Energy Demand & Buildings energy use

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Energy and Net Zero in the UK – 10th Oxford Energy Day – 23 March 2022

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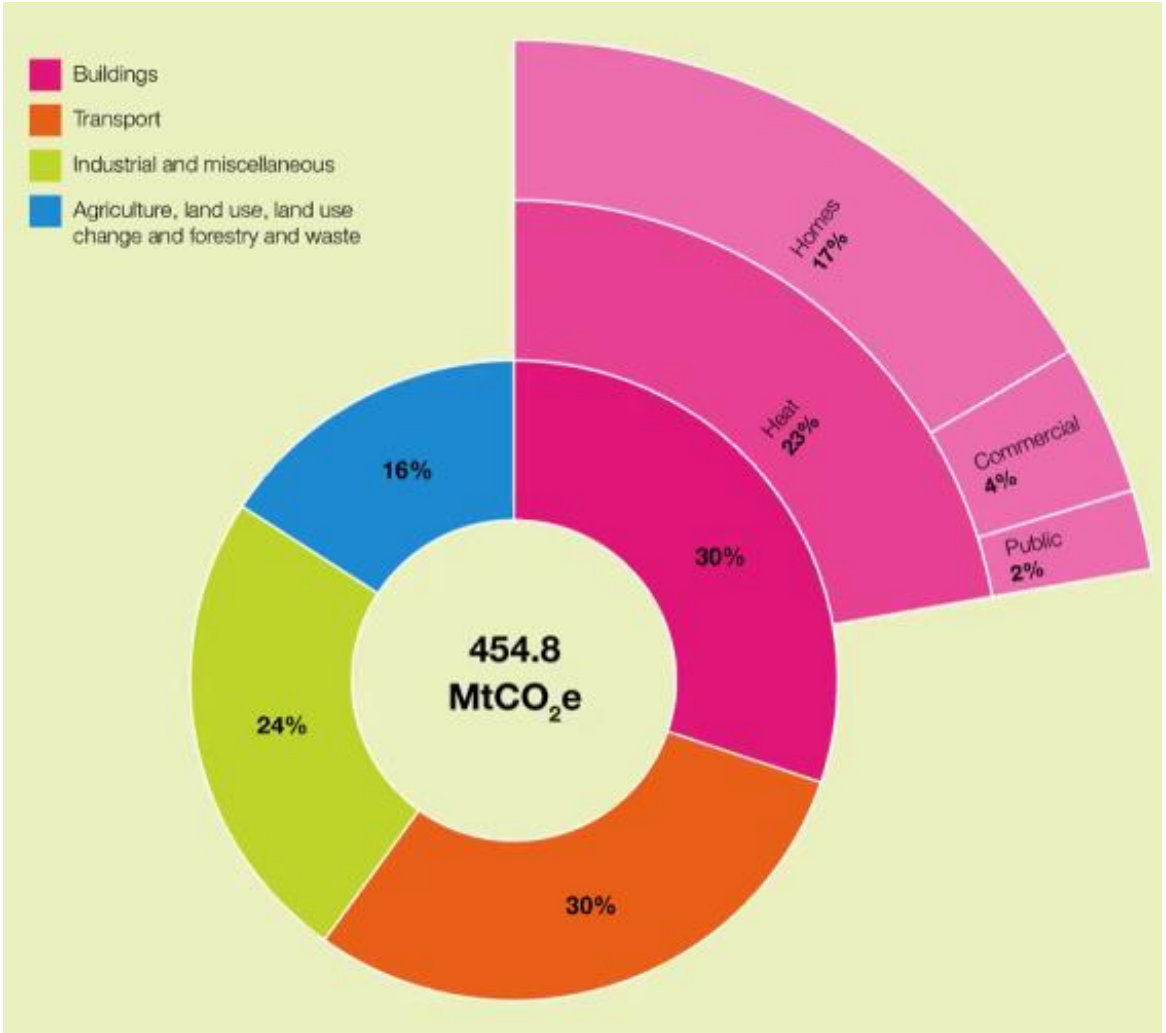
UK’s buildings challenge to Net Zero

- Around **30 million buildings** responsible for **~30% of national GHG emissions**
- Quite **inefficient building stock** and **large number of ‘hard-to-treat’ buildings**
- Around **85% of properties are connected to the gas** grid while still many others use oil, coal or liquified propane gas



(Source: UK GHG emission - Department of Business, Energy and Industrial Strategy (BEIS)- Ene
Policy Briefings – 23 February 2022, Daniel Newport, Presentation slides)

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UK's challenge to Net Zero

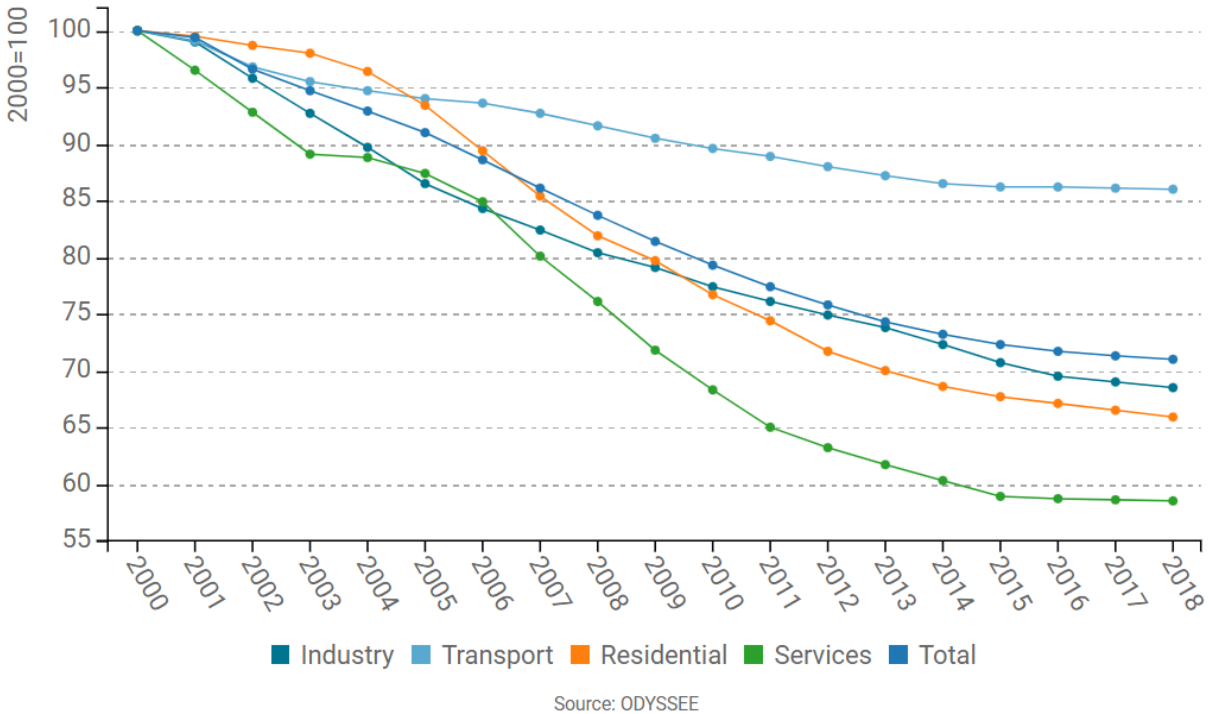
In 2018, the final energy consumption was around 137 Mtoe = 15% below its level in 2000

Residential sector (32%) of the total

- In 2018, the Clean Growth Strategy (CGS) set out **policies to promote clean growth**, including improving **energy efficiency of business, industry and UK homes**

- In 2021, the government set new targets for domestic energy efficiency: by **2025, homes should produce 75-80% less CO2 compared to current levels**

Figure 2: Technical Energy Efficiency Index



(Source: European Commission part of the EnR Club- Odyssee -Mure. Available at: https://www.odyssee-mure.eu/publications/efficiency-trends-policies-profiles/united-kingdom.html#buildings)

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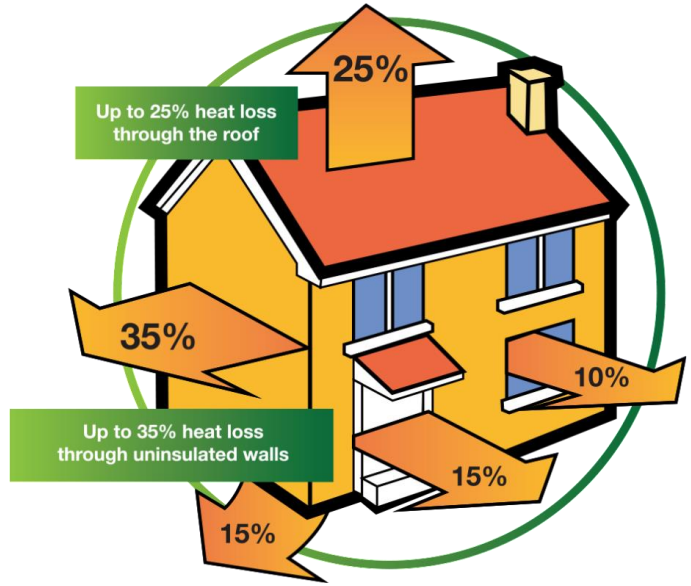
UK's Net Zero challenge: Buildings



Falls in emissions largely reflect energy efficiency improvements in buildings.

Demand for gas and electricity has fallen by 16% and 14% since 2005

(Source: CCC, 2020)

Figure 3: Energy consumption of space heating per m2 (normal climate)

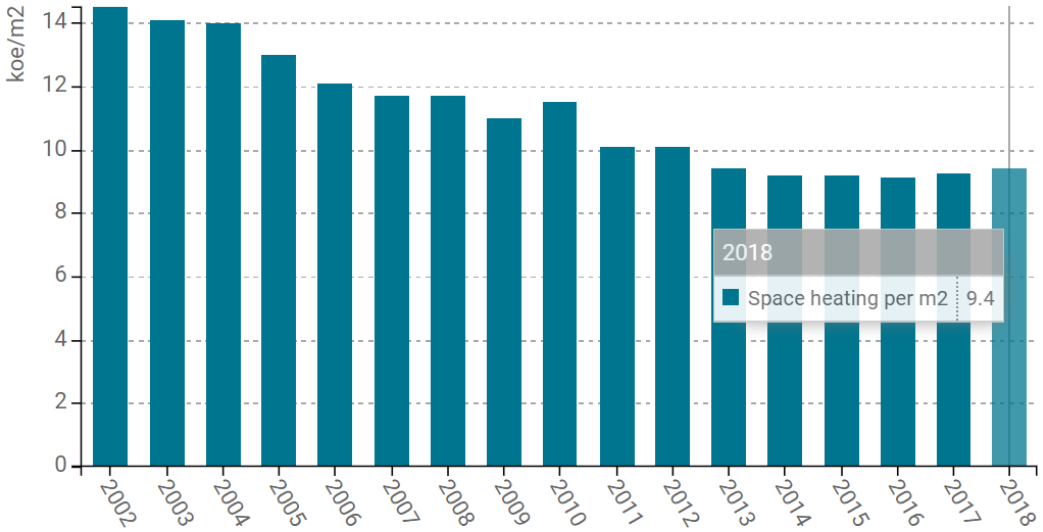
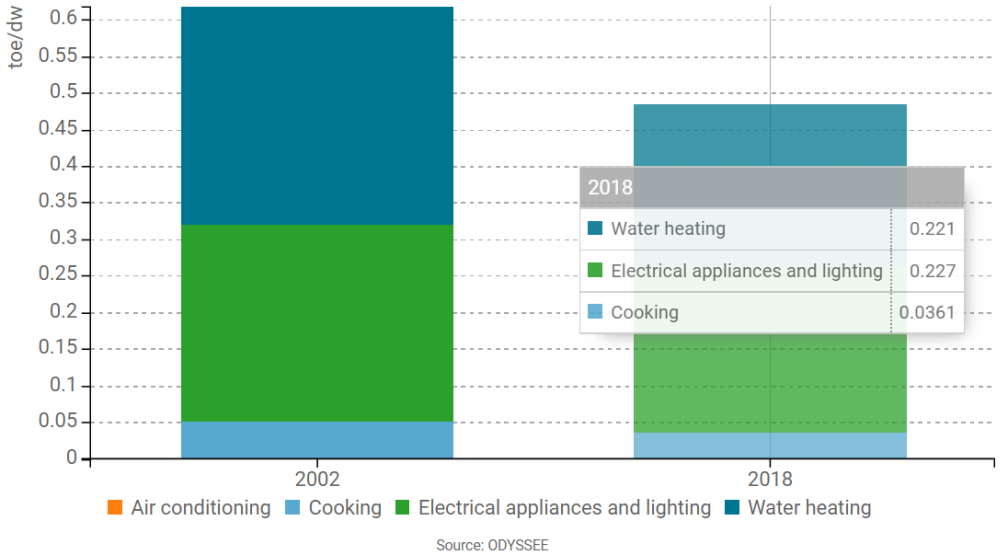


Figure 4: Energy consumption per dwelling by end-use (except space heating)



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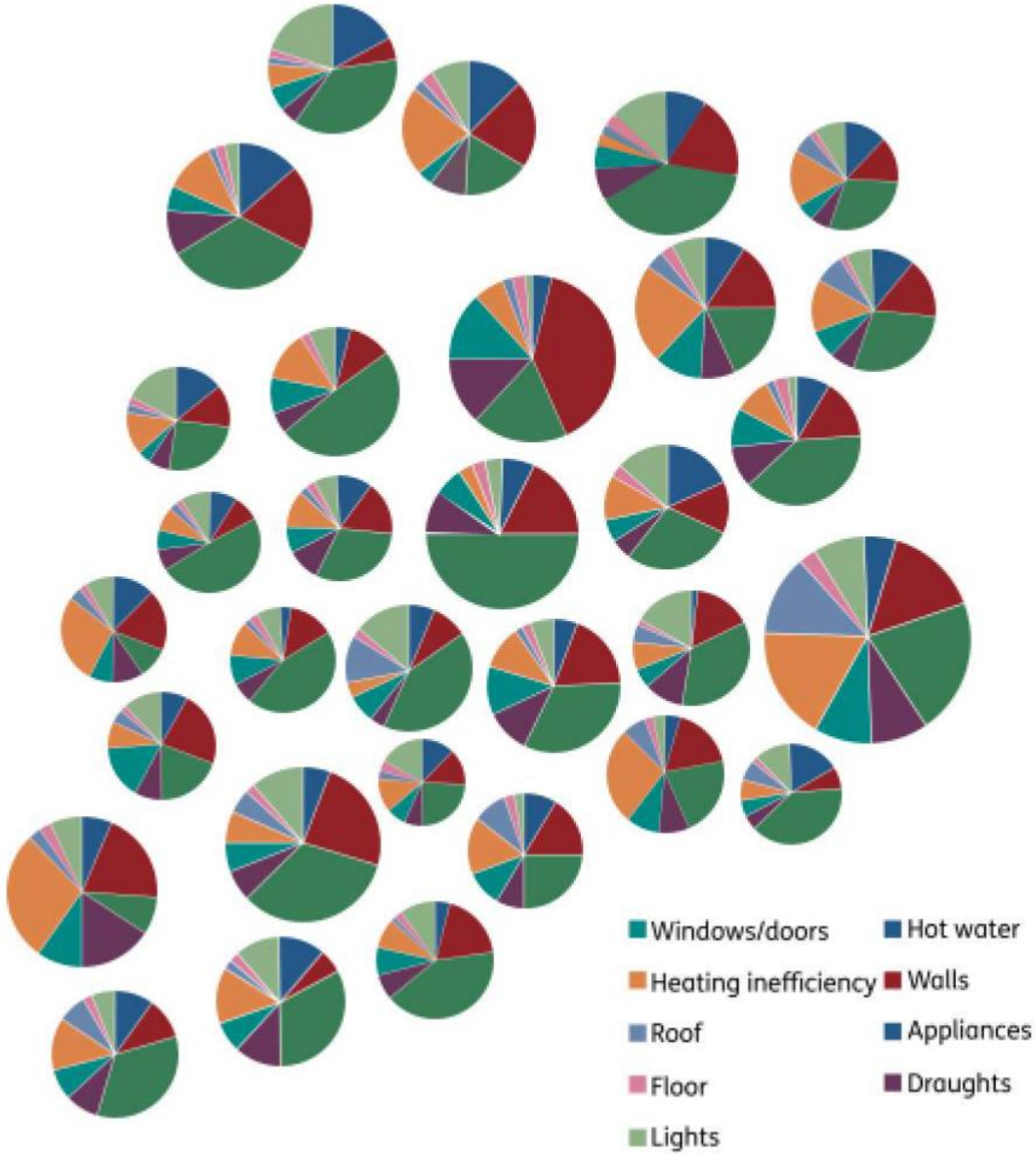
(Source: European Commission and is part of the EnR Club- Odyssee -Mure. Available at: https://www.odyssee-mure.eu/publications/efficiency-trends-policies-profiles/united-kingdom.html#buildings)

Every building is unique

- Energy use in a dwelling depends on a range of factors: **the building fabric, the building services and the occupants**
- Complications arising from:
  - The diversity of the housing stock and large number of hard to treat properties
  - Lack of public understanding
  - Achieving cost effectiveness for comprehensive refurbishment
  - Supply chain limitations, including the skills and capacity to deliver



The pie charts shows both the total energy use -from the size of the pie- and the breakdown in energy use in different homes (*Source Retrofit Academy)*

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Buildings' energy performance to Net Zero

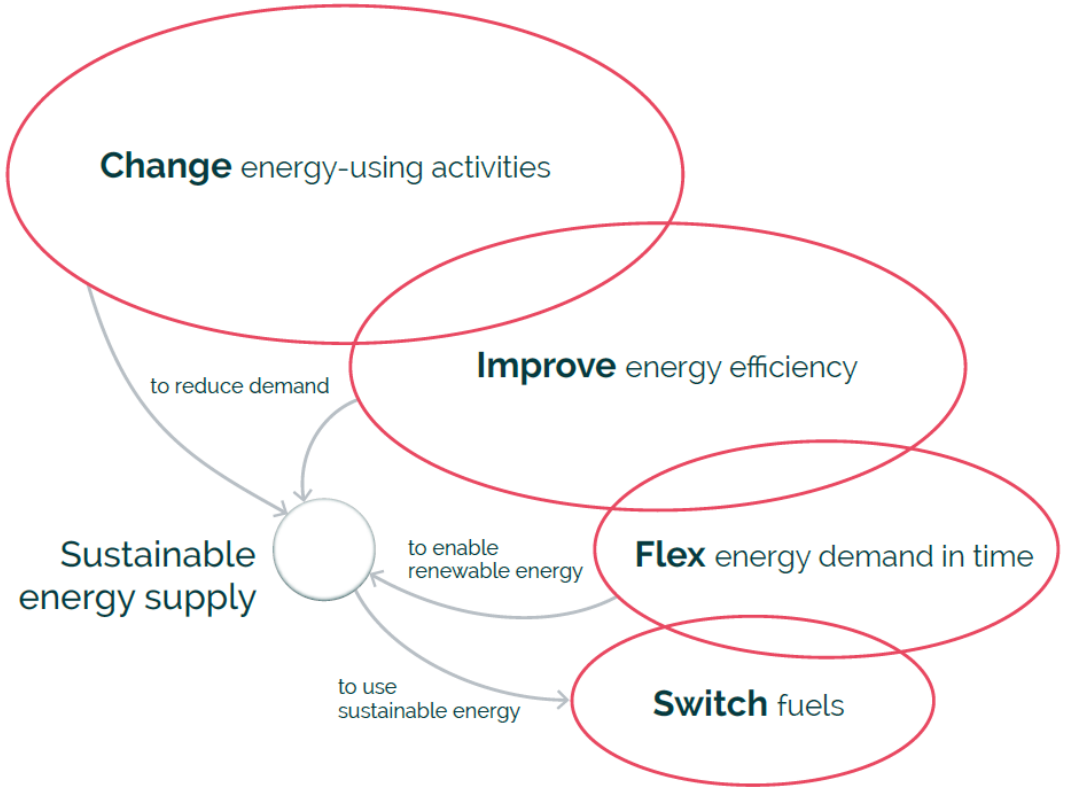

Figure 2. Contributions of the demand side to energy sustainability.

(Source: CREDS 2019 Shifting the focus: energy demand in a net-zero carbon UK)

*'Achieving net zero emissions from the housing stock needs the **combination of two processes of change**, the first in **the energy supply system**, the second **in dwellings themselves**'*

(Steadman, P. 2021)

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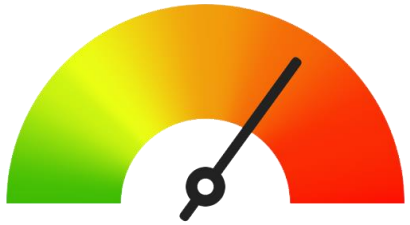
Buildings' retrofit challenge

Benefits from a good retrofit

- **Reduced fuel use**
- **Reduced fuel costs and emissions**
- **Improved comfort and health**
- **Improved asset value**

Barriers to retrofit

- **Access to information, awareness, motivation**
- **Skills Shortage & supply chain capacity to bespoke solutions**
- **Finance and Value**
- **Disruption**
- **Quality and Trust**



Risks from retrofit

- **Poor retrofit**

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How does poor retrofit look like?

Poor retrofit is the consequence of **poor risk management,** resulting in **damage or deterioration of the building**, and **serious risks** to the **health and wellbeing** of occupants, **costs** as the substantial unforeseen of remedial work

(Source: https://passivehouseplus.ie/news/health/)

Health Posted Mar 06, 2018 Add new comment

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Disastrous Preston retrofit scheme remains unresolved

A disastrous failed external insulation contract run under a government energy saving scheme has affected up to 390 homes in Preston with water penetration, mould and damp.

But a good retrofit its not only about…

technologies

(e.g. heat pumps, photovoltaics, insulation products)

But also about …

‘whole-building’ retrofit approach

(e.g. planning sequence of works, ‘fabric first’, integration of the occupants in the design)

working practices & skills

(e.g. ‘multi-skilling’ of on-site workers to reduce industry fragmentation)

business processes

(e.g. new business models for better quality assurance and customer service)

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Local Supply Chain Demonstrator projects

New Retrofit standards

Scaling-up quality in retrofit & futureproof building stock

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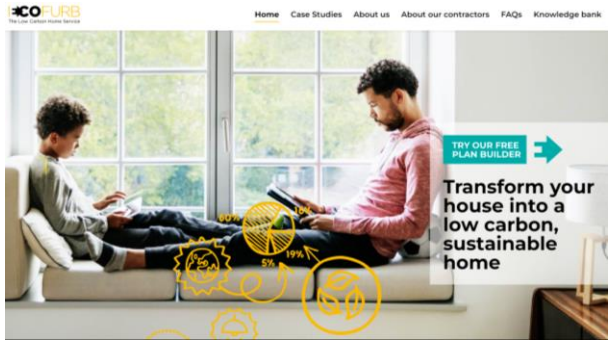
Manchester: People-Powered Retrofit

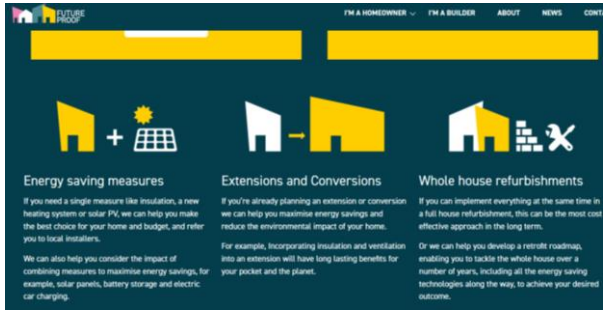
Greater London: Ecofurb



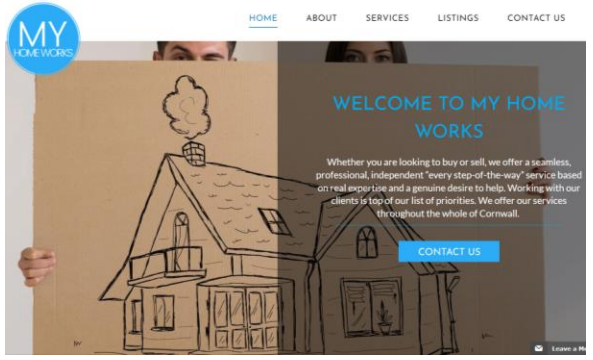
East/West Sussex: Warmer Sussex

Oxfordshire: Cosy Homes

Bristol & Bath: Futureproof

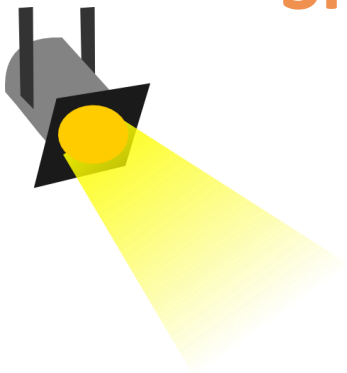


Cornwall: Homeworks



Ways forward…

Shift of focus



Improve building stock

at speed

at scale

&

of good quality

- ✓Policy continuity and financial incentives
  - Continuity of processes **moving focus from Quantity to Quality of work**
- ✓ Raise minimum Building Regulation standards, facilitate other more ambitious standards
  - **Learn from failures** – feed back loops
- ✓A ‘whole-building’ approach that involves new combinations of people, technology, knowledge and behaviour
  - **Customer/end-user centred approach** that continues after the delivery of the project
- ✓Change of culture for the supply chain and skills
  - From technical or micro-economic effects of what and how much to **who can do good quality work**, and **how can be organised on a grand scale**

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Thank you!

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