

UK RETROFIT POLICY and NET ZERO COMMITMENTS

Lynne Sullivan OBE, RIBA

PATHWAY TO 2050 – KEY PRINCIPLES AND DRIVERS

- Catastrophic climate change: Significant need to reverse greenhouse effect
- UK Climate Change Act
- UK COP21 and Net Zero commitment
- UN Sustainable Development Goals
- Renewable energy and re-forestation
- Valuing scarce resources; circular economy



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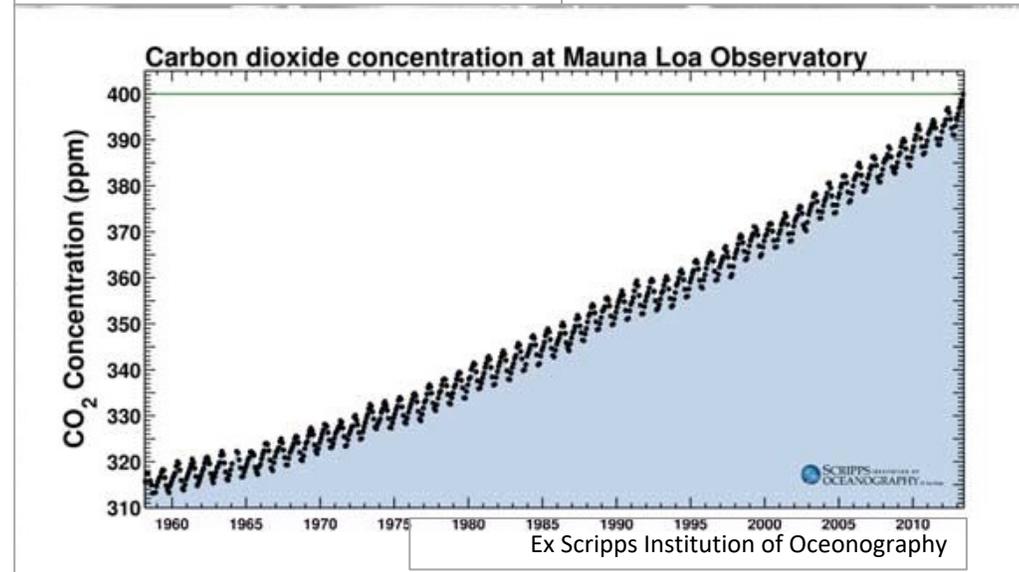
Earth has crossed a scary threshold for the first time in more than 800,000 years, and it could lead to tens of thousands of deaths

Kevin Loria May 9, 2018, 3:07 PM 1,313

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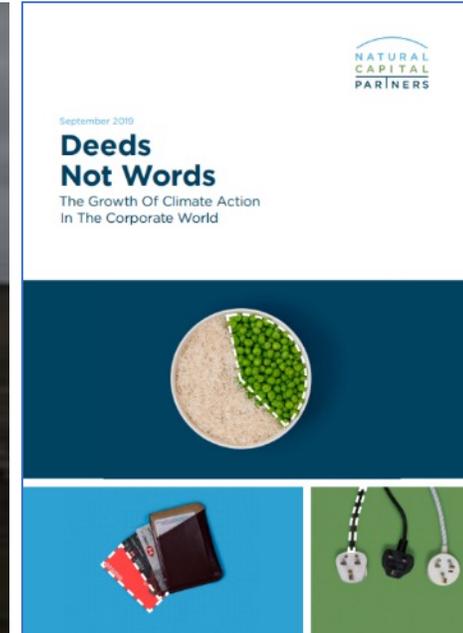
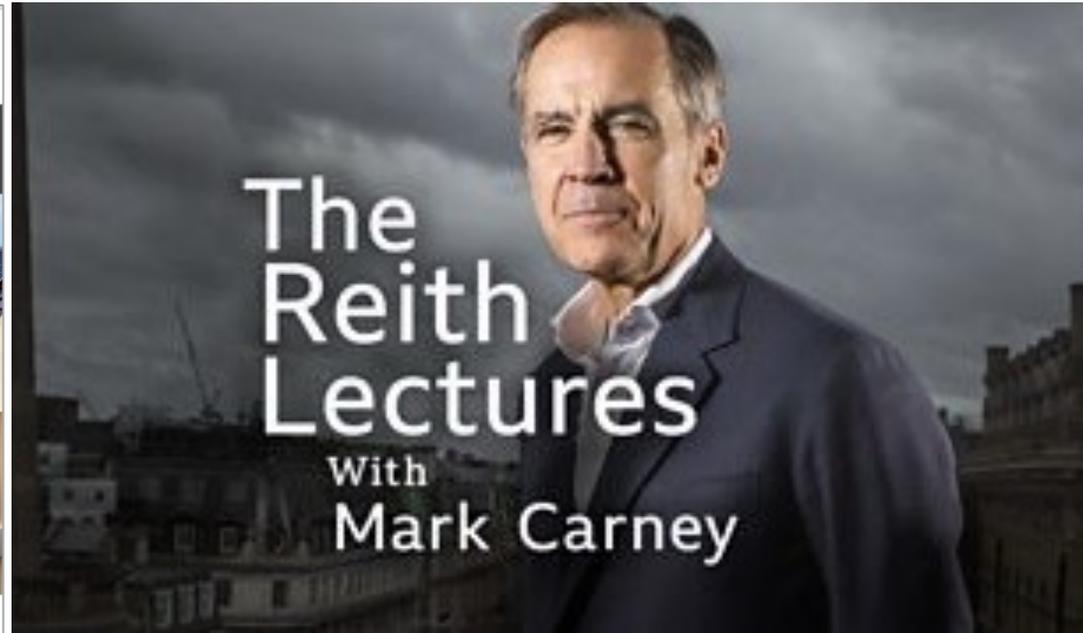
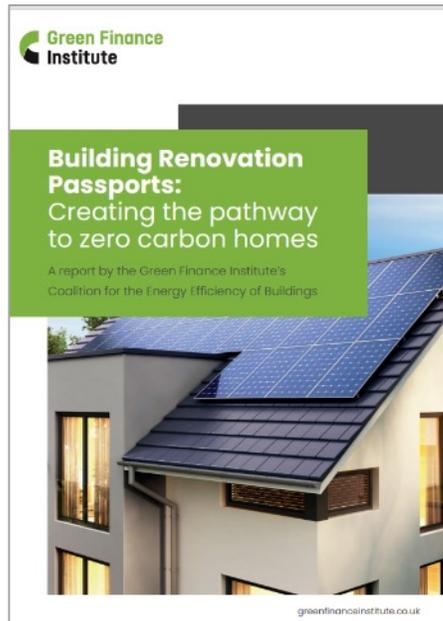
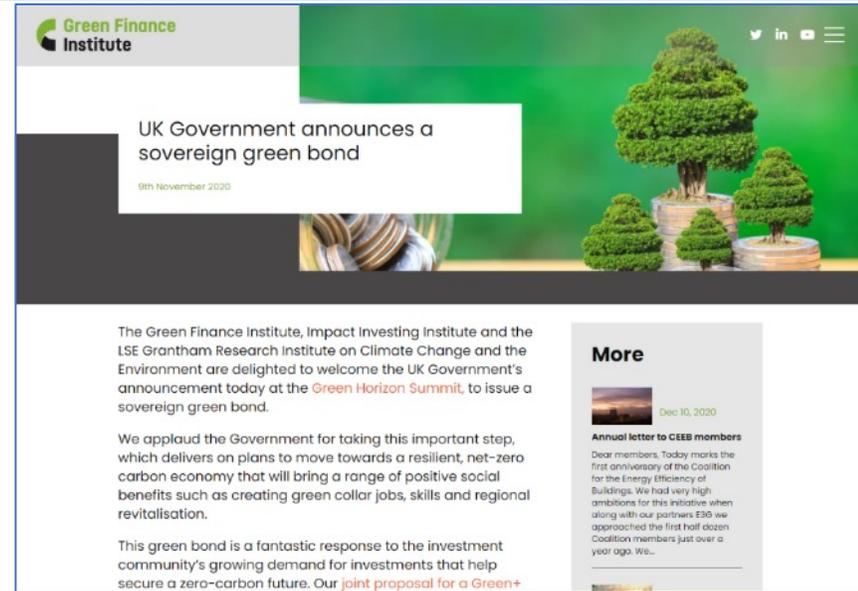
- Monthly average atmospheric carbon dioxide levels have topped 410 ppm for the first time in more than 800,000 years, according to recent research.
- There's good reason to think this will have disastrous effects on human health.

Kevin Frayer/Getty Images



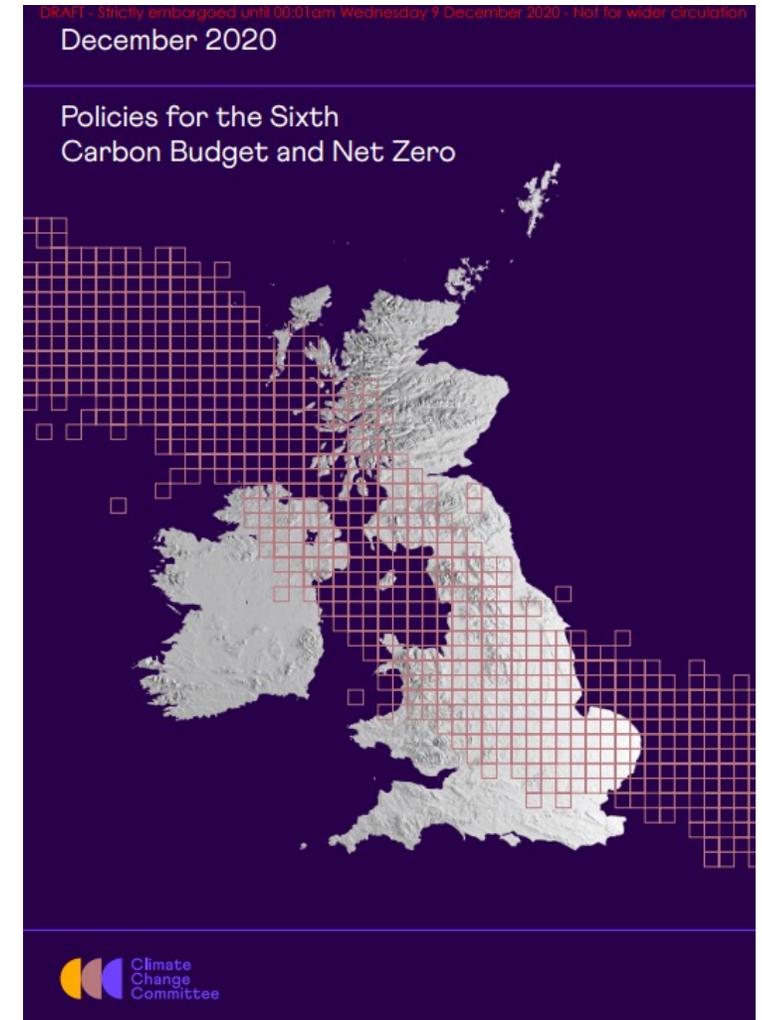
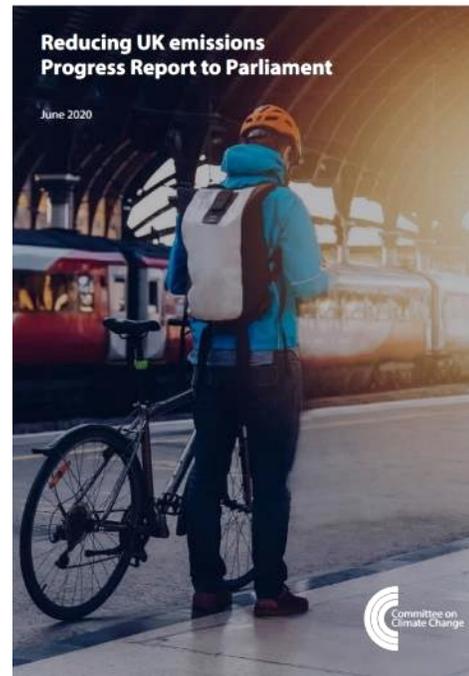
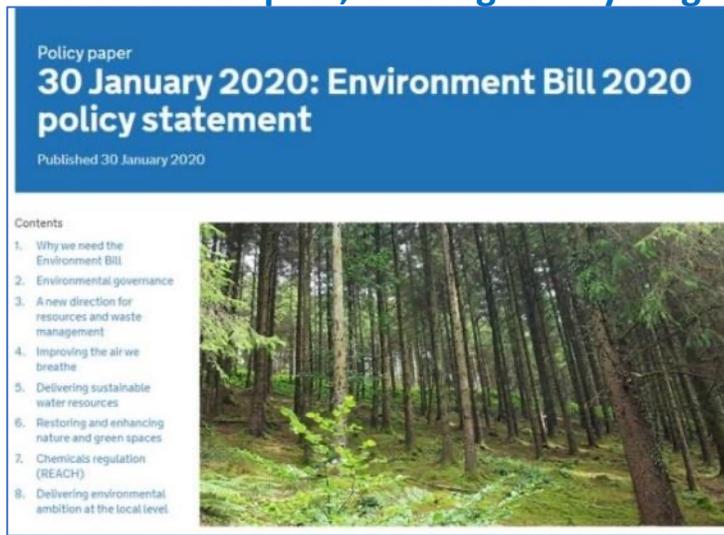
PATHWAY TO 2050 – KEY PRINCIPLES AND DRIVERS: RESILIENCE FOR INVESTORS

- Mark Carney argues that the roots of our environmental emergency lie in a deeper crisis of values. He suggests how we create an ecosystem in which society's values broaden the market's conceptions of value. Significant need to reverse greenhouse effect; UK Net Zero commitment
- The bailouts of corporations associated with the global crash of 2008 meant that the under-privileged effectively 'paid for' the rescue of businesses who previously enjoyed 'private' profit
- Resilience for assets a priority for long-term investment



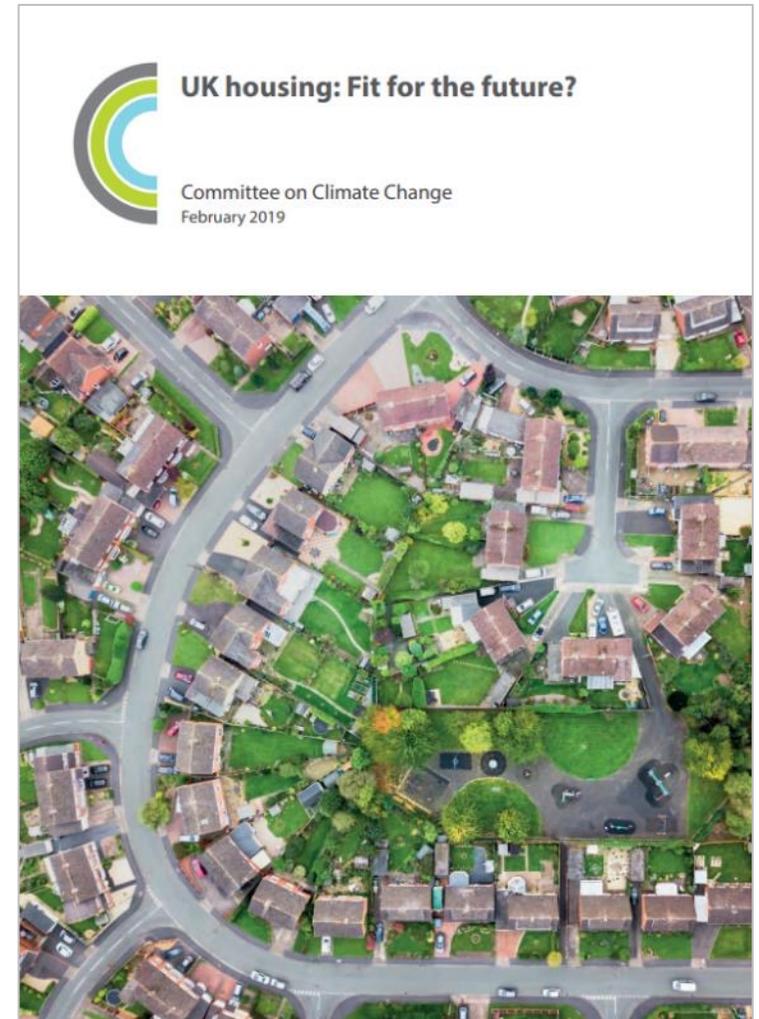
PATHWAY TO 2050 – UK CARBON BUDGETS AND POLICY DRIVERS

- New buildings to be Zero emissions – cannot add to the problem – fabric standards “Passivhaus or thereabouts” (Lord Deben) with space heating demand ~15-20kWh/m2
- Market failure in retrofit – must accelerate transition – “energy efficiency is a top priority in the post-covid recovery, and it is widespread geographically and provides skills and employment” (Lord Deben)
- Government requirement for Biodiversity Net Gain
- Future Homes Standard (including Zero Emissions from heating) and the healthy, age-friendly agenda
- Electrification of transport; walking and cycling



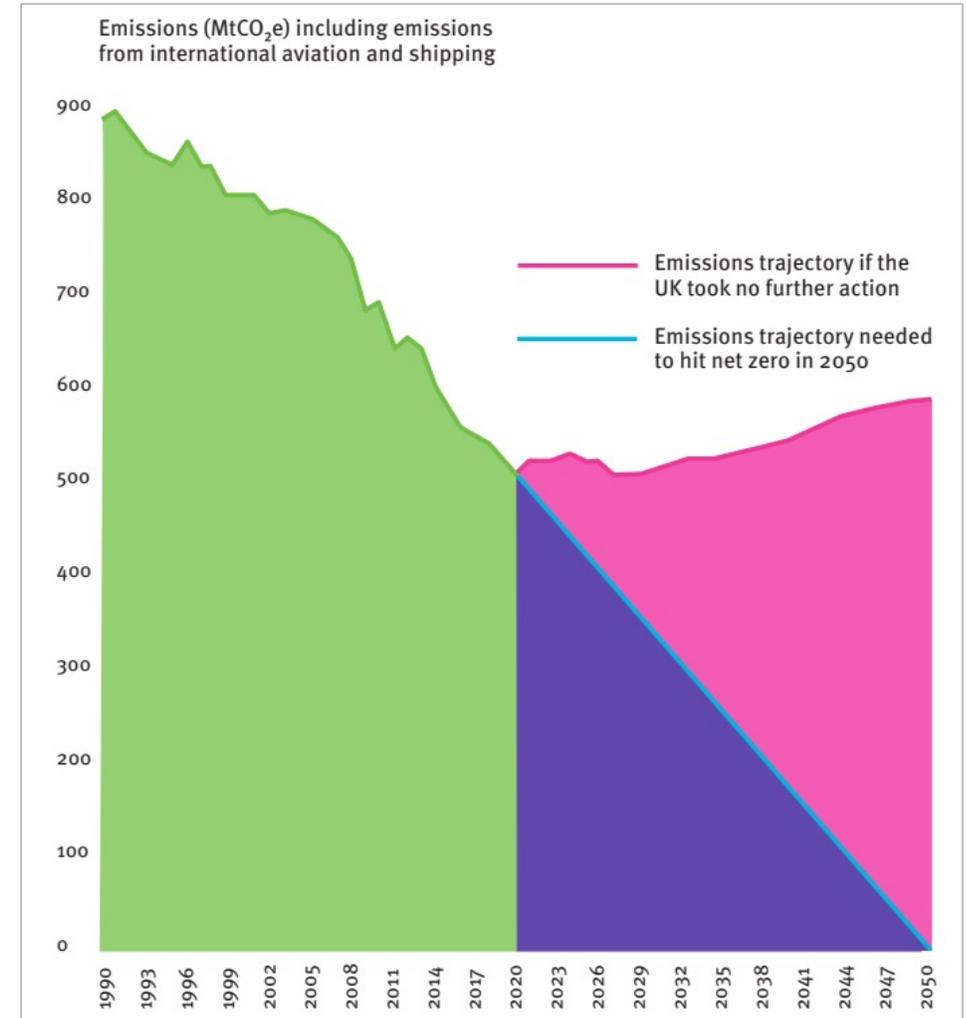
UK's EXISTING BUILDINGS STOCK – POLICIES vs PRIORITIES FOR NET ZERO

- Failure of successive retrofit programmes to tackle the upgrade of our existing buildings stock: EEC tackled the 'low-hanging fruit'; Green Deal; stop-start ECO, Green Homes Grant etc
- Building Regulations: Energy Efficiency last reviewed 2012 and current consultation represents minor improvements to fabric and changes to carbon intensity of fuel source; no clear indications for addressing the performance gap
- CCC – successive reports on homes: 2019 - Deployment of energy efficiency measures in buildings are running at less than 20% of the rate under CCC 2018 indicators, having fallen sharply since policy changes in 2012. How the Government's target for all houses to be made EPC band C by 2035 will be delivered remains largely unclear; PRS MEES regulations are limited in scope and impact due to cost cap; Tackle performance, compliance and skills gaps
- 2021Green Alliance: Put in place long term regulation and funding for a robust homes decarbonisation programme
- RIBA et al: regulate the energy performance of both new and existing buildings; Introduce embodied energy targets; define operational energy targets and benchmarks; require demolition permits for all prospective demolitions, and require feasibility studies to be carried out for adaptive reuse of any existing structures prior to granting permission for new builds
- National Retrofit Strategy (CLC's RMI Working Group chaired by FMB with Green Construction Board) BUT Heat in Buildings Strategy delayed



UK's EXISTING BUILDINGS STOCK – POLICIES vs PRIORITIES FOR NET ZERO

- CCC call for delivery of the Government's energy efficiency plans to upgrade all buildings to EPC C over the next 10-15 years
- CCC's Further Ambition options for heating buildings would still result in emissions of 4 MtCO₂e in 2050. This requires roll-out of technologies across the building stock, including peak heat for buildings on the gas grid, ie heat pumps, hybrid heat pumps and district heating in conjunction with hydrogen, and new smart storage heating, combined with high levels of energy efficiency.
- By 2035 almost all replacement heating systems for existing homes must be low-carbon or ready for hydrogen, so the share of low carbon heating increases from 4.5% today to 90% in 2050. These changes could be made at an average cost of around £140/tCO₂e (CCC)
- Scaling up the market for heat pumps as a critical technology for decarbonising space heating, while maintaining quality
- Expand the rollout of low-carbon heat networks in heat dense areas like cities, using anchor loads such as hospitals and schools
- Prepare to shift away from using fossil fuel Combined Heat and Power (CHP) as a supply source towards low-carbon heat by preference from the mid2020s



UK's EXISTING BUILDINGS – CCC's “HEADWINDS, TAILWINDS + BALANCED PATH”

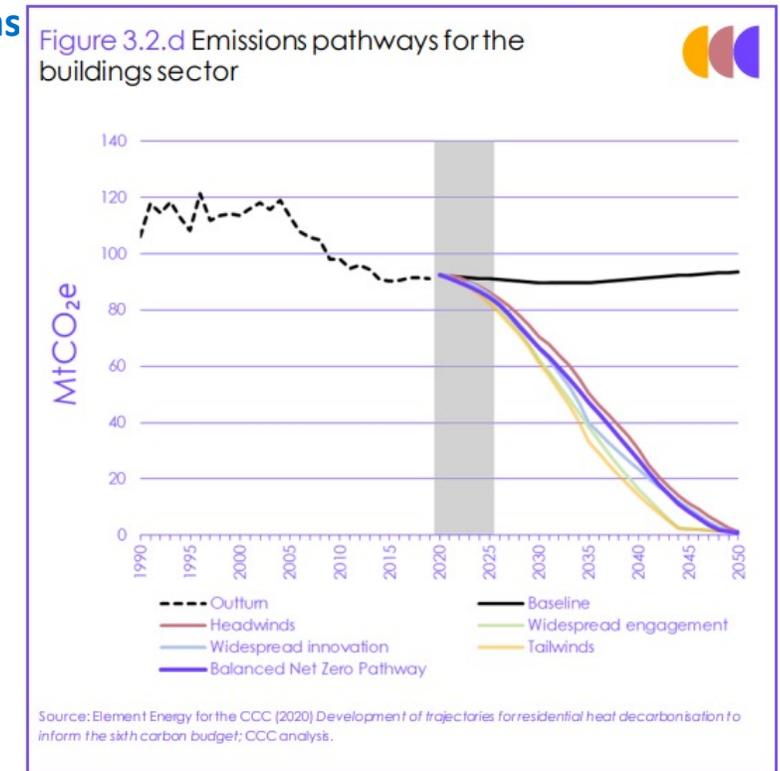
- 6th Budget: Median scenario ‘moderate’ energy efficiency and limited (~11%) homes using hydrogen-based heating
- Non-residential heat and catering mainly electrified with limited hydrogen
- Other scenarios factor higher co-benefits from higher energy efficiency targets eg jobs, regeneration, comfort, tax revenues
- The Balanced Pathway requires investment across all buildings (residential and non-residential) at an average rate of around ~£12 billion per year to 2050
- More widely, the shift to electrification and heat networks can also deliver improved energy security and improved air quality
- A ‘more flexible’ electricity system is identified as a requirement, deploying storage through hydrogen and batteries (eg the Balanced Pathway assumes 18 GW of battery storage capacity by 2035)
- Grid capacity: currently gas @ ~170GW versus ~40GW windpower (2030 estimate)
- Robust enforcement needed

Table 3.2.b
Summary of key differences in the buildings sector scenarios

	Balanced Net Zero Pathway	Widespread Engagement	Widespread Innovation	Headwinds	Tailwinds
Behaviour change and demand reduction	<p>Moderate levels of behaviour change (homes).</p> <p>25% of eligible households pre-heat, 3% reduction in space heat demand from smarter heating management and use, low-flow shower heads.</p>	<p>High levels of behaviour change (homes).</p> <p>50% of eligible households pre-heat, 6% reduction in space heat demand, 50°C hot water temperature with daily legionella cycle,* low flow shower heads</p>	<p>High levels of behaviour change (homes).</p> <p>50% of eligible households pre-heat, 6% reduction in space heat demand, heat-as-a-service delivering higher performance, low flow shower heads</p>	<p>Moderate levels of behaviour change (homes)</p> <p>25% of eligible households pre-heat, 3% reduction in space heat demand, low flow shower heads</p>	<p>High levels of behaviour change (homes)</p> <p>50% of eligible households pre-heat, 6% reduction in space heat demand, heat-as-a-service delivering higher performance, low flow shower heads</p>
Efficiency	<p>Moderate energy efficiency uptake in homes. Loft and wall insulation for all fuel poor.</p> <p>Fast commercial uptake; Moderate-paced public uptake.</p>	<p>Moderate-high energy efficiency uptake in homes. Loft and wall insulation for all fuel poor.</p> <p>Fast uptake of energy efficiency in other buildings.</p>	<p>Lower energy efficiency uptake in homes. Loft and wall insulation for all fuel poor. Innovation drives down energy efficiency costs and delivers high performing deep retrofits.</p> <p>Moderate-paced uptake in other buildings.</p>	<p>Lower energy efficiency uptake in homes. Loft and wall insulation for all fuel poor.</p> <p>Slow commercial uptake; moderate-paced public uptake.</p>	<p>High energy efficiency uptake in homes (full economic potential). Loft and wall insulation for all fuel poor.</p> <p>Fast uptake of energy efficiency in other buildings.</p>
Low-carbon fuels/ technology	<p>Hybrid hydrogen scenario in homes, with 11% of homes using hydrogen for heat. Limited use</p>	<p>Fully electrified scenario (including heat networks). No biofuels in homes.</p>	<p>Hybrid hydrogen scenario in homes, with 10% of homes using hydrogen for heat. Widespread</p>	<p>Widespread network conversion to hydrogen, with 71% of homes using hydrogen for heat. Smaller</p>	<p>Buildings fully electrified, except for areas around industrial clusters which use H₂ boilers. 11% of homes</p>

UK's EXISTING BUILDINGS – CCC's “HEADWINDS, TAILWINDS + BALANCED PATH”

- Energy efficiency and behavioural measures in the CCC Balanced Pathway **ONLY** deliver a 12% reduction in heat demand to 2050 (which they describe as “conservative”) based on 15m households getting one of the loft/floor/wall insulation measures
- Solid wall insulation measures increase to just over 250,000 a year by 2025 (from just 11,000 in the past year) Propose insulating 3.4 million by 2050, or just under half of the total UK stock of solid wall buildings.
- CCC 6th Budget assumes average heat pump/energy efficiency package is ~£12,000 (falling > 10% by 2035)
- ~3m existing homes have heat pumps installed by 2030; 1m installations per annum by 2035
- By 2050 20% of heat is distributed by heat networks
- Phase out fossil-based fuels in the 2020s
- Alternative scenario in 2030s assumes wider uptake of green hydrogen systems
- ‘Green Jobs Taskforce’ and a National Skills Fund in 2021 “to develop green jobs to support upgrading energy efficiency in buildings”



UK's EXISTING BUILDINGS – THE INDUSTRY VIEW OF A HOLISTIC APPROACH

- CCC acknowledge the importance of the holistic approach, but arguably the Balanced Pathway assumptions do not reflect it.
- Single measures approaches have been shown to create substantial technical barriers, higher costs, and potentially damaging unintended consequences (cf Green Deal, Green Homes Grant)
- Can the history of failures inform a ground-breaking policy?

Box 3.2.a

A holistic approach to retrofit

Measures to address thermal efficiency, overheating, indoor air quality and moisture must be considered together when retrofitting or building new homes.

There are zero cost actions householders can take now to better ventilate and shade their homes, including shutting curtains during the day to limit solar gains, and opening windows to improve ventilation.⁸ There are also home upgrade measures which can improve overheating and ventilation further.

- Shading measures can include high specification blinds (e.g. with reflective backing) and/or external shading or awnings. We estimate that installing moderate cost measures to the most at-risk property types would add £4-£5 billion of total investment costs to 2050.¹⁸
- Ventilation measures (which can also help mitigate overheating risk) include extract fans, mechanical extract ventilation (MEV) and mechanical extract ventilation and heat recovery (MVHR). Installing extract fans is estimated to cost around £550 per home, while MEV or MVHR could add between £1,700-£4,100 per home.⁹

Wider adaptation needs, such as water efficiency and flood resilience, should be considered as part of retrofit needs but have not been costed as part of this work.

Sources: CCC and Element Energy analysis.



Each Home Counts
An Independent Review of Consumer Advice, Protection, Standards and Enforcement for Energy Efficiency and Renewable Energy

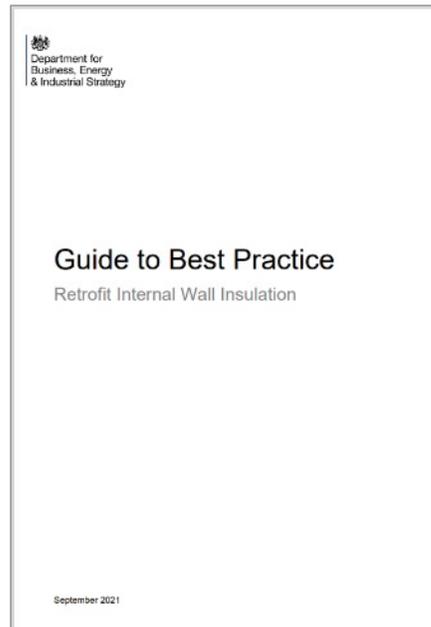
Dr Peter Bonfield, OBE, FREng

Department for Business, Energy & Industrial Strategy | Department for Communities and Local Government

December 2016

UK's EXISTING HISTORIC BUILDINGS – INDUSTRY VIEW OF A HOLISTIC APPROACH

- Single leaf external wall moisture
- Sensitivities for appearances changes
- Heat Pumps work with lower circulating temperatures so internal energy efficiency and large emitters required or underfloor heating if feasible
- Moisture permeability (not the same as air tightness!) sensitivities
- Vacuum glazing and high performance glazing need not change the appearance of windows
- Good ventilation with heat recovery – not always easy to duct in existing buildings



CASE STUDY – SOLID WALL INSULATION – New Court, Trinity College, Cambridge

Typology and Construction:

- College Accommodation - originally planned in two-room sets but variously remodelled over time. Replanned – closer to original pattern - to provide 133 study bedrooms (1/3 ensuite, 2/3 with shared facilities) with 4 fully-accessible rooms, teaching rooms, fellows' sets and tutorial offices.
- Original construction 1820s solid brick walls either fair-face or with a variety of facings - ketton stone, roman render.
- Retrofit works include thermal upgrade with internal wall insulation - 60mm vapour-permeable wood-fibre, double-glazing to existing, refurbished window frames, MVHR, underfloor heating with GSHP borehole heat source.

Tenure Type: Private College accommodation and offices
Location: New Court, Trinity College, Cambridge
Programme
 Project Commenced - January 2010
 Listed Building Consent - January 2013
 Site Start - March 2014
 Phase 1 - August 2015
 Phase 2 - January 2016

Completion

Brief: College brief required provision of accommodation to contemporary standards, enhancement of historic character and fabric quality, and 88% reduction to carbon emissions.
Assessment Method: Extensive character and policy analysis, building physics monitoring and calibrated WUFI modelling to develop mould risk parameters and acceptable solutions

Client: Master, Fellows and Scholars of Trinity College

Project Team:

- 5th Studio - Architects
- Max Fordham LLP - M+E Engineers
- Max Fordham LLP - Building Physics Modelling
- CAR - Structural Engineers
- Bidwells - Project Management
- Richard Utting Associates - Cost Consultants
- Beacon - Planning and heritage consultants
- Archimetrics - Building fabric monitoring
- SDC - Main Contractors Munro - Building Services
- AVV - Render
- Coulsons - Fitted furniture and linings
- NBT - Insulation - building physics advice
- Bill Bordass - building physics advice
- GCU - Material property analysis

Project Description:

- Indicative Floor Area: 5,340m²
- Cost: Total contract cost: c.£20m.
- Cost/m²: £3,745
- Construction Period: 21 months
- Design Output: 7 years building and interior condition monitoring and space heating monitoring

Typical energy usage:

- Annual space heating - Currently: c.857,000 kWh
- Predicted: c.124,000 kWh

Overview of components of project

View of completed study bedroom

Archimetrics

1-year monitoring results from sample insulation installation

Technical Measures:

- U-value improvement: 0.675 to 0.25w/m² typical
- Airtightness: 19m³/m²@ 50Pa

Lessons learned: While 'theoretically' addressing occupancy-generated moisture, vapour impermeable insulation solutions proved to create dangerous conditions in terms of external moisture, especially solar-driven vapour, pressure. The delivery of these standards to historic buildings of this quality and significance requires abnormal levels of site supervision and quality management.

Innovations: Internal wall insulation to Grade 1 Listed Building, sealed double-glazing within existing window frames. MVHR distribution ductwork using historic chimney flues.

Trinity College case study for SWI report GCB 2015 and included in 'Sustainable Building Conservation' Oriel Prizeman

UK's EXISTING BUILDINGS – THE PUBLIC'S VIEW OF A HOLISTIC APPROACH

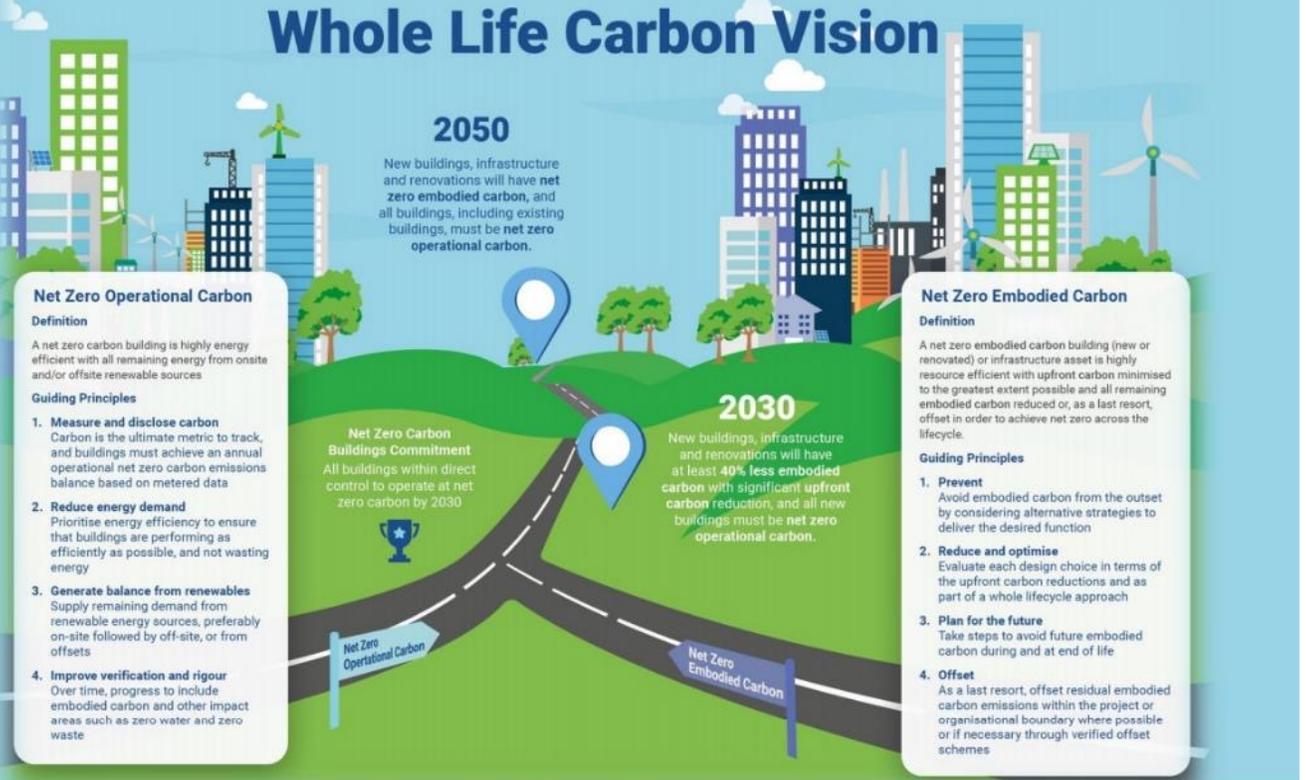


The path to net zero

Climate Assembly UK
Full report

- 1 On **home retrofits**, assembly members emphasised the need to **minimise disruption in the home, put in place support around costs, and offer flexibility and choice to homeowners**. They had a slight preference for upgrading each home all in one go (56%), compared to upgrading each home gradually (44%) but attached conditions to the former around how it is financed. Some assembly members stressed that the choice between gradual and all-in-one retrofits should be one for homeowners.
- 2 The best technology to use for **zero carbon heating** is a matter of significant policy debate. However at least 80% of assembly members 'strongly agreed' or 'agreed' that each of **hydrogen (83%), heat pumps (80%), and heat networks (80%)** should be part of how the UK gets to net zero.
- 3 **94% of assembly members 'strongly agreed' or 'agreed' that "people in different parts of the country should be offered different solutions to zero carbon heating"** (see Figure 2 overleaf). They argued that areas should be able to choose the technologies best suited to their needs.

Whole Life Carbon Vision



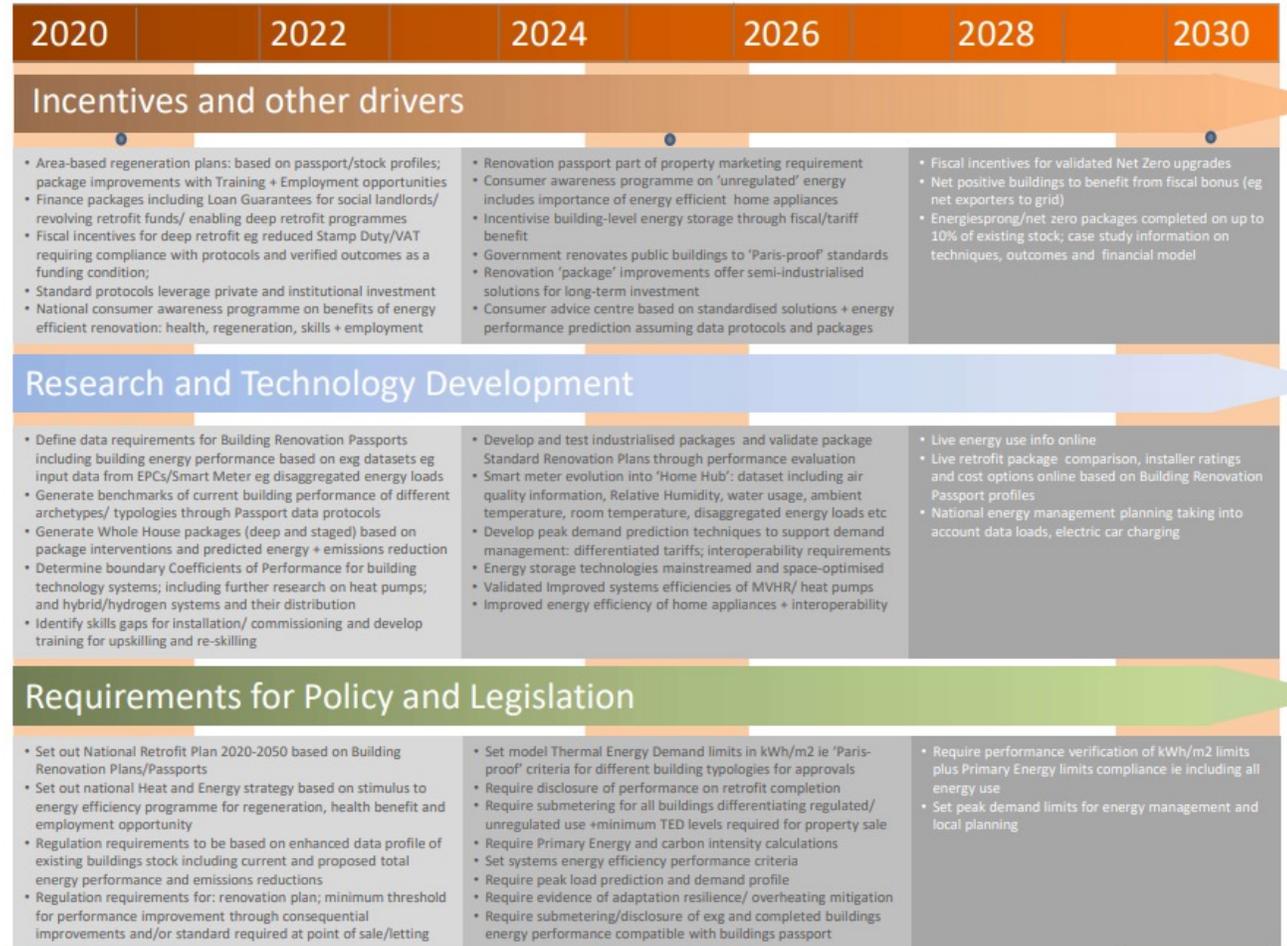
UK's EXISTING BUILDINGS – THE INDUSTRY VIEW OF A HOLISTIC APPROACH

- Green Construction Board response to the Buildings Mission call for halving buildings energy and halving cost – in Retrofit
- Builds on 5 years of reports on how to scale up retrofit and revitalize the retrofit supply chain
- Recommendations digitized whole building planning and area-based stock profiling for scale-up
- Recognises the building renovation passport enables post-project monitoring of outcomes and is the missing jigsaw piece of an end-to-end quality assurance process which attracts investors.



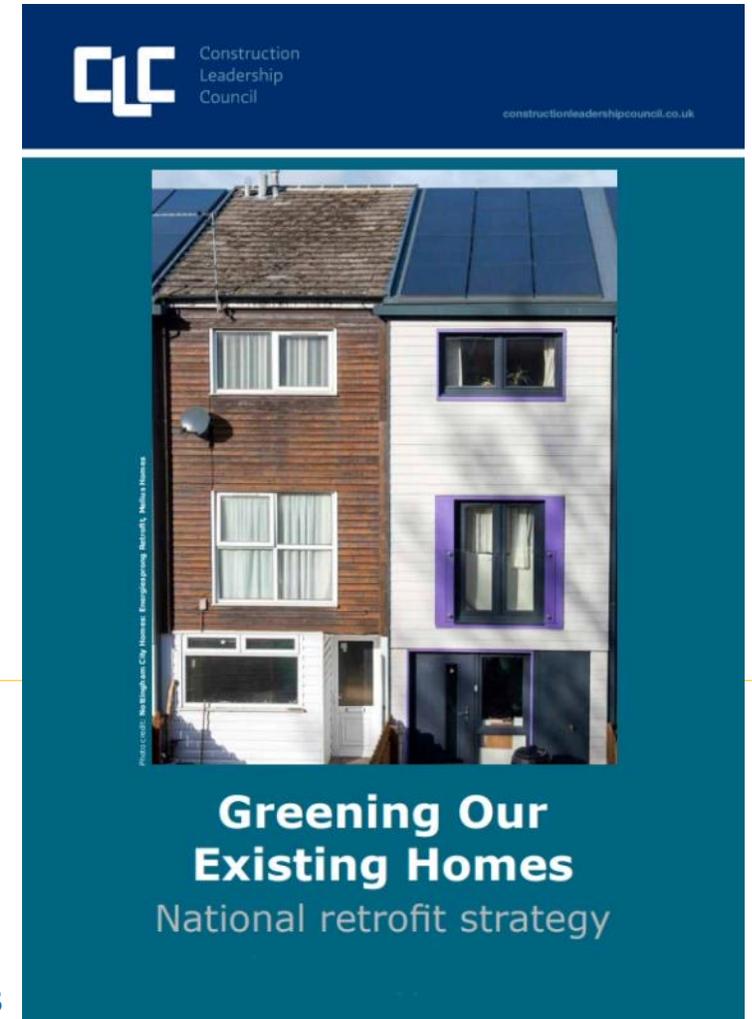
The Green Construction Board

BUILDINGS ENERGY TASKGROUP – SUMMARY OF RECOMMENDATIONS FOR EXISTING BUILDINGS IN RESPONSE TO 2030 'MISSION'



UK's EXISTING BUILDINGS – THE INDUSTRY VIEW OF A HOLISTIC APPROACH

- The National Retrofit Strategy is even more ambitious than CCC's pathway
 - Proposes Net Zero energy plans and an interlock of skills, standards and partnership approach to funding; requires government investment in skills and fuel poverty programmes; target Energy Use Intensity in kWh/m² to benchmark standards – more specific than EPC ratings
 - Median energy demand (total) ~62kWh/m² with space heating demand around 50 but according to planned packages compatible with property type; heat pump efficiencies linked with energy efficiency etc.
 - Proposes central delivery agency coordinating communications and regional/local hubs with the potential to create new and higher skilled jobs in every region and community and boost existing players (including SMEs and their supply chains)
-
- Delivering quality – assured end to end Quality Control to generate confidence in owners and investors
 - Proposes Government policy and investment will kickstart supply chain and private investment and economic opportunities
 - A comprehensive approach deploying digital techniques, renovation passports and buildings profiling to open up markets for packaged approaches, streamlined industrialization, and easier recognition of optimal conditions for alternative approaches eg heat networks, energy management



GREEN CONSTRUCTION BOARD

TRANSFORMING THE UK RETROFIT INDUSTRY – NATIONAL RETROFIT STRATEGY

Interlocking components: Successful delivery of the strategy requires a suite of interdependent modules and if any are left out, the whole ceases to function. Each are dealt with in turn below.

Proposal for the partnership approach to funding the programme: It is proposed that a partnership approach is adopted to funding the national retrofit strategy. The costs are outlined in the table below. Critically, the Government is being asked to invest £5.3 billion over the next four years.

2021 200,000 homes	2022 - 2024 855,000 homes
<p>£3.64bn* programme</p> <p>36,000 direct jobs sustained (27,000 indirect)</p> <p>Government invests £1.16bn</p> <p>Govt revenue £2.69bn</p> <p>Tax benefit per £, £1.36</p> <p>Private capital £2.5bn</p> <p>Health benefits £316m</p> <p>Additional GDP £4.76bn</p>	<p>£16.8bn programme</p> <p>100,000 direct jobs sustained (80,000 indirect)</p> <p>Government invests £5.3bn</p> <p>Govt revenue £12.4bn</p> <p>Tax benefit per £, £1.84</p> <p>Private capital £11.4bn</p> <p>Health benefits £1.4bn</p> <p>Additional GDP £21.9bn</p>
Avoided CO2 emissions: 0.532Mt	Avoided CO2 emissions: 2.53Mt
By 2030 12,300,000 homes	Net Zero homes from 2040 27,300,000 homes
<p>£235.7bn programme</p> <p>500,000 direct jobs sustained (390,000 indirect)</p> <p>Government invests £75.4bn</p> <p>Govt revenue £174.4bn</p> <p>Tax benefit per £, £1.58</p> <p>Private capital £160.2bn</p> <p>Health benefits £22.1bn</p> <p>Additional GDP £308.7bn</p>	<p>£523.7bn programme</p> <p>Jobs sustained down to 70,000 (40,000 indirect)</p> <p>Government invests £167.6bn</p> <p>Govt revenue £387.6bn</p> <p>Tax benefit per £, £1.84</p> <p>Private capital £356.1bn</p> <p>Health benefits £55.9bn</p> <p>Additional GDP £686.1bn</p>
Avoided CO2 emissions: 46.8Mt	Avoided CO2 emissions: 84.9Mt

Other benefits:

- **£436** energy bill saving per home on average per year
- Can be regionally focused targeting the **greatest need**.
- **6,000** avoided deaths p.a.
- **500,000** jobs (retrofit and related)
- Household disposable incomes **2%** higher
- For every **£1** invested - **£2** back in economy



*All figures are cumulative.

Leadership and Communications

An umbrella to tie diverse local programmes into a coherent whole: A Central Delivery Authority akin to the stature of the Olympics Delivery Authority is needed to oversee and leader strategy deliver, ensuring that all stakeholders are fully enfranchised and that standards are high.

Supported transition and a research and innovation culture

Provide a safe development environment for new entrants and existing organisations so that they grow to meet the new demands as well as extending in capability.

Performance Standards

Ensuring homes perform as promised.

Finance and Grants

Financial support in a variety of ways to suit the variety of ownership models.

Training and Accreditation

Building up an army of professionals and trades that can do the work fully and well. This involves developing the skills of the existing workforce and recruiting and training new entrants.

Materials and Equipment

Scaling up the supply of materials and equipment in line with demanding quality standards.

Creating Customer Demand

A comprehensive approach to giving every homeowner a vision of what their home needs, the belief that it is needed and a route to achieving the change.

Compliance and Quality regime

Creating an industry culture that ensures all jobs are done to high, enforced standards.

UK's EXISTING BUILDINGS – THE INDUSTRY VIEW OF A HOLISTIC APPROACH

The Low Carbon Routemap for the Built Environment

The Green Construction Board

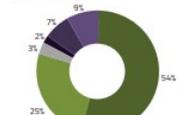
March 2013

The Green Construction Board has developed the Low Carbon Routemap for the Built Environment to serve as a visual tool enabling stakeholders to understand the policies, actions, and key decision points required to achieve the UK Government target of 80% reduction in greenhouse gas emissions vs 1990 levels by 2050 in the built environment. The Routemap also sets out actions, together with key performance indicators that can be used to deliver and measure progress in meeting the 2050 target.

The Routemap covers both infrastructure and buildings sectors, and addresses segments of operational and capital (embodied) carbon emissions. The emissions covered by the Routemap are as follows:

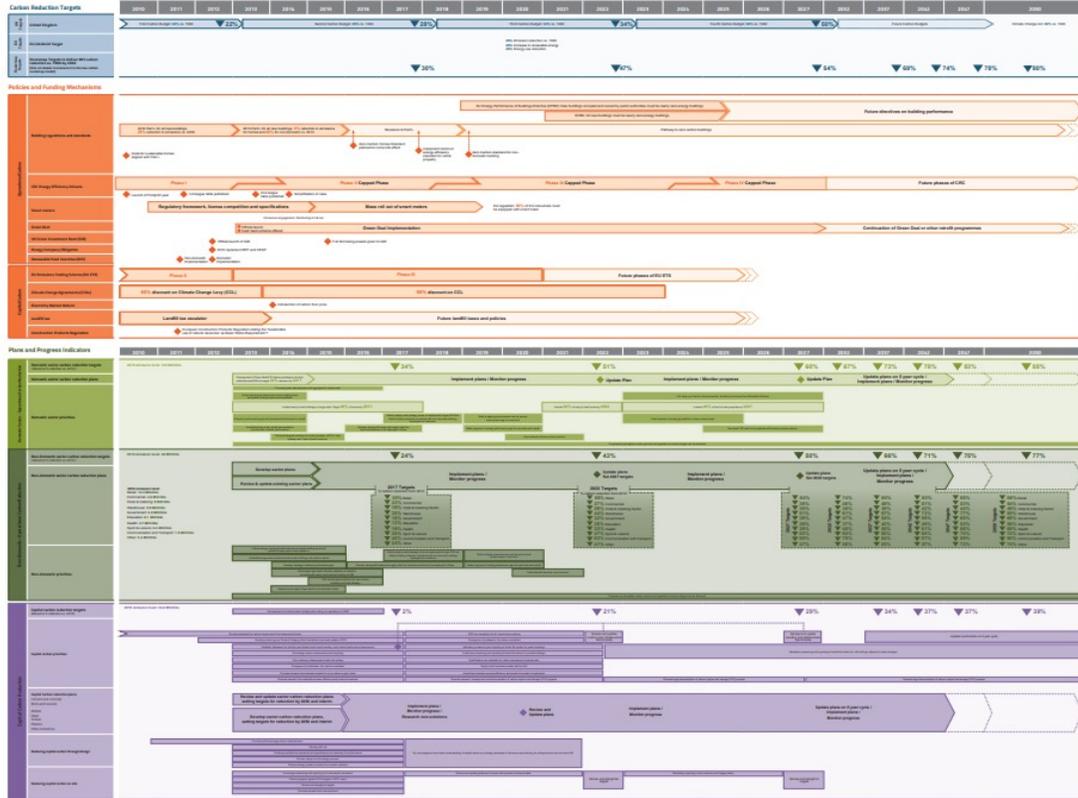
- Operational carbon in buildings emissions from regulated energy use (excluding plug loads) for all domestic and non-domestic building sectors except industrial.
- Operational carbon in infrastructure emissions from outdoor lighting, waste from construction, demolition and excavation, and water/wastewater. The use of transport infrastructure (by car, for example) is excluded. Some components of infrastructure that include buildings (such as railway stations) are included in the analysis, but appear under buildings.
- Capital carbon covers emissions arising from the production and manufacture of materials (in the UK and abroad), transport of materials and people, all industry design and consultancy activities, and the emissions from on-site activities for the construction and demolition of buildings and infrastructure.

Breakdown of Carbon Emissions in the Built Environment (2010)



- Key
- Domestic operational carbon
 - Non-domestic operational carbon
 - Infrastructure operational carbon
 - Infrastructure capital carbon
 - Domestic capital carbon
 - Non-domestic capital carbon

Built Environment Carbon Reduction Targets
Unless otherwise noted, all carbon reduction targets presented in the routemap are based on a percentage reduction from 2010 and align with the reduction trajectories delivered in scenario 3 of the low carbon routemap model. Collectively they cover domestic, non-domestic and infrastructure and the delivery of an 80% reduction in carbon emissions in the built environment to 2050. In this sense the targets are based on a modelled scenario and do not represent any form of sector commitment.



GREEN CONSTRUCTION BOARD

Whole Life Carbon Vision

2050

New buildings, infrastructure and renovations will have net zero embodied carbon, and all buildings, including existing buildings, must be net zero operational carbon.

2030

Net Zero Carbon Buildings Commitment
All buildings within direct control to operate at net zero carbon by 2030

New buildings, infrastructure and renovations will have at least 40% less embodied carbon with significant operational carbon reduction, and all new buildings must be net zero operational carbon.

Net Zero Operational Carbon

Definition
A net zero carbon building is highly energy efficient with all remaining energy from onsite and/or offsets renewable sources

Guiding Principles

- Measure and disclose carbon**
Carbon is the ultimate metric to track, and buildings must achieve an annual operational net zero carbon emissions balance based on metered data
- Reduce energy demand**
Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy
- Generate balance from renewables**
Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets
- Improve verification and rigour**
Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste

Net Zero Embodied Carbon

Definition
A net zero embodied carbon building (new or renovated) or infrastructure asset is highly resource efficient with upfront carbon minimised to the greatest extent possible and all remaining embodied carbon reduced or, as a last resort, offset in order to achieve net zero across the lifecycle

Guiding Principles

- Prevent**
Avoid embodied carbon from the outset by considering alternative strategies to deliver the desired function
- Reduce and optimise**
Evaluate each design choice in terms of the upfront carbon reductions and as part of a whole lifecycle approach
- Plan for the future**
Take steps to avoid future embodied carbon during and at end of life
- Offset**
As a last resort, offset residual embodied carbon emissions within the project or organisational boundary where possible or if necessary through verified offset schemes

Key outputs



1
A report setting out the actions, policies and processes needed to manage the net zero transition in the built environment



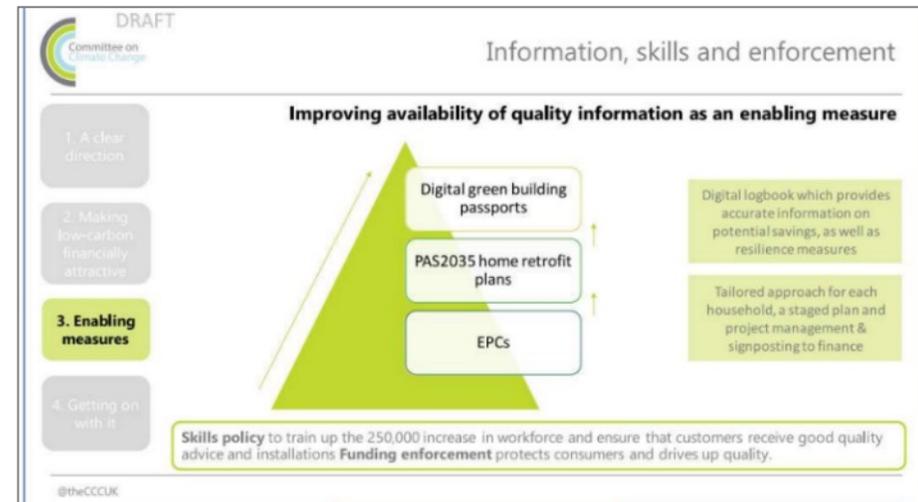
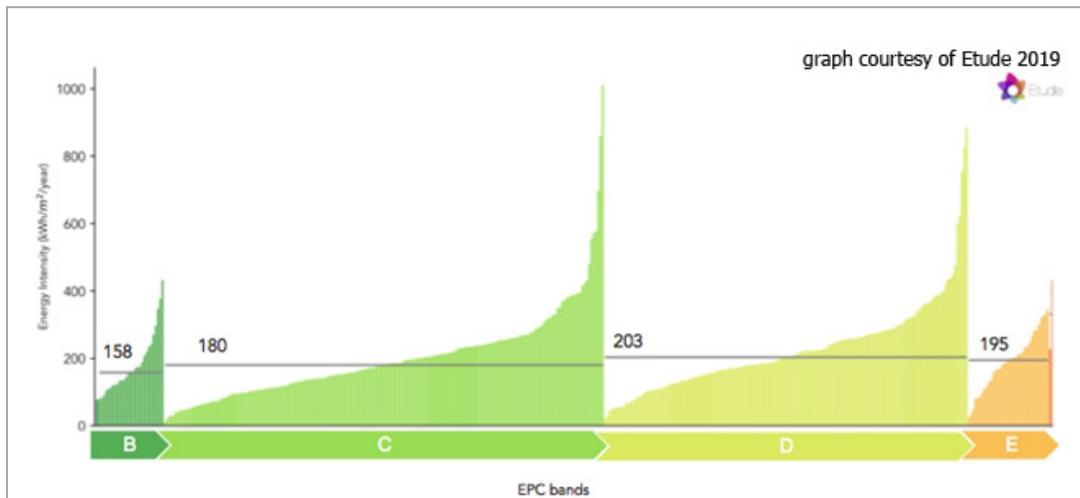
2
A 1.5° aligned science-based trajectory for reducing built environment emissions, including targets for relevant sub-sectors

UK's EXISTING BUILDINGS – THE INDUSTRY VIEW OF A HOLISTIC APPROACH

- EPC for domestic and non-domestic buildings show how it is a poor reflection of actual energy use and inadequate for Net Zero planning
- EPC bands have wide variation within band and across bands (especially in existing stock) and covers a wide range of 'scores'
- The Scottish Government highlighted the need to reform EPC in its Heat in Buildings Strategy consultation. It has now released a consultation which proposes changes to the format of Domestic Energy Performance Certificates (EPCs) proposing that a third metric is added, which would inform dwelling owners about the energy use of their property; this metric would be called 'Energy Use Rating' and would be based on kWh/M²/year.

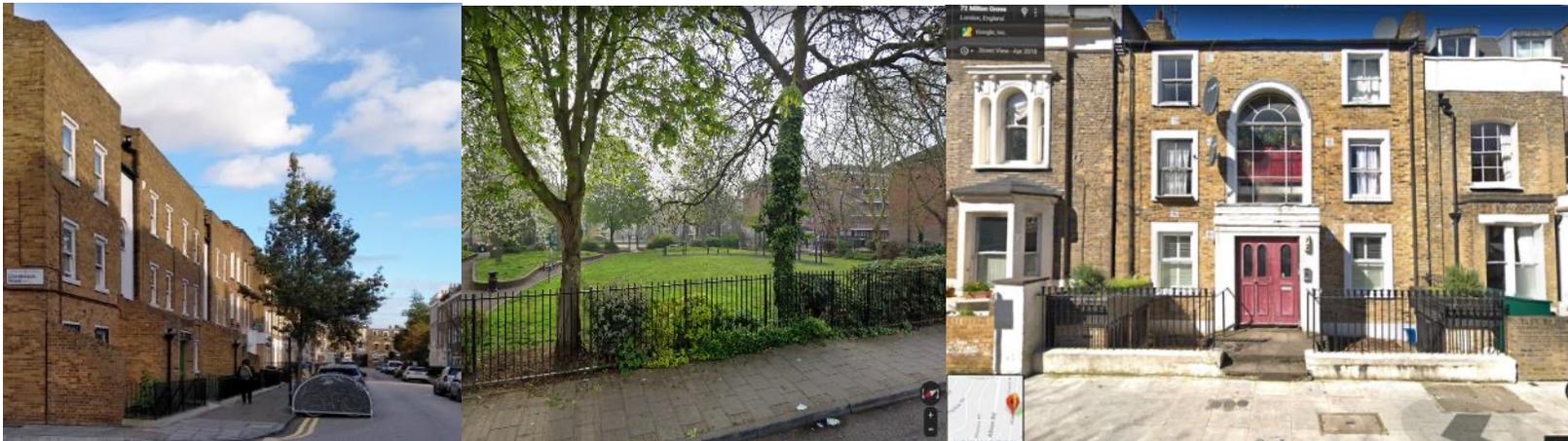
	Before /m2	After /m2	Before House	After house
Space heating [kWh]	162	25	14,723	2,275
Hot water [kWh]	24	19	2,145	1,729
Lighting, pumps and fans [kWh]	7.2	6.0	654	546
Electric (home) appliances [kWh]	24.2	20.0	2,200	1,820
Total	217	70	19,722	6,370^{II}

Table showing assumed energy split - Energiesprong Transition Zero document p20 2015



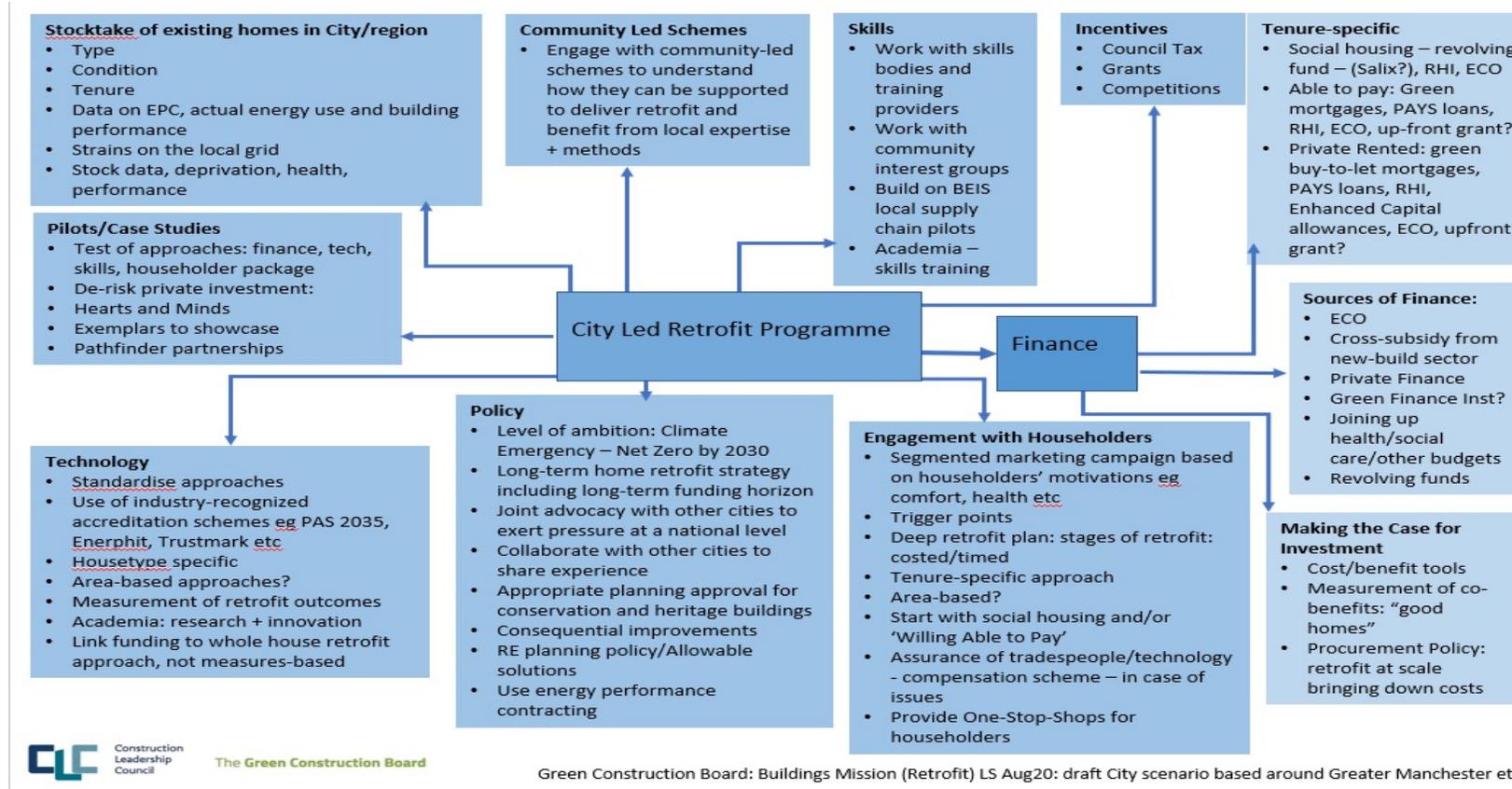
UK's EXISTING BUILDINGS – THE INDUSTRY VIEW OF A HOLISTIC APPROACH

- Neighbourhood retrofit, working with local people, ideas and skills, can create healthy sustainable communities
- Retrofit-led regeneration utilises wide-scale retrofitting of existing housing and buildings to transform low income areas. The delivery of high-quality whole home retrofits can be used as the catalyst for wider improvements to local amenities and infrastructure, and for community engagement and employment programmes. Together these interventions can help to revitalise an area, enhance the standard of living and provide lasting benefits and opportunities for the community.
- Home retrofit alone will not regenerate communities, so UKGBC set out a 'vision' of wider improvements to the local area which can be undertaken alongside the retrofit works.



LOCAL AUTHORITY RESPONSE– SPECIFIC TARGETS FOR ENERGY EFFICIENCY

- Greater Manchester Combined Authority

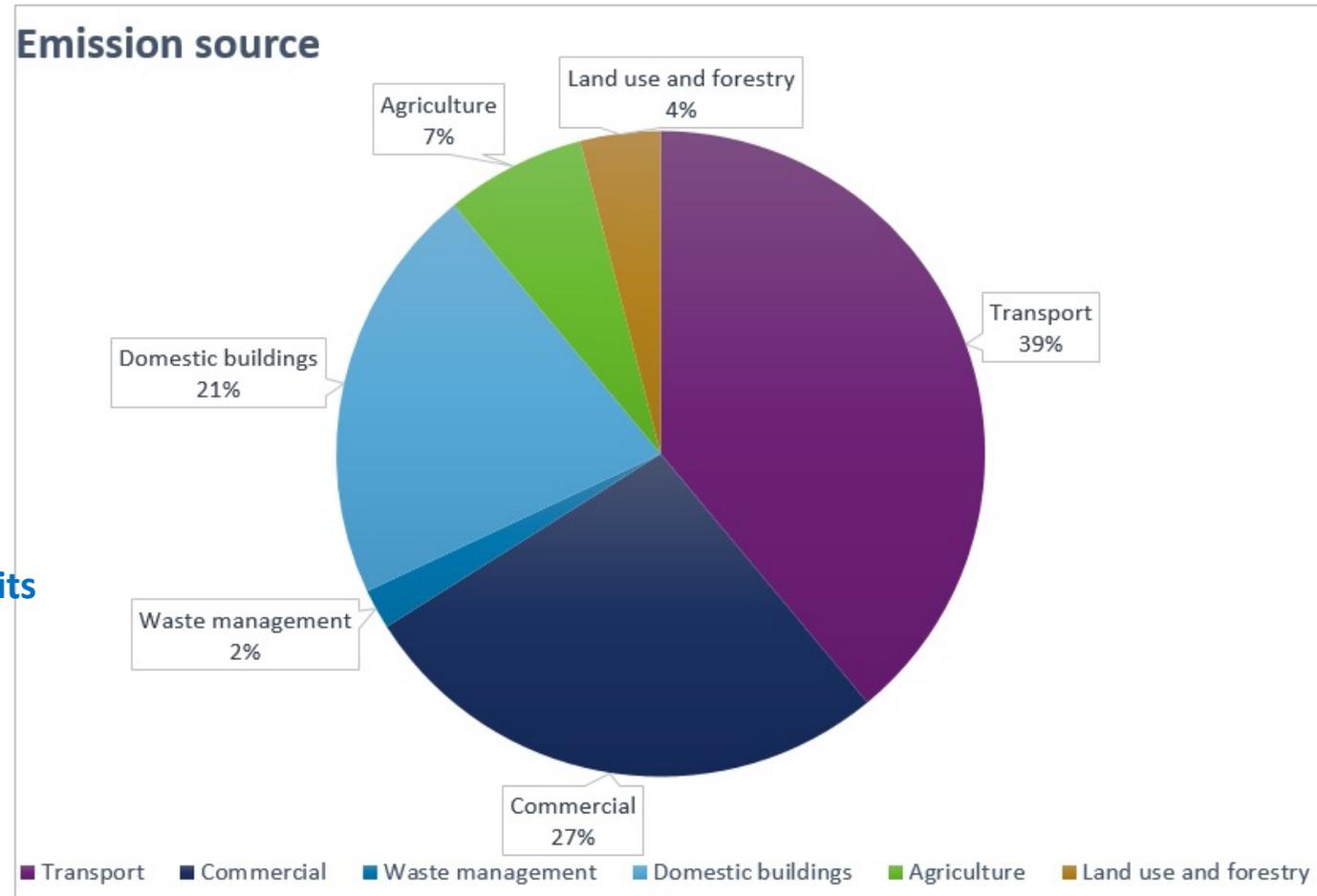


Housing
Greater Manchester unveils ambitious vision for new homes, green spaces and revitalised town centres

- City Led Retrofit Programme
- 30,000 zero-carbon homes for social rent: As part of Greater Manchester’s Homelessness Prevention Strategy, Leaders will publish a plan to deliver 30,000 zero-carbon homes for social rent. A new commitment to work to radically improve temporary accommodation standards will also focus on families experiencing homelessness.

LOCAL AUTHORITY RESPONSE– SPECIFIC TARGETS FOR ENERGY EFFICIENCY

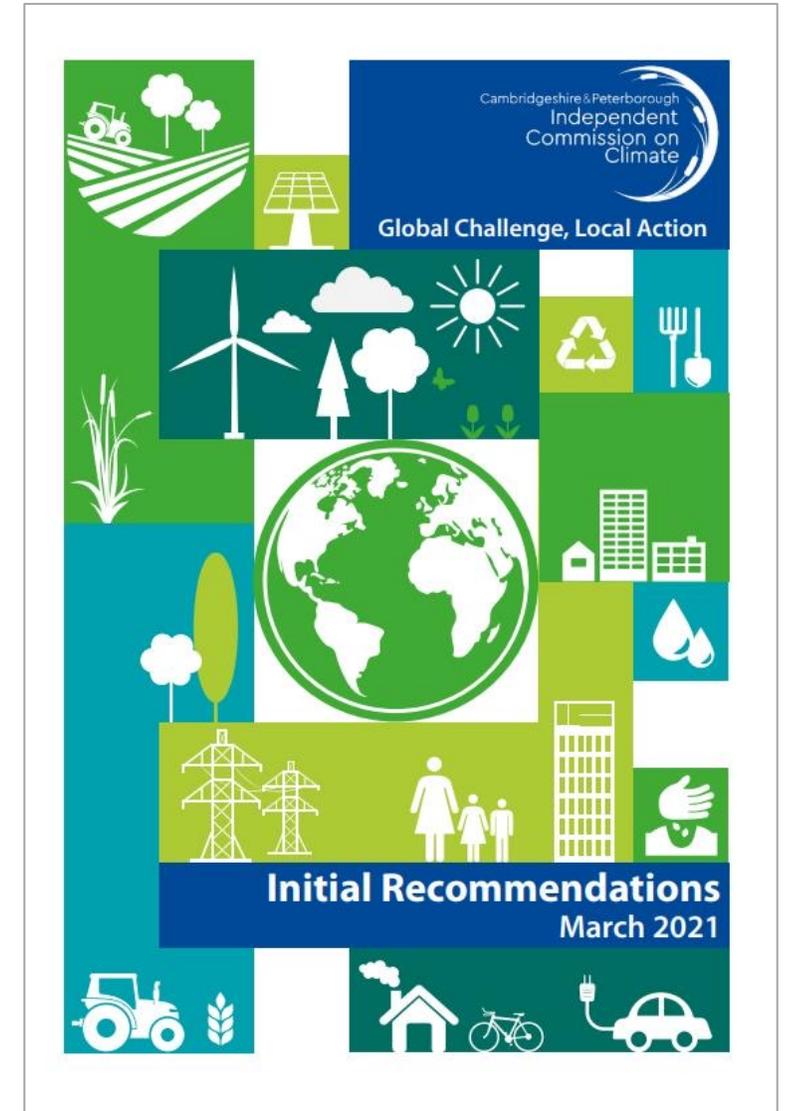
- Using Planning process to set the context for sustainable buildings
- Sustainable Development Test to include:
 - Connectivity
 - Resource Infrastructure
 - Ecology/Land Quality Priority Assessment
- Community involvement in the Planning process
- The potential for approvals based on a performance standard to be required to verify performance in use
- Recent local plan consultations with demand limits relating to retrofit include:
 - - Central Lincolnshire
 - - Greater Cambridge
 - - Cotswold Councils



EXAMPLE:
Combined
Authority
Emissions sources

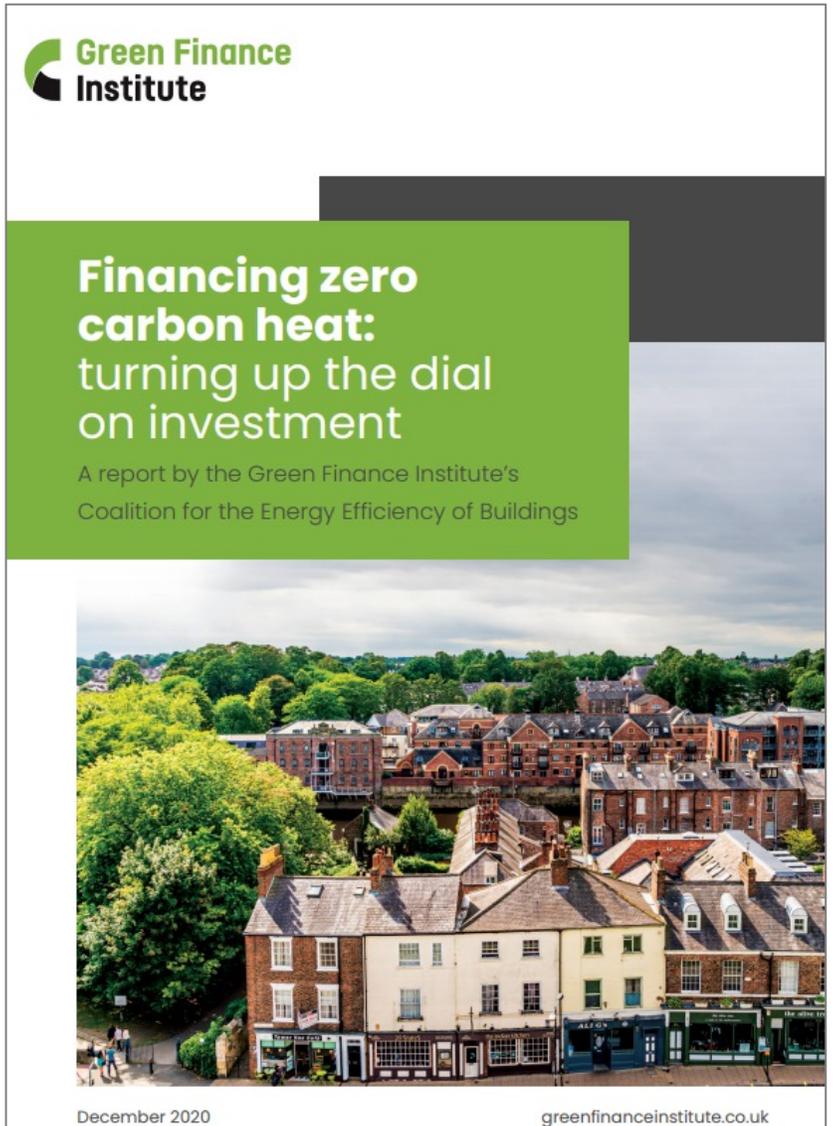
LOCAL AUTHORITY RESPONSE– SPECIFIC TARGETS FOR ENERGY EFFICIENCY

- **Cambridgeshire and Peterborough Combined Authority ICC Recommendations**
 - **Adopt a ‘net zero ready standard for new homes by 2023**
 - **All existing building should have a Building renovation plan for Net Zero, and the the CA should support home-owners to encourage behaviour change and support financing; and prioritise achievement of NZ in social housing through digital green passports, prioritizing energy efficiency and low carbon systems**
 - **Develop a local area energy plan**
 - **Actively monitor performance and ensure standards enforced**
 - **Development siting for connectivity: public transport access, EV charging**



RETROFIT FINANCE OPPORTUNITIES for DECARBONISATION PATHWAYS

- different technological options for decarbonising heat for each of the four housing segments: (on-gas grid, off-grid, heat network connected and newbuild)
- 600,000 heat pumps per year by 2028 (PM Ten-point Plan)
- Currently there are around 17,000 heat networks in the UK which supply nearly 500,000 consumers, accounting for 2% of domestic heat.
- Proposes demonstrators for appraising different options
- District heating schemes require a high density of heat demand to be economic, therefore are suitable for urban areas, new build developments and some rural areas.
- Cf ~£500/tCO₂e reported cost of semi-rural heat network?
- Green Finance Institute about to launch their proposals on Building Renovation Plans, representing an industry wide view on developing a consistent approach to building renovation passports to unlock the green finance mechanisms to support the UK's net zero ambitions for retrofit scale-up. The proposals for Building Retrofit Plans provide a harmonised framework to speed transition and stimulate demand, market providers, and finance opportunities, and will be applied in pilot schemes



UK's EXISTING BUILDINGS STOCK – POLICIES vs PRIORITIES FOR NET ZERO

- CLARITY ON TECHNICAL OPTIONS: HYDROGEN/ HYBRID/ ELECTRICITY
- CLARITY ON PEAK LOAD DEFERRAL: MINIMUM ENERGY EFFICIENCY TO AVOID FUEL POVERTY + COMPETITION FROM OTHER SECTORS EG TRANSPORT AND INDUSTRIAL DECARBONISATION
- SUPPORT FOR WHOLE BUILDING APPROACH, COMBINATIONS OF MEASURES
- ENFORCEMENT OF BUILDING TARGETS AND OUTCOMES
- HISTORIC BUILDINGS EXEMPTIONS
- LOCAL ENERGY PLANNING: DNOs, HEAT NETWORK AND RETROFIT PROGRAMMES
- BETTER ADVICE, GUIDANCE, AND LOCAL DEMONSTRATORS
- BETTER REGULATION, PREDICTION AND ENFORCEMENT
- GALVANISE LOCAL SKILLS, SUPPLY CHAINS AND ECONOMIC PARTNERS

The Business, Energy and Industrial Strategy (BEIS) Committee has launched an inquiry examining the path to decarbonising heating in homes. The BEIS Committee will examine the Government's 'Buildings and Heat Strategy', due in November, and investigate the policies, priorities and timelines which are needed to **decarbonise heating** in residential buildings and help ensure the UK gets on track to deliver **Net Zero by 2050**. The Committee's inquiry on decarbonising heat follows a ...



NOVARA MEDIA

The Government Wants Green Homes. Big Oil Has Other Ideas

The government's Heat and Buildings Strategy could be dead in the water.

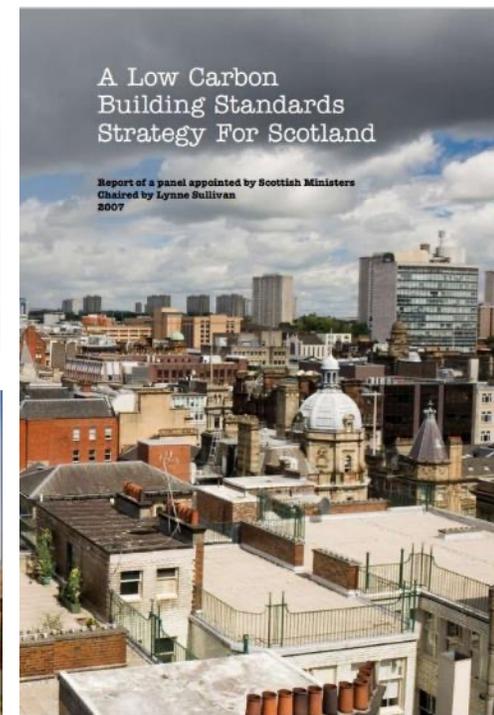
by Alex King
24 September 2021



Simon Dawson / No 10 Downing Street

Buildings Mission 2030

Background report to Recommendations from the Green Construction board in response to the 2030 Buildings Mission
April 2019



THANK YOU

Lynne Sullivan OBE, RIBA



Construction
Leadership
Council

The Green Construction Board