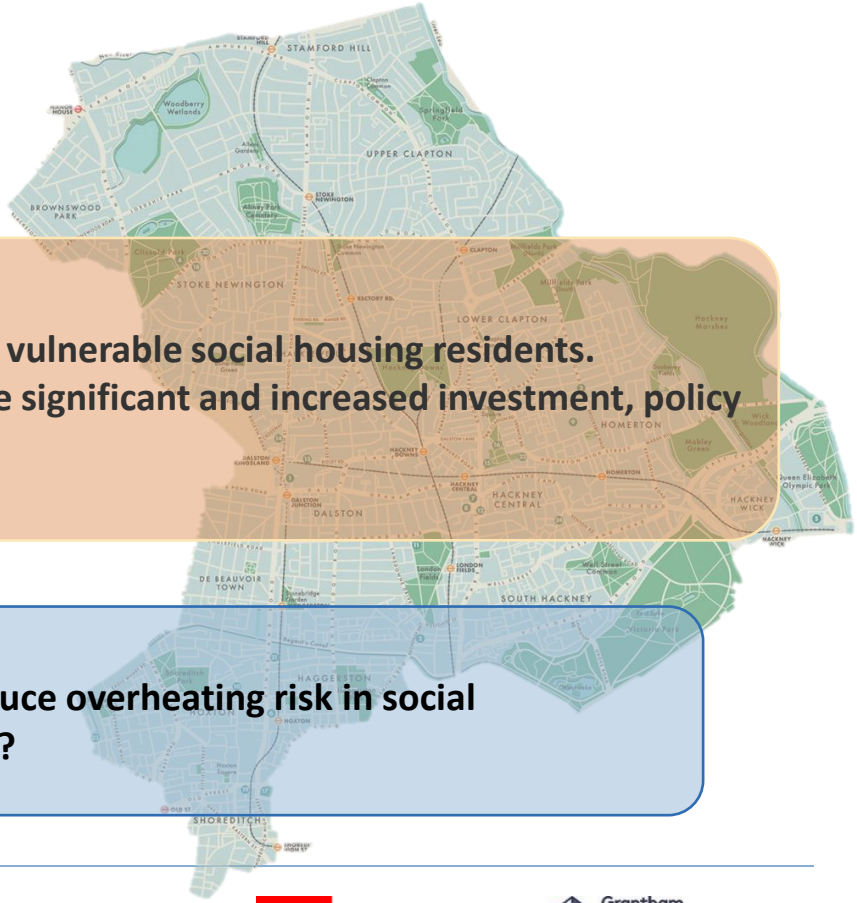
Hackney pilot - Increasing Investment to Reduce Heat Risk in Social Housing



CHALLENGE

Hackney's growing heat risk disproportionately affects its vulnerable social housing residents. Addressing social housing overheating at scale will require significant and increased investment, policy alignment and effective delivery.

↓

KEY POLICY QUESTION

How can increased investment be mobilised to reduce overheating risk in social housing and enable delivery at the necessary scale?

Hackney Measure Longlist MCA - Social Housing Retrofit

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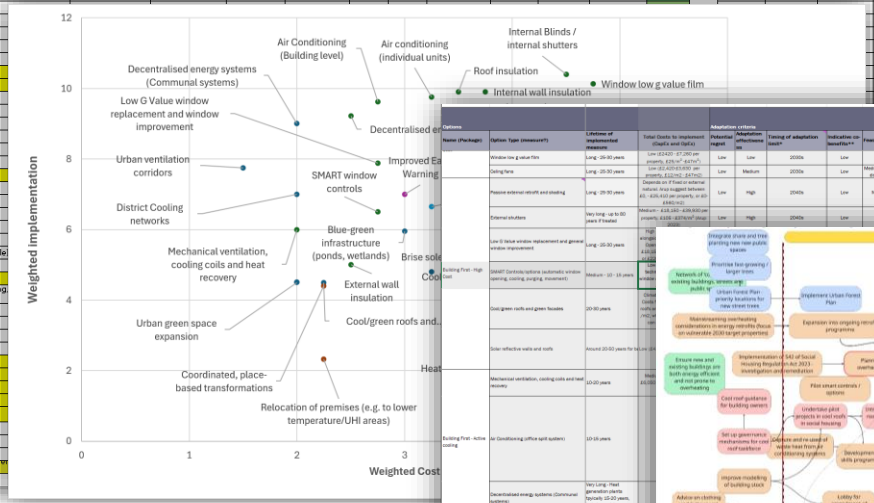
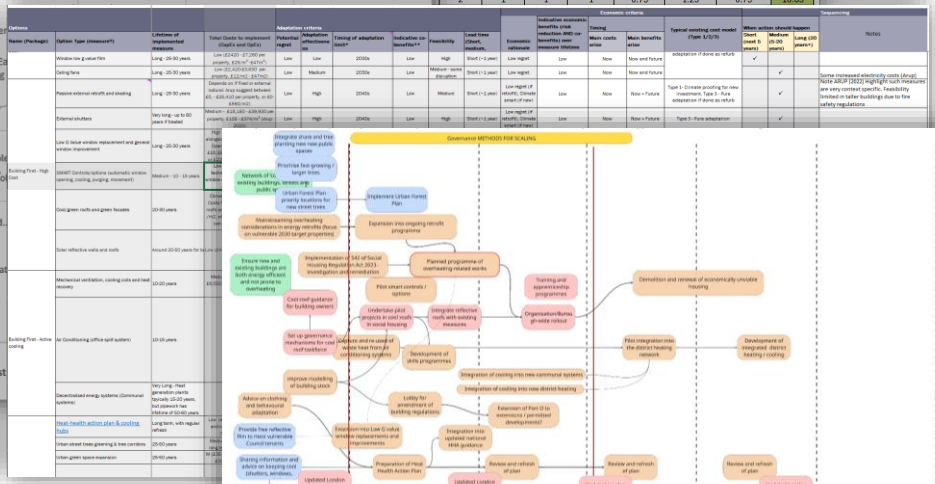
Raw scores

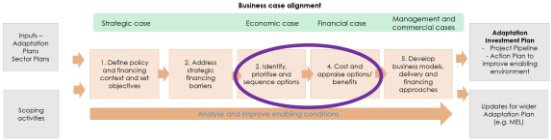
Measure	Impact			Cost			Implementation				Total
	Risk reduction	Cobenefits	Distributional impacts	Capex	Opex	Repex	Scalability	Flexibility	Feasibility	Net zero retrofit alignment	
Window low g value film	3	2	4	5	5	4	5	5	5	4	42
Internal Blinds / internal shutters	4	2	4	4	5	5	5	4	4	4	41
Internal wall insulation											
Changes to clothing and attire											
Parametric Insurance											
Roof insulation											
Public information campaigns											
Solar reflective walls											
Solar reflective roofs											
Ceiling fans											
External shutters											
Improved monitoring and information											
Air conditioning (individual units)											
Cool/green roofs and green facades (building level)											
Decentralised energy systems (Building level)											
Increase openable window area											
Urban street trees, greening & tree corridors											
Air Conditioning (Building level)											
Risk transfer through contracts											
Brise soleil											
Decentralised energy systems (Communal systems)											
Training in overheating risk assessment (buildings and people)											
Personal risk assessment and heat risk occupant surveys											
Blue infrastructure (ponds, wetlands)											
SMART Controls/options (automatic window opening, cooling, ... movement)											
Improved Early Warning Systems											
District Cooling networks											
External wall insulation											
Coordinated, place-based transformations											
Heat-health action plan											
Cooling hubs											
Physical shading structures											
Cool pavements											
Urban ventilation corridors in new developments											
Cool/green roofs and green facades (area based)											
Mechanical ventilation, cooling coils and heat recovery											
Urban green space expansion											
Relocation of premises (e.g. to lower temperature/UHI areas)											

Weighted scores

	Impact			Cost			Implementation				Total
	Risk reduction	Cobenefits	Distributional impacts	Capex	Opex	Repex	Scalability	Flexibility	Feasibility	Net zero retrofit alignment	
	50%	30%	20%	50%	25%	25%	25%	25%	25%	25%	
Window low g value film	1.5	0.6	0.8	2.5	1.25	1	1.25	1.25	1.25	1	12.4
Internal Blinds / internal shutters	2	0.6	0.8	2	1.25	1.25	1.25	1	1	1	12.15
Internal wall insulation				1.5	1.25	1	1	0.75	1	1	11.2
Changes to clothing and attire				2.5	1.25	1.25	1	1.25	0.5	0.5	11.35
Parametric Insurance				2.5	1	1	1.25	1.25	1	0.25	10.95
Roof insulation				1.5	1.25	0.75	1.25	0.75	0.75	1	10.95
Public information campaigns				2.5	1	1.25	1.25	1.25	1	0.75	10.9
Solar reflective walls				2	1.25	1	1.25	1.25	1	1.25	10.9
Solar reflective roofs				0	0	0	0	0	0	0	0
Ceiling fans				2	1	1	1	0.75	1.25	0.75	10.65







Daily Max Results Summary

Hackney Archetype Number	Archetype Code	Archetype Weightage	Number of Flats	Avg. Opt. T	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31	31-32	32-33	33-34	34-35	35-36	36-37	37-38	38-39	39-40	40-41	41-42	42-43	43-44	44-45	45-46	46-47	47-48	48-49	49-50	>50
1	Middle Flat-Solid-U_1.70-MidFloor-LowHeight	20.58%	4108	37.5	29.1	21.5	17.4	18.9	15.3	13.3	11.8	7.7	3.9	2.5	1.1	1.2	1.4	1.4	1.8	0.9	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Corner Flat-Solid-U_1.70-MidFloor-LowHeight	16.83%	3359	37.3	28.0	20.6	17.2	18.4	15.5	13.1	11.8	6.5	3.5	2.3	1.3	1.1	1.6	1.5	1.4	0.8	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Middle Flat-Cavity-U_1.40-MidFloor-LowHeight	10.31%	2058	37.5	29.2	21.8	16.8	19.3	15.2	13.3	11.9	7.9	3.9	2.5	1.1	1.1	1.5	1.5	1.8	1.0	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Corner Flat-Cavity-U_1.40-MidFloor-LowHeight	9.63%	1922	37.3	28.1	21.1	17.3	18.1	15.7	13.4	11.9	6.8	3.5	2.3	1.3	1.0	1.6	1.5	1.5	0.9	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Corner Flat-Cavity-U_0.45-MidFloor-LowHeight	4.80%	959	36.3	40.9	26.7	20.8	20.9	16.4	14.8	12.6	6.0	3.0	2.2	1.3	1.2	1.3	1.6	0.8	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Middle Flat-Cavity-U_0.45-MidFloor-LowHeight	4.30%	858	36.5	43.4	27.8	21.2	21.7	15.7	14.8	12.6	7.6	3.3	2.3	1.1	1.2	1.6	1.0	1.1	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Corner Flat-Cavity-U_1.40-MidFloor-MidHeight	4.17%	833	36.4	29.4	22.1	18.4	19.5	14.8	13.3	9.7	5.0	2.8	2.0	1.5	1.1	1.7	1.3	0.7	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Middle Flat-Cavity-U_1.40-MidFloor-MidHeight	2.89%	576	36.3	29.0	21.5	20.7	17.9	14.9	13.5	10.2	4.6	1.8	2.0	1.4	1.3	1.7	1.3	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	Middle Flat-Solid-U_1.70-MidFloor-MidHeight	2.21%	442	36.2	29.1	21.0	20.5	17.8	15.0	13.6	9.9	4.3	2.0	2.0	1.4	1.3	1.6	1.2	1.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Corner Flat-Cavity-U_1.40-MidFloor-MidHeight	1.67%	334	35.9	43.6	29.8	20.4	20.6	17.2	14.5	11.0	5.5	3.3	1.6	1.4	1.0	2.0	1.4	0.5	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Corner Flat-Cavity-U_1.40-MidFloor-HighHeight	1.58%	316	36.1	27.5	19.3	19.2	18.4	13.5	12.3	8.3	3.4	2.1	1.6	1.6	1.4	1.8	1.3	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Corner Flat-Solid-U_1.70-MidFloor-MidHeight	1.46%	292	36.4	29.1	22.0	18.3	19.8	14.8	13.0	9.3	5.1	2.9	1.8	1.5	1.1	1.6	1.3	0.7	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Middle Flat-Solid-U_1.70-Top-U_2.0-LowHeight	1.37%	274	37.3	24.6	20.8	16.3	17.8	18.2	13.3	11.3	6.7	3.3	1.9	1.3	1.3	1.5	2.3	1.7	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Middle Flat-Solid-U_1.70-Top-U_2.0-MidHeight	1.22%	243	37.7	25.7	19.6	17.2	17.4	16.1	13.1	11.1	8.2	3.8	2.4	1.0	1.0	1.3	2.1	1.7	0.9	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Corner Flat-Solid-U_1.70-Top-U_2.0-MidHeight	1.13%	226	37.6	25.1	19.6	16.3	16.7	16.9	13.7	10.8	7.8	3.3	2.0	0.7	1.3	1.4	2.4	1.4	1.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Middle Flat-Cavity-U_0.45-MidFloor-MidHeight	1.03%	205	35.9	43.1	27.0	21.7	19.8	16.8	14.9	11.6	5.1	2.6	1.5	1.3	1.5	1.0	1.6	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Corner Flat-Solid-U_1.70-Top-U_2.0-LowHeight	1.01%	202	37.3	23.5	20.8	16.0	17.3	18.3	13.4	10.8	6.7	3.3	1.9	1.0	1.3	1.8	2.1	1.5	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	Corner Flat-System-U_0.45-MidFloor-HighHeight	1.00%	199	37.0	38.0	25.0	20.5	18.1	15.3	14.6	11.9	6.5	2.8	1.8	1.5	1.2	1.8	1.5	1.3	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Corner Flat-System-U_0.45-MidFloor-MidHeight	0.84%	167	37.2	41.0	26.4	20.8	20.3	15.8	14.2	13.0	7.5	3.5	2.6	1.5	0.9	1.5	1.8	1.1	0.8	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Middle Flat-System-U_1.70-MidFloor-LowHeight	0.73%	146	38.8	26.2	22.2	15.5	18.8	13.8	13.1	13.1	9.8	5.7	3.7	2.3	0.9	0.7	1.7	1.4	1.5	1.1	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	Corner Flat-System-U_1.70-MidFloor-LowHeight	0.68%	136	39.0	26.7	20.7	16.3	17.6	14.3	13.4	13.3	9.9	6.2	3.2	2.2	1.1	0.7	1.5	1.5	1.7	1.0	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	Corner Flat-Cavity-U_0.45-MidFloor-HighHeight	0.62%	124	35.2	38.8	25.0	23.0	19.0	16.8	13.6	9.0	4.0	2.3	1.5	1.4	1.2	1.6	0.8	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Middle Flat-Cavity-U_1.40-MidFloor-HighHeight	0.59%	118	36.0	27.6	20.1	20.2	16.6	14.1	12.3	8.3	3.6	1.8	2.0	1.3	1.3	1.7	1.3	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Middle Flat-Solid-U_1.70-Top-U_2.0-LowHeight	0.57%	113	37.3	25.1	21.2	17.5	18.1	13.5	11.5	6.8	3.4	2.0	1.2	1.4	1.3	2.3	1.7	1.5	1.1	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	Corner Flat-System-U_0.45-MidFloor-LowHeight	0.55%	110	37.7	38.0	27.2	19.5	19.7	15.6	14.2	13.5	8.8	4.6	2.4	1.6	1.1	1.5	1.7	1.4	0.9	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	Middle Flat-Cavity-U_1.40-Top-U_2.0-MidHeight	0.55%	110	37.8	26.0	20.0	17.0	17.3	16.1	13.4	11.1	8.2	3.9	2.5	0.9	1.1	1.3	2.3	1.6	1.0	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	Corner Flat-Cavity-U_1.40-Top-U_2.0-MidHeight	0.46%	91	37.7	25.1	20.5	16.1	17.0	17.1	13.8	11.0	7.7	3.6	2.2	0.7	1.2	1.4	2.5	1.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	Corner Flat-Cavity-U_1.40-Top-U_2.0-LowHeight	0.45%	90	37.3	24.2	21.5	15.9	17.3	18.4	13.5	10.9	6.7	3.3	2.0	0.9	1.3	1.8	2.2	1.4	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	Corner Flat-Solid-U_Non-defined-MidFloor-LowHeight	0.44%	87	37.3	28.0	20.6	17.2	18.4	15.5	13.1	11.8	6.5	3.5	2.3	1.3	1.1	1.6	1.5	1.4	0.8	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	Middle Flat-Solid-U_Non-defined-MidFloor-LowHeight	0.37%	73	37.5	29.1	21.5	17.4	18.9	15.3	13.3	11.8	7.7	3.9	2.5	1.1	1.2	1.4	1.4	1.8	0.9	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	Middle Flat-System-U_0.45-MidFloor-LowHeight	0.36%	69	37.5	40.9	27.3	20.4	20.5	15.7	14.0	13.1	9.6	4.6	2.7	1.5	0.8	1.7	1.5	1.5	1.1	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	Middle Flat-System-U_0.45-MidFloor-MidHeight	0.34%	68	37.1	41.6	27.0	20.6	20.7	15.5	14.0	13.2	8.0	3.1	2.0	1.3	0.9	1.9	1.3	1.6	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	Middle Flat-System-U_0.45-MidFloor-HighHeight	0.34%	68	36.8	39.5	25.0	20.5	18.7	15.5	14.2	11.5	6.4	2.6	1.8	1.3	1.3	2.0	1.2	1.4	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	Corner Flat-System-U_1.70-MidFloor-MidHeight	0.34%	68	38.1	28.8	21.0	16.5	18.1	14.9	13.0	12.2	7.9	4.4	2.4	1.2	1.3	0.9	2.2	1.6	0.9	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	Middle Flat-Cavity-U_0.45-Top-U_0.18-LowHeight	0.28%	56	35.1	42.2	28.0	20.5	19.9	18.4	15.9	9.0	2.9	2.4	1.5	1.3	1.7	1.6	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Daily Mean Results Summary

Hackney Archetype Number	Archetype Code	Archetype Weightage	Avg. Opt. T	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31	31-32	32-33	33-34	34-35	35-36	36-37	37-38	38-39	39-40	40-41	41-42	42-43	43-44	44-45	45-46	46-47	47-48	48-49	49-50	>50
1	Middle Flat-Solid-U_1.70-MidFloor-LowHeight	20.58%	31.4	33.8	29.8	20.2	12.3	3.6	2.5	1.8	2.5	0.6	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Corner Flat-Solid-U_1.70-MidFloor-LowHeight	16.83%	31.5	33.2	29.7	19.5	11.6	3.4	2.4	2.0	2.4	0.8	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Middle Flat-Cavity-U_1.40-MidFloor-LowHeight	10.31%	31.4	34.1	29.7	20.1	12.5	3.6	2.6	1.9	2.6	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Corner Flat-Cavity-U_1.40-MidFloor-LowHeight	9.63%	31.4	33.9	29.6	19.7	11.6	3.5	2.5	1.9	2.4	0.8	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Corner Flat-Cavity-U_0.45-MidFloor-LowHeight	4.80%	30.9	42.4	35.6	23.8	12.9	2.8	2.3	2.4	1.8	0.9	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Middle Flat-Cavity-U_0.45-MidFloor-LowHeight	4.30%	30.9	44.4	36.1	24.3	13.3	3.2	2.3	2.2	1.8	0.9	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Corner Flat-Cavity-U_1.40-MidFloor-MidHeight	4.17%	31.0	37.0	31.2	20.0	10.9	2.7	2.2	2.2	1.8	1.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Middle Flat-Cavity-U_1.40-MidFloor-MidHeight	2.89%	30.9	37.5	31.0	20.0	10.3	2.5	2.6	1.9	1.8	1.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	Middle Flat-Solid-U_1.70-MidFloor-MidHeight	2.21%	30.9	36.8	30.9	19.8	9.9	2.5	2.5	2.1	1.8	1.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Corner Flat-Cavity-U_0.45-MidFloor-MidHeight	1.67%	30.6	44.6	36.4	23.3	11.4	2.8	2.4	1.9	1.7	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Corner Flat-Cavity-U_1.40-MidFloor-HighHeight	1.58%	30.6	33.0	25.3	17.5	6.8	2.7	2.2	2.3	1.4	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Corner Flat-Solid-U_1.70-MidFloor-MidHeight	1.46%	31.0	36.5	30.8	20.3	10.5	2.7	2.3	2.1	2.0	0.8	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Middle Flat-Solid-U_1.70-Top-U_2.0-LowHeight	1.37%	31.6	32.4	28.8	17.8	12.1	3.5	2.5	2.6	2.3	0.7	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Middle Flat-Solid-U_1.70-Top-U_2.0-MidHeight	1.22%	31.4	30.8	26.9	16.8	10.6	3.3	2.8	1.5	2.6	0.9	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Corner Flat-Solid-U_1.70-Top-U_2.0-MidHeight	1.13%	31.4	31.3	26.6	16.3	10.8	3.2	2.6	2.0	2.4	1.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Middle Flat-Cavity-U_0.45-MidFloor-MidHeight	1.03%	30.6	44.6	35.5	23.0	11.5	2.8	2.1	2.7	1.3	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Corner Flat-Solid-U_1.70-Top-U_2.0-LowHeight	1.01%	31.7	31.8	28.6	17.7	11.5	3.8	2.5	2.5	2.4	0.8	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	Corner Flat-System-U_0.45-MidFloor-HighHeight	1.00%	30.5	41.0	30.8	19.9	10.9	2.5	2.4	2.3	1.5	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Corner Flat-System-U_0.45-MidFloor-MidHeight	0.84%	30.8	43.5	32.8	22.9	13.0	3.5	2.1	2.0	1.9	1.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Middle Flat-System-U_1.70-MidFloor-LowHeight	0.73%	31.5	30.6	26.7	18.4	12.2	4.8	2.3	1.3	2.9	1.0	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	Corner Flat-System-U_1.70-MidFloor-LowHeight	0.68%	31.7	29.9	25.7	17.0	12.0	4.8	2.2	1.5	2.7	1.1	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	Corner Flat-Cavity-U_0.45-MidFloor-HighHeight	0.62%	30.2	44.4	33.9	22.0	7.6	3.2	2.0	2.5	1.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Middle Flat-Cavity-U_1.40-MidFloor-HighHeight	0.59%	30.5	33.6	24.5	17.5	7.3	2.6	2.4	2.3	1.2	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Middle Flat-Solid-U_1.70-Top-U_2.0-LowHeight	0.57%	31.6	33.4	28.8	17.5	12.1	4.0	2.3	2.5	2.4	0.8	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	Corner Flat-System-U_0.45-MidFloor-LowHeight	0.55%	31.1	40.8	32.4	21.9	14.1	3.8	2.4	1.8	2.4	0.9	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	Middle Flat-Cavity-U_1.40-Top-U_2.0-MidHeight	0.55%	31.4	31.2	27.3	16.8	10.5	3.6	2.8	1.5	2.6	0.9	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	Corner Flat-Cavity-U_1.40-Top-U_2.0-MidHeight	0.46%	31.4	31.5	27.0	16.2	10.6	3.4	2.6	2.0	2.4	1.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	Corner Flat-Cavity-U_1.40-Top-U_2.0-LowHeight	0.45%	31.7	32.5	28.5	17.8	11.5	3.9	2.4	2.5	2.3	0.8	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	Corner Flat-Solid-U_Non-defined-MidFloor-LowHeight	0.44%	31.5	33.2	29.7	19.5	11.6	3.4	2.4	2.0	2.4	0.8	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	Middle Flat-Solid-U_Non-defined-MidFloor-LowHeight	0.37%	31.4	33.8	29.8	20.2	12.3	3.6	2.5	1.8	2.5	0.6	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	Middle Flat-System-U_0.45-MidFloor-LowHeight	0.36%	31.0	42.3	33.0	23.4	13.5	4.5	2.0	1.8	2.3	1.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	Middle Flat-System-U_0.45-MidFloor-MidHeight	0.34%	30.8	43.3	33.4	22.0	13.3	2.9	2.1	2.1	2.0	1.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	Middle Flat-System-U_0.45-MidFloor-HighHeight	0.34%	30.5	41.7	30.8	20.1	10.9	2.7	2.3	2.6	1.1	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The National case study - Building the Economic Case for Climate Adaptation of Public Assets and Services

CHALLENGE

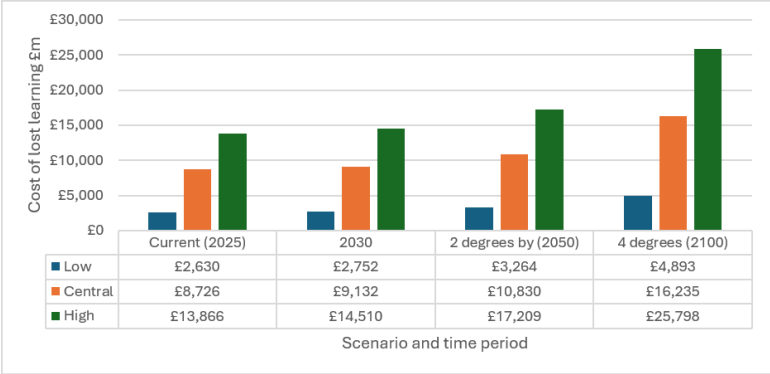
The UK's public estate and services face growing climate risks, including heat, flooding and extreme weather. Without adaptation, costs, disruption and pressure on public finances will increase. Stronger evidence is needed to inform NAP4 investment decisions and support increased investment for long-term resilience.

KEY POLICY QUESTION

What is the economic, fiscal and investment case for prioritising climate adaptation across England's public estate, infrastructure and services, particularly schools, and how can this evidence inform future investment and financing approaches?

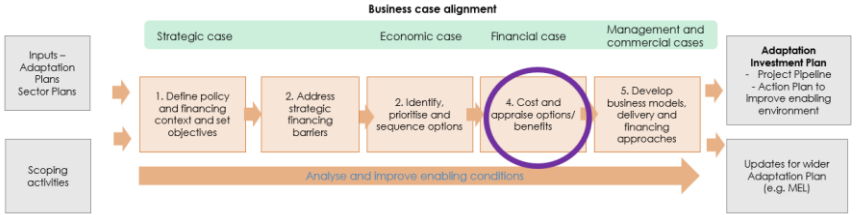
National pilot – towards costs and benefits of addressing overheating

- Built up a detailed understanding of costs of inaction
- Developing results on the economic costs of lost learning – literature review and new values for use in appraisal
- Combined with DfE numbers – costs of overheating could be £3.2bn/year – £17.2bn/year by 2050s – DfE's own appraisal figures much higher
- Also produced indicative numbers on the costs of adaptation, based on early adaptation measures.
- Working with the Met Office extend with new analysis to inform packages of investment, cost-benefit analysis and optimisation of public investments



	Current (2025)	2030	2 degrees by (2050)	4 degrees (2100)
Low	£2,630	£2,752	£3,264	£4,893
Central	£8,726	£9,132	£10,830	£16,235
High	£13,866	£14,510	£17,209	£25,798

Source: England et al., forthcoming



ATTENUATE
ENABLING UK CLIMATE ADAPTATION

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Grantham Research Institute on Climate Change and the Environment

What are we learning

- Even in ‘advanced’ UK regions, there is a lot of work to do to build up packages of investment – lots of data and evidence gaps
- Therefore need to limit scope of work – not a whole NAP or city strategy – but targeted to particular challenges
- Alignment to existing policy context and involvement of sectoral and finance actors is crucial – helps identify entry points and anchor the process on bankability
- Needs to be supported by wider capacity building – to help engagement and uptake
- Need to shift from a broad conception of enabling environments (‘policies’) to specifics (‘insurance requirements for schools’)

ATTENUATE
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Case studies



LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Grantham Research Institute on Climate Change and the Environment

Paul Watkiss Associates

Environment Agency

LOVE DES/GN STUD\O

UNIVERSITY OF BATH

Met Office

Green Finance Institute

Financial incentives - Cool Roofs in LA

- Evidence that cool roofs in California could offset 51%-100% of increased heat exposure and energy demand.
- LA Department of Water and Power run a Consumer Rebate programme which includes efficient air con and cool roofs
- Programme pays between $0.20 and $0.60 per sq ft for cool roofs programe
- 2021/22 evaluation says CRP mobilised 2,000,704 square ft of installs ~ $920k - $2.7m based on total cost – public sector contribution of $400k – $1.2m.
- Programme has been significantly expanded following California wildfires to reduce wildfire risks



Type of benefit	Examples
Economic	Reduced morbidity and mortality, reduced GHG emissions, improved productivity
Financial	Improved property values, reduced cooling costs, reduced roof degredation,
Fiscal	Reliable tax revenues

Strasbourg - blended finance for nature-based solutions in housing

- Wihrel and Rives do Bohrie neighbourhoods, Ostwald, Strasbourg. Mix of social housing and new development
- €5m to install 78,000m2 of green space and depaving across development including – playgrounds, communal areas
- Complicated funding stack provided with a mix of public funds (local, regional), and private sector.
- Leveraged regional technical assistance from regional water agency for the costs of feasibility studies and soil unsealing



Type of benefit	Examples
Economic	Reduced morbidity and mortality, reduced GHG emissions,
Financial	Improved property values, reduced energy costs
Fiscal	Reliable tax revenues

Sources: Tenants, Regional Government, Municipality, Housing owners
Instruments: Grants

	Existing public realm	New public realm	City of Ostwalk	Private space (HM)	Chapel Street	Total
Surface area (m2)	6,200m^2	9,100m^2	4,200m^2	57,500m^2	1,000m^2	78,000m^2
Cost of work (ex. VAT)	€390,000	€925,000	€165,000	€3,455,000	€165,000	€5,100,000
Funding shares						
EMS funding	100%	50%	0%	50%	50%	€2,662,500
Ostwald funding (municipality)	0%	0%	100%	0%	0%	€165,000
HM funding	0%	50%	0%	50%	50%	€2,272,500

Paris District Cooling Network

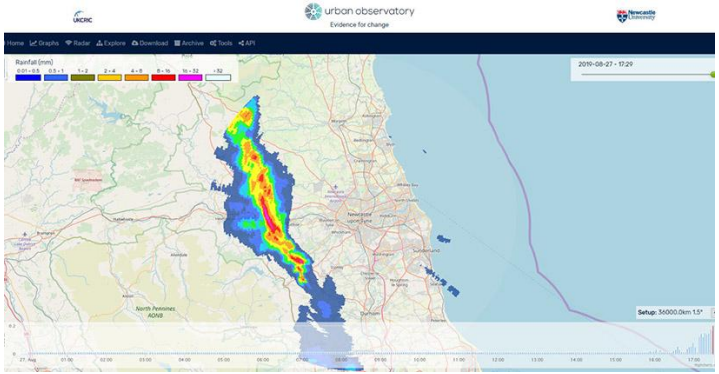
- The Fraîcheur de Paris network is one of Europe's largest district cooling systems, using cold water from the Seine and geothermal wells to provide efficient, low-carbon cooling
- 10 production sites and 4 storage sites supply nearly 400 GWh/year of cooling to more than 730 buildings via 90 kilometers of networks.
- City of Paris subcontracts the company under defined tariffs, investment plans and expansion commitments - supports via regulatory framework and granting of network rights & permits
- Fraîcheur de Paris (ENGIE/RATP) invests in infrastructure and recovers costs via tariffs paid by connected buildings (private and public) for cooling services
- The network is 100% renewable electricity certified (since 2013) and carbon-neutral (since 2018)



Type of benefit	Examples
Economic	Increases Energy efficiency, reduces GHG Emissions, reduced morbidity and mortality, improved productivity
Financial	Avoided A/C costs for building owners/tenants, Revenues from the sale of cooling,
Fiscal	Steady revenue stream through long-term public service concession

Newcastle Weather Networks

- Pilot programme funded by Newcastle University – working with Local Council to install in pilot schemes in schools
- Built out gradually over time by the University through successive grants
- Installed in range of public sites, including schools, fire stations.
- Covers temperature, rainfall and radar data.
- Now being used by City as core research tool, as well as value provided for education.
- More bespoke advice and support provided by the University through targeted R&D projects.



Sources: UK Research Councils / Innovate UK, Private sector, public institutions
Instruments: Grants

Type of benefit	Examples
Economic	Improved coordination and decision making, correction of information asymmetries
Financial	Improved funding and financing secured through more competitive research
Fiscal	Reduced costs from extreme weather through preparation

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Thankyou



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