KR: Context is the CEC Q2 2023 Conservation and Adaptation Consultation, from which a short-term Working Group was convened, with a second and final meeting on 1 Sep.
What happens now?

Presentation to the Edinburgh Association of Community Councils

Conservation and Adaptation: The challenge of shaping legacy housing for greater energy efficiency.

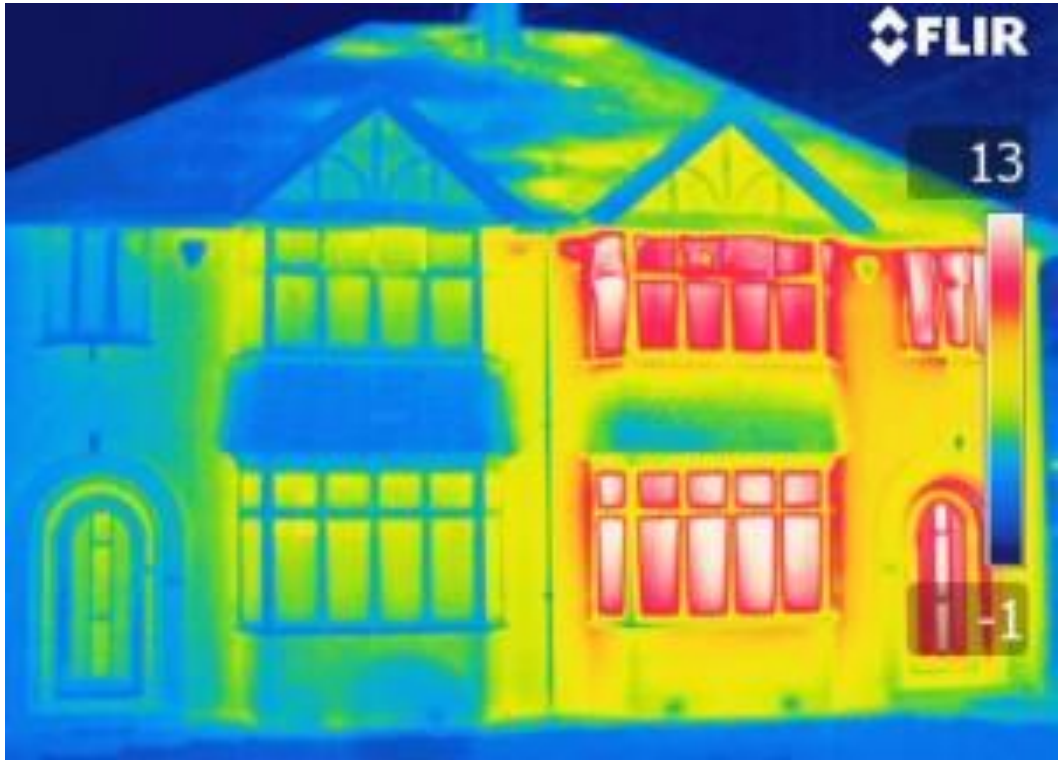
Douglas Rogers – Community councillor

Marchmont & Sciennes Community Council

Introduction

The following slides are grouped as:

- 3-6 Current programs seeking to support the Net Zero target
- 7-8 What the issues are going forward
- 9-10 Feedback from survey and the Fabric First philosophy
- 11-15 How the insulation in our houses could be improved
- 16-18 What these improvements might achieve and conclusions



An infrared image of a pair of semi-detached houses, one fully insulated

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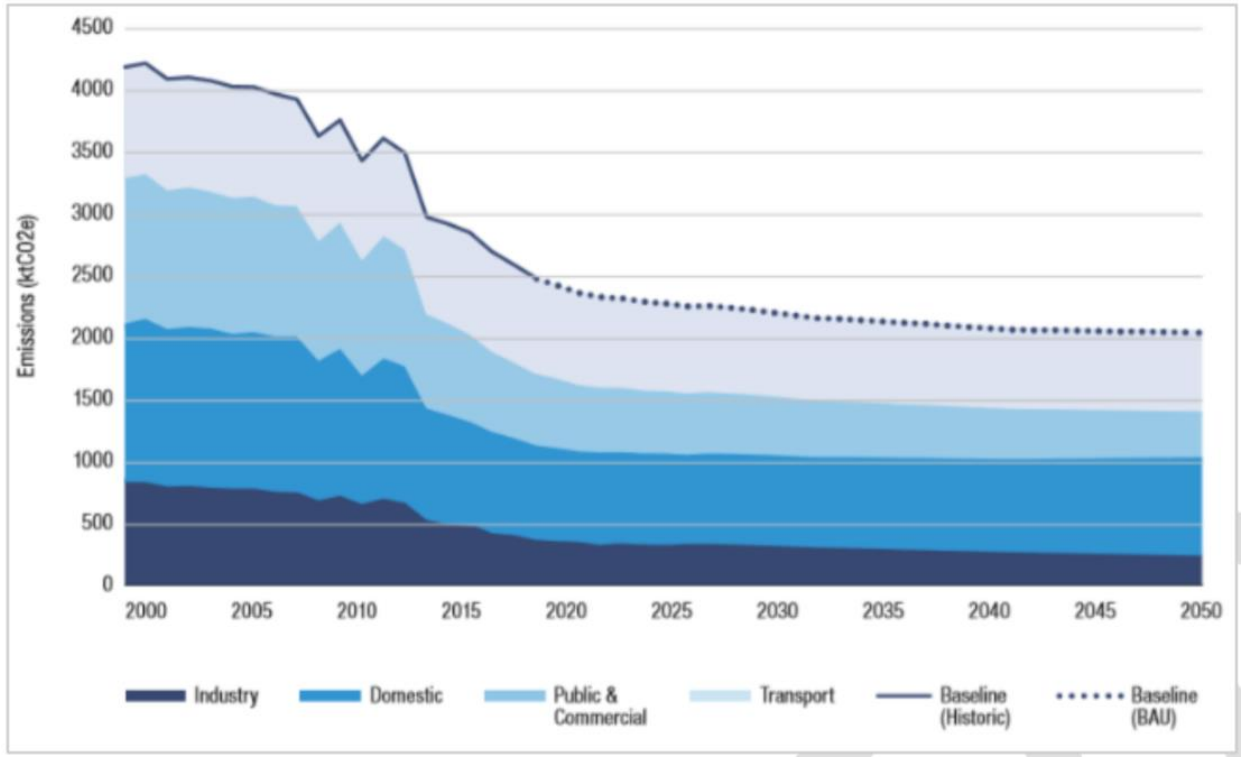
How can we meet the 2030 Net Zero target for Edinburgh?



Cumulative emissions reduction potential by scenario. From A Net-Zero Carbon Roadmap for Edinburgh.

From Net-Zero carbon roadmap

- 40% reduction since 2000 now is:
  - 31% from transport
  - 29% from domestic housing
  - 23% Public & commercial
  - 17% industry
- 9% projected reduction by 2030
  - Decreased domestic emissions offset by building new houses and flats
- Acceleration of carbon reduction programmes is required to meet the Net Zero target!

KR: The Scot Gov net zero target is 2045. Edinburgh looks to be stranded by its ambition. There's the risk of disillusion.

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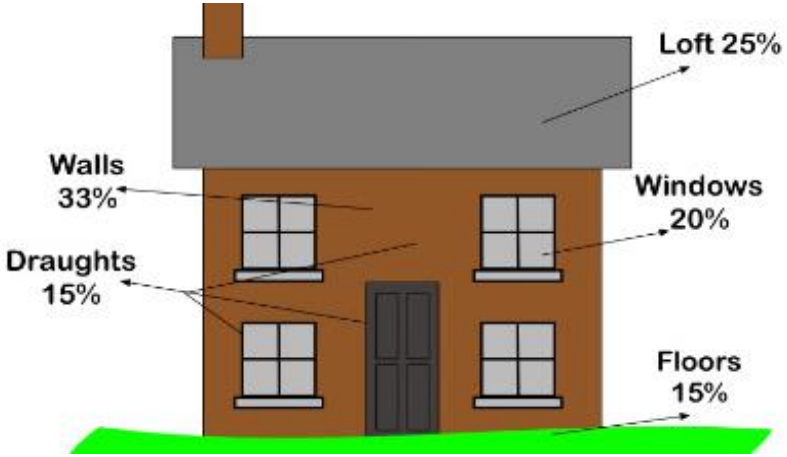
So what can we do?

Insulate our houses?

Evidence in a Cambridge research paper on houses with improved insulation, showed some benefit initially but no significant energy saving after 5 years:

- We insulate first for comfort – so reduced settings drift back
- Then to reduce bills – but only when our bills are too high
- Finally to reduce our carbon footprint



Heat loss ratio from uninsulated house

How can we ensure that houses are better insulated?

Through legislation?

- An EPC rating of C for properties let by 2028
- Houses must be sold with an EPC rating certificate
- Building regulations set insulation standards

By providing grants and loans?

- Loans available for insulation upgrades listed on EPC certificate
- Grants for heat pumps and some insulation improvements

There is still not enough incentive to insulate to a high standard!

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Who is doing what in the Council?

City of Edinburgh council's Conservation & Adaptation work

- First working group held 15th August: Second on 1st September
- Instigated by the planning committee – lead by Councillor Osler
- Survey results analysed by Dr Lee of Edinburgh University with detailed analysis

Conservation & Adaptation: Analysis of Responses to the City of Edinburgh Council Public Consultation
Report prepared for the Short-Term Working Group
Dr W. V. Lee | University of Edinburgh
Version: 21 August 2023 2 / 41

Please cite this report as: Lee, W.V. (2023). Conservation & Adaptation: Analysis of Responses to the City of Edinburgh Council Public Consultation. Report prepared for the Short-Term Working Group, The City of Edinburgh Council. Edinburgh, UK

City of Edinburgh's Local Heat and Energy Efficiency Strategy

- First working group – 4th September
- Programme Development officer – Kyle Drummond reports:
  - The baseline analysis of houses and other building stock is complete.
  - Initial Strategic Zones have been developed with consultation with key stakeholders
  - Work is underway on modelling Delivery Areas and seeking internal approval
  - Will begin consultation on Delivery Plan in October 2023
  - Refined LHEES and Delivery Plan to be brought to Policy & Sustainability Committee in December 2023.

KR: Scot Gov-led programme. Arguably pivotal in the Net Zero 2030 setting. Community Councils need to be on top of this programme.

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What other initiatives are there?

The University of Edinburgh – Climate Change Institute

- Survey evaluation
- Analysis of current practices
- Workshops on meeting NetZero

The Engine Shed and Historic Environment Scotland

- Courses and information
- Refurbishment case studies

Edinburgh Building Retrofit and Improvement Collective

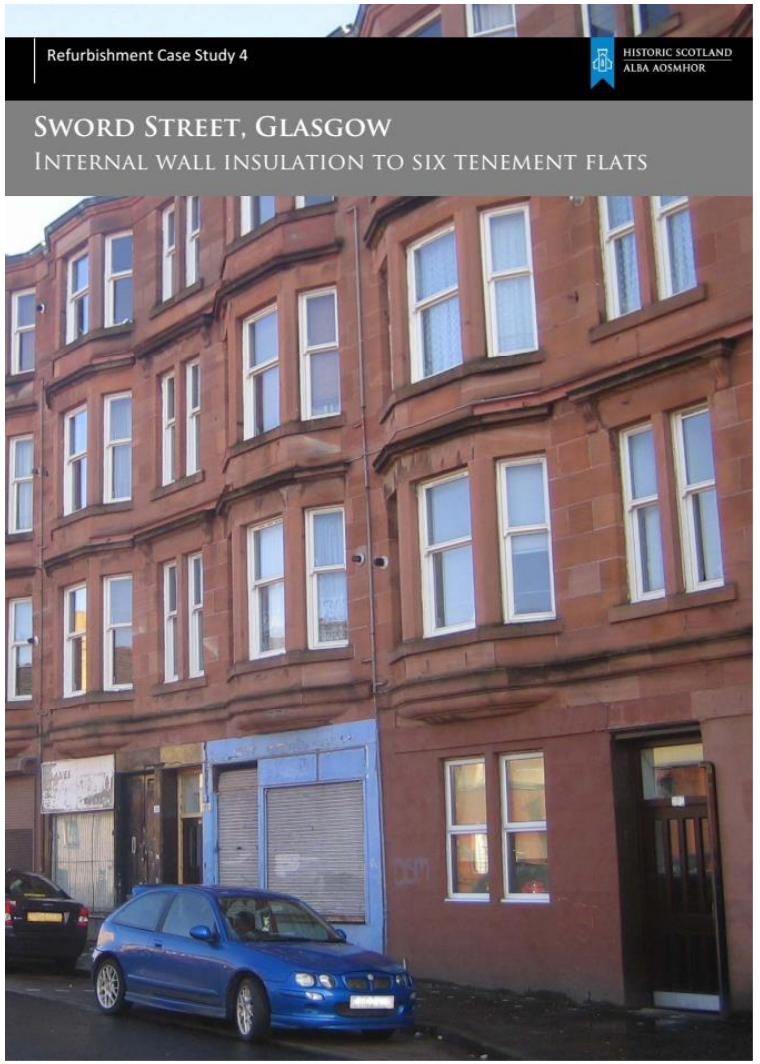
- Seeking to encourage community cooperation ***

Home energy Scotland and WarmWorks

- Grants and loans for householders

KR: Stay on top of this.

- Insulation and heating upgrades for the vulnerable



*** KR: It's worth taking a look at this venture - https://edinbric.scot/ - It's built on the 'circular / doughnut economy' concept and on grass-roots endeavour. It's relatively new (H2 2022), funded from the CEC Edinburgh Community Climate Fund (2023).

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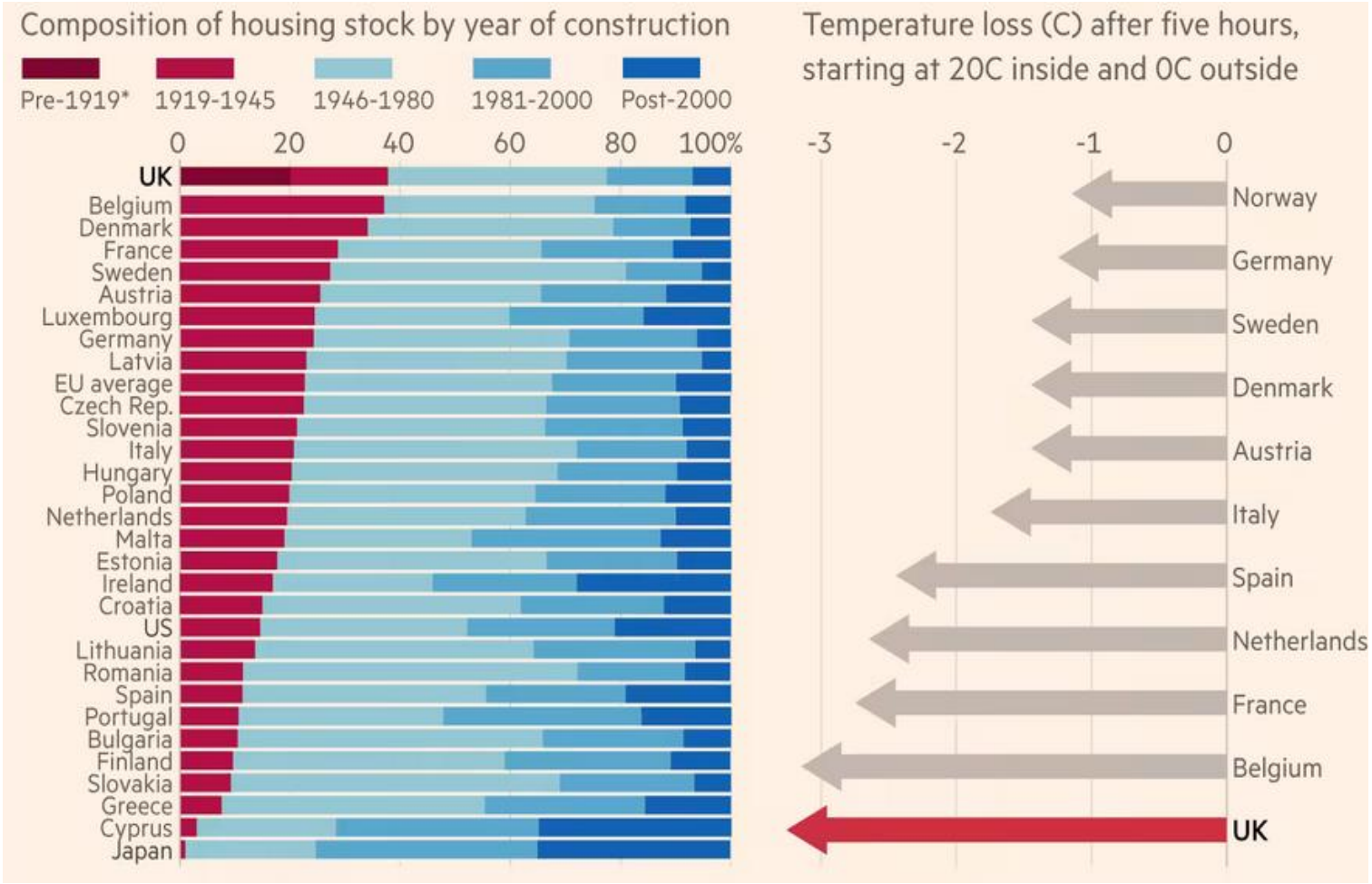
High energy consumption, perhaps our houses are too old?

"Britain's housing stock is among the oldest and most poorly insulated in the developed world."

www.bretrust.org.uk

- 20% of UK pre 1919
- Up to 80% in Edinburgh conservation areas
- Best case heat loss of 1°C over 5 hours in Norway
- Heat loss over 5 hours way more than 3°C here



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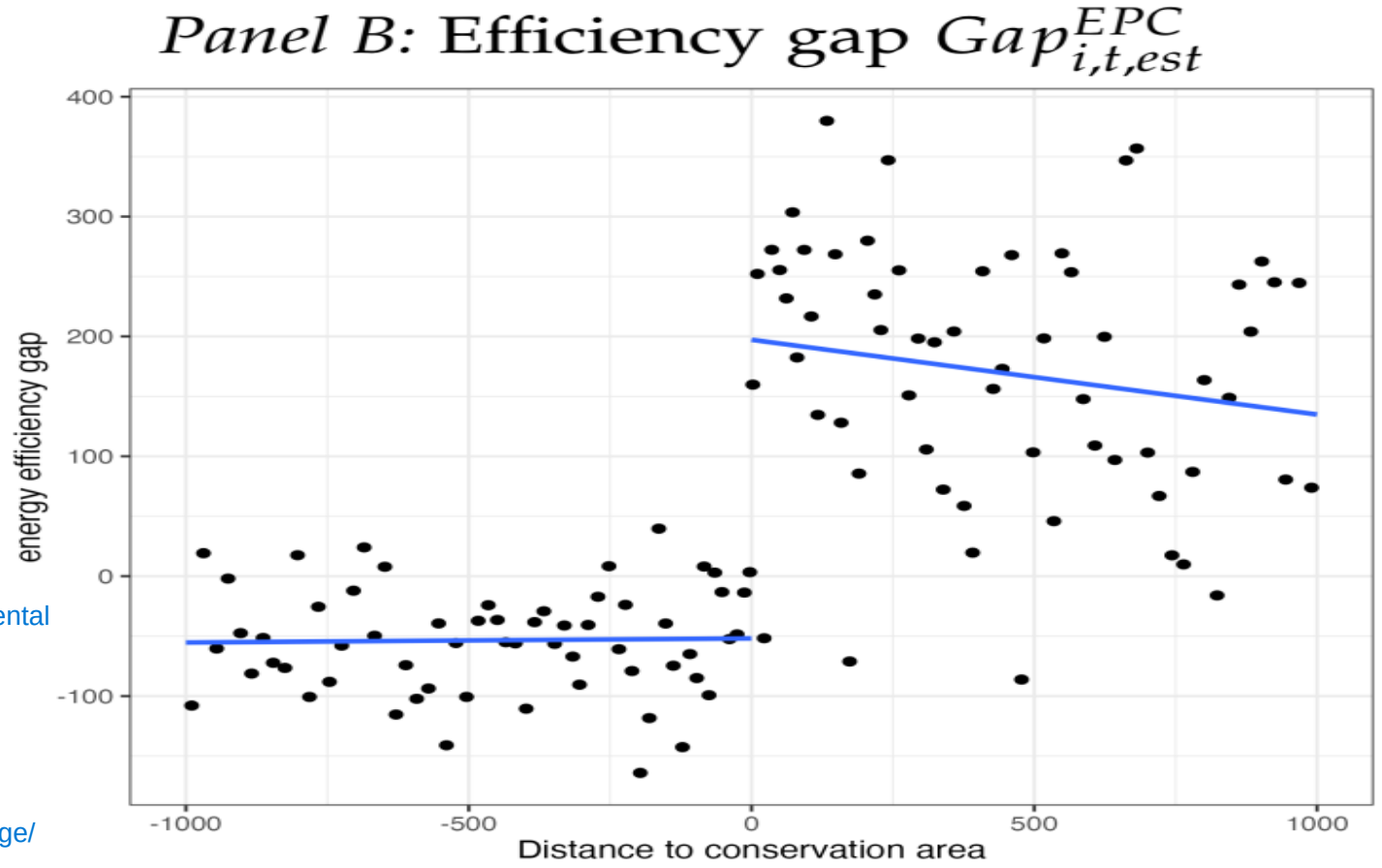
Or is it because we live in Conservation Areas?

Efficiency worse in a conservation zone

Graphics from the CAGE working paper No 654 ***

- Restriction on window replacement
- Difficulty to apply external insulation
- Over emphasis of retaining look over energy efficiency

KR: The fundamental dilemma



*** KR: CAGE; see https://econpapers.repec.org/paper/cgewacage/

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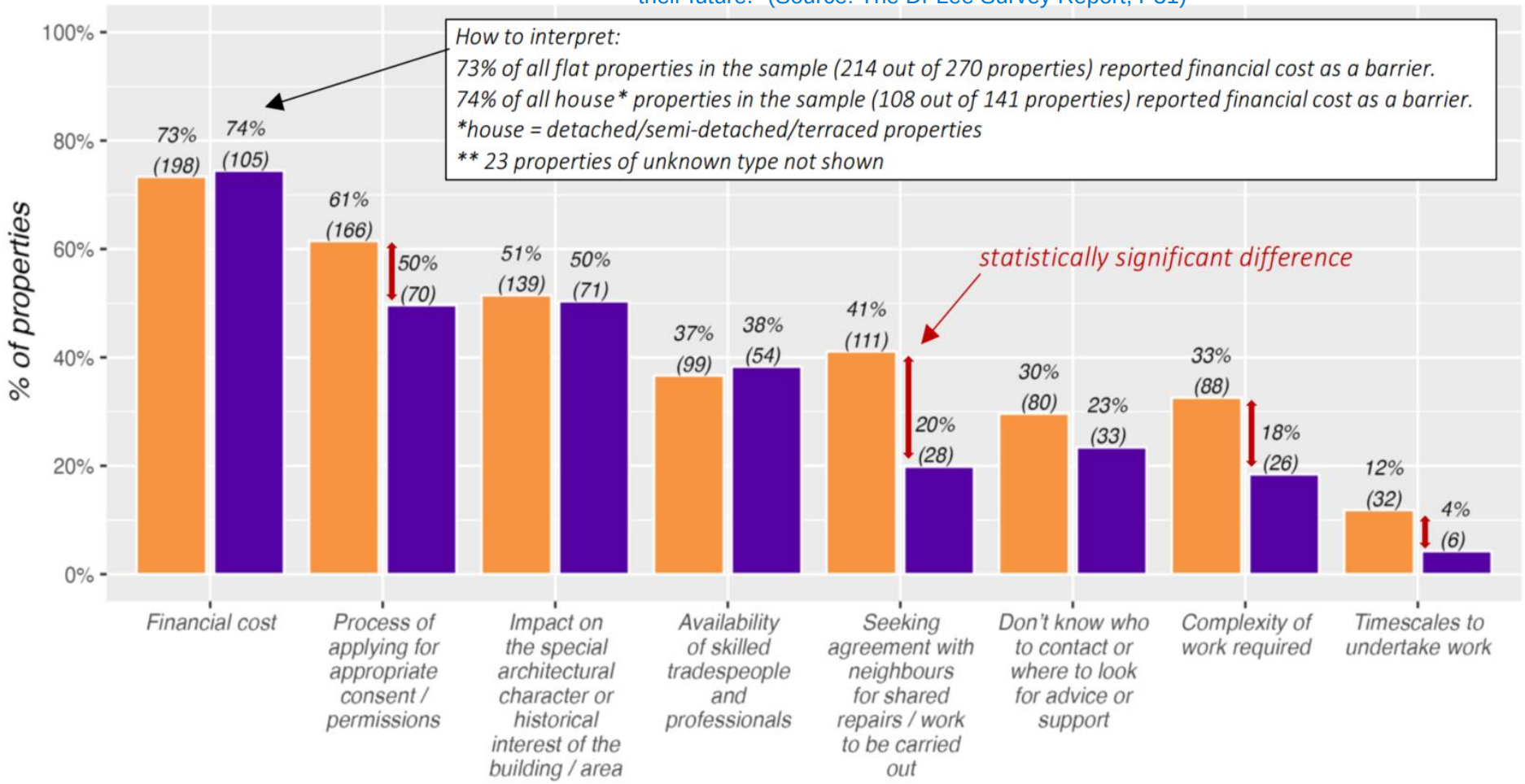
Key takeaway from Conservation & Adaptation survey

KR: Upfront costs, long (and uncertain) 'payback period'.
Then there are the 'plannng rules;
"so outdated and predate concerns around climate change and cost-of-living and now require serious review and revision."
"building conservation is far prioritised over living, energy, and environmental issues -- we need to prioritise our families' wellbeing and their future." (Source: The Dr Lee Survey Report, P31)



Analysis of Responses to the City of Edinburgh Council Public Consultation.

Dr W. V. Lee
University of Edinburgh
21st August 2023

property type

Flat House

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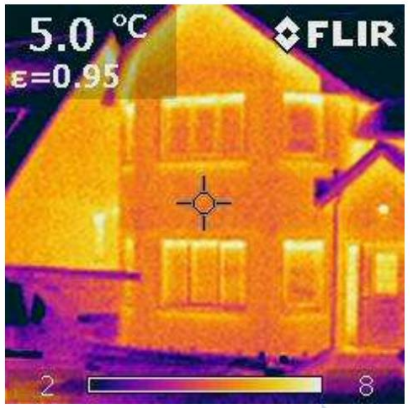
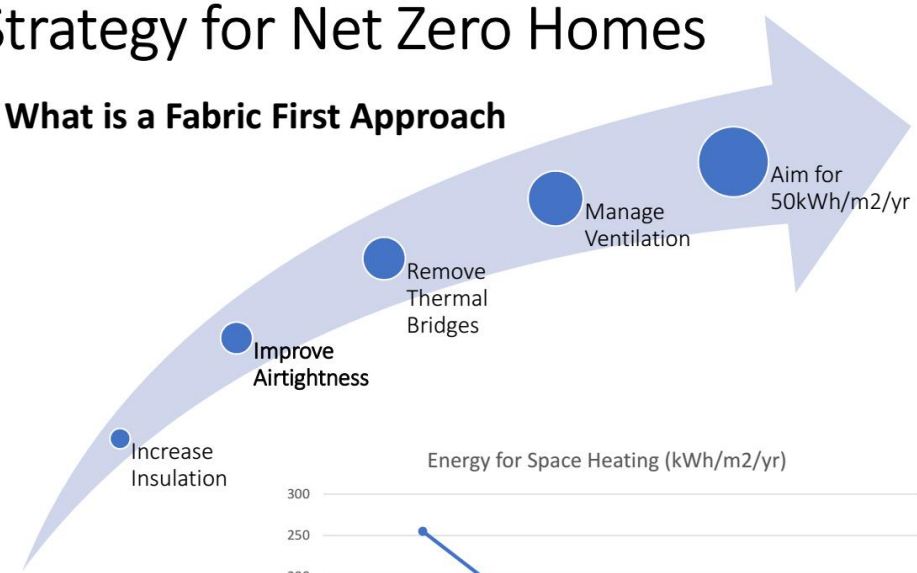
The fabric First approach

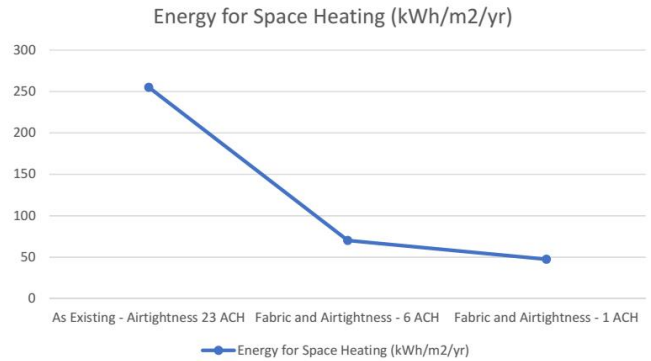
Preferred Retrofit Strategy for Net Zero Homes



What is a Fabric First Approach



Fabric First → Zero Direct Emission Heating → Onsite Generation and Storage



We need to concentrate on stopping the heat escaping!

- Insulation first
- Resolve thermal bridges
- Seal the house and use forced ventilation with heat exchanger
- Go beyond the EPC ratings

Link group Housing association strategy for NetZero.

- Fabric First approach
- Target 50kWhr/m^2/yr
- Note: EnerPHit is 25kWhr/m^2/yr

Much lower 'energy need' is the target

KR: EnerPHit - the PassivHaus approach to Rertofits - see this link - https://passipedia.org/certification/enerphit - and this one too - https://architecturetoday.co.uk/a-roadmap-to-retrofit-is-enerphit-the-answer-2/ . From the latter: "we stand no chance of getting to net zero carbon without retrofitting our existing stock". A;lso, take a look at the Link Group Business Plan 2022-2025; purposeful, detailed, informative. See - https://linkhousing.org.uk/media/6628/link-group-business-plan-2022-25.pdf .

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Infiltration – its not the cold air getting in it's the hot air getting out!

There are some obvious culprits:

- Open chimneys
- Poorly fitting windows and doors
- Gaps in floorboards

Retrofit draught proofing

- Brush seals on sash windows
- Foam seals on door jams
- Bottoms of doors less easy to seal
- Chimney sheep to block chimneys

Or should we be replacing our doors and windows to include double seals?

KR; Thermal transmittance - U-value- is the rate of transfer of heat through a structure or material, divided by the difference in temperature across that structure. The units oif measurement are Watts per square metre with the temperatiure difference of 1 Kelvin.

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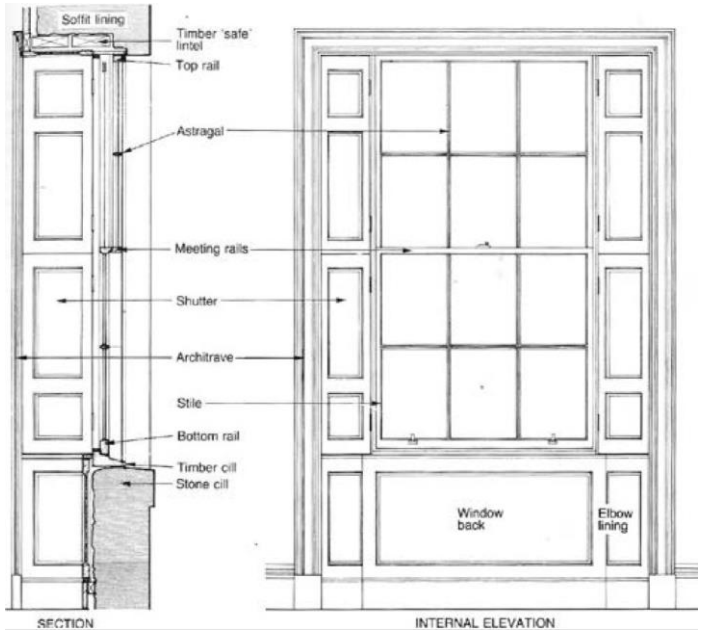
Windows – thin double glazing is this enough?



Window details from planning guidance + thin-double glazed

Glazing units only	Glass	Cavity	Overall	U value
Heritage 3/4/3	3 mm	4 mm	10mm	1.9 W/m^{2}K
Heritage 4/4/4	4 mm	4 mm	12 mm	1.8 W/m^{2}K
Heritage 4/6/4	4 mm	6 mm	14 mm	1.4 W/m^{2}K
Heritage 4/8/4	4 mm	8 mm	16 mm	1.1 W/m^{2}K

What the October 2022 planning guidance says

- Replacement windows: "*should be designed to replicate the original details including materials, design and opening method*"
- Improving thermal efficiency: "*Heavy curtains and traditional shutters can be used to help reduce the amount of heat which escapes from the building*"
- Replacement Narrow profile glazing: "*a cavity gap of 6 mm between two 4mm glass panes will usually be acceptable*"

Achievable U values for complete installation

- Double glazing with solar film 1.2 W/Km^2
- Derated if not vertical to 1.4 W/Km^2
- Triple glazing with solar film 0.8 W/Km^2
- Velux pentuple glazing 0.5 W/Km^2
- EnerPHit: 0.8 W/Km^2 normally required

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Roofs and ceilings – not always easy to insulate.

Most Edinburgh rooves are mainly flat with pitched front aspect.

- Flat rooves can be “Hot decked” with insulation under the roofing felt
- Gabled rooves need to be insulated from inside – air space must be ventilated by using porous membrane under slates
- A U value of 0.2 W/Km^2 can be achieved with an insulation thickness of 150mm to 210mm depending on material used

For houses with gabled roofs, achieving a low U value can be easily achieved then by adding extra layers of rockwool insulation.

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Walls – much more difficult.

*** KR: See https://www.historicenvironment.scot/about-us/what-we-do/conservation/refurbishment-case-studies/

What are our walls mostly built of?

- Stone between 600mm and 900mm thick
- Lathe and plaster wall lining on battens

How can we insulate them?

- Inject insulation behind wall lining
- Apply insulation on top of wall lining
- Fit insulation into new framework

What are the problems?

- Preserving complex cornices and skirtings
- Controlling the moisture level in the walls

Injecting polystyrene insulation behind wall lining

Hemp board insulation between timber framing

Historic Scotland Refurbishment case study 4 ***

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Forced heat-transfer ventilation

Why install heat recovery ventilation?

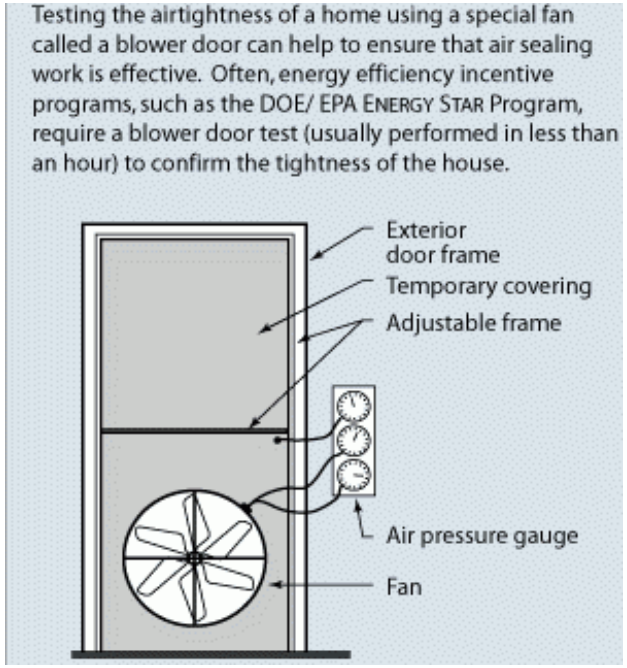
Infiltration is a major cause of heat loss in buildings.

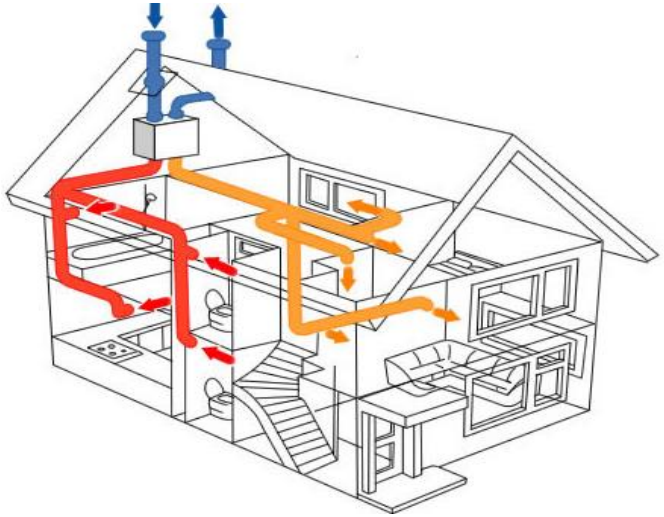
- Buildings require regular changes of air so once the house is sealed, forced ventilation systems with heat recovery are required.
- Ventilation is especially important in old stone buildings as moisture penetrates through the walls.

What is required?

The building must first be checked for air-tightness

- The EnerPHit standard requires less than 0.6 air changes per hour with the fan fitted into a doorway.
- Heat exchange units are now readily available that will work in one room or throughout the house.





Air flow through house

Full house heat exchange ventilation unit

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Using my house as an example
1860 terraced - floor area 140m²

Part	Current			Workable		Just possible	
	Area	U value	Heat loss	U value	Heat loss	U value	Heat loss
Walls	52	1.6	60.2	0.3	11.3	0.2	7.5
Windows	22	2.4	38.4	1.1	17.6	0.8	12.8
Doors	3	1.4	3.2	1.4	3.2	1.0	2.3
Ceiling	69	0.3	12.4	0.2	8.9	0.2	7.4
Cupola	1	1.4	0.7	1.4	0.7	0.8	0.4
Total			115		42		30

Currently – 115 kWhr/m²/yr – excluding infiltration

- Thin double glazing, insulated loft, draught proofing

Workable – 42 kWhr/m²/yr – excluding infiltration

- Insulate walls – upgrade windows and loft insulation

Just possible – 30 kWhr/m²/yr – excluding infiltration

- Triple glazing, deep wall insulation, improved doors

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The elephant in the room

The main problems

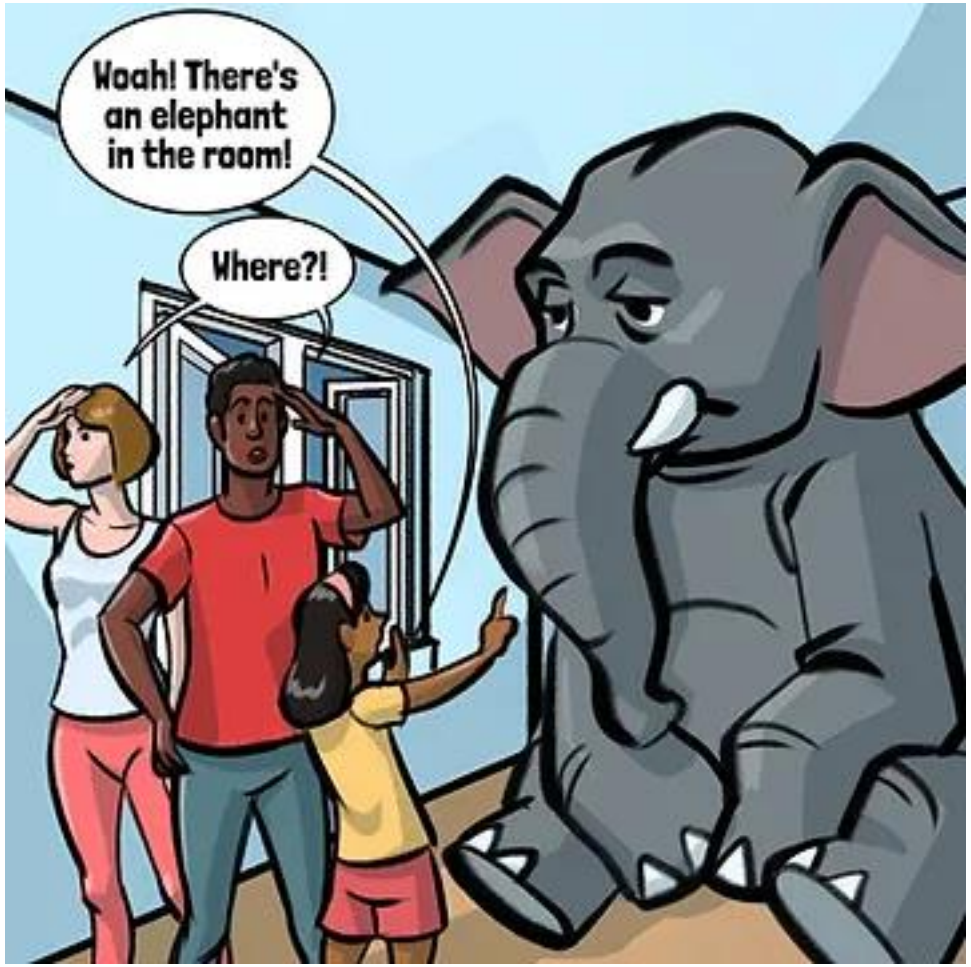
- An EPC rating of C is not sufficient
- 2030 is only 7 years away
- The planning regulations are a major barrier
- Old stone houses require ventilation
- Householders are not going to tolerate disruption

And also the elephant questions

- Where are the skilled workers to do this?
- Where is the money going to come from?
- How will people be encouraged to do this?

How can we Conserve and Adapt?

- Must allow like for like replacement
- Insist on forced ventilation with heat recovery
- Remove silly limitations in planning guidelines
- All building warrants to require extended insulation



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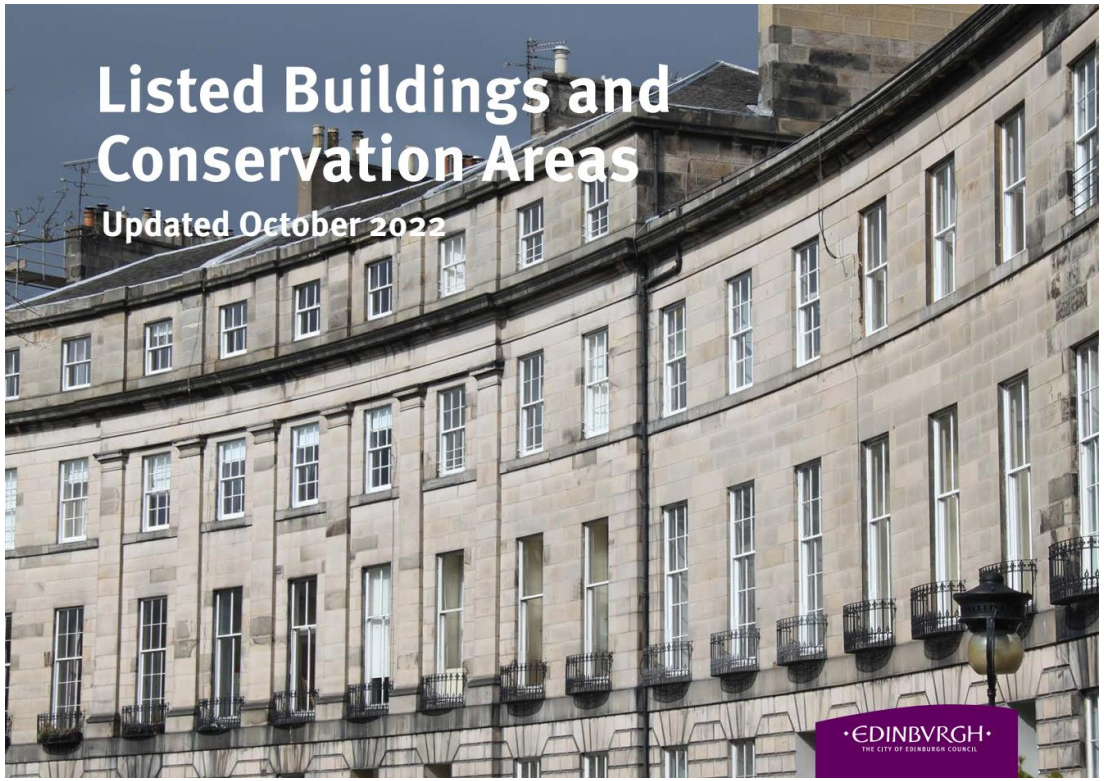
A reasoned response to the Conservation & Adaptation programme.

KR: Submitted by the author, Douglas Rogers, to the Conservation and Adaptation Working Group. What happens next? He speaks here of an 'advisory leaflet' - we are really talking of a 'route map', and of the need for independent third-party evaluation of the options open to people in specific cases (as Ian Doig of Merchiston CC argues).
Anyone care to help Douglas from here? His email is at the bottom of the page.

My take on what needs to happen now

- A leaflet prepared to be distributed to all householders in conjunction with other departments to give broad advise on reaching the necessary standard
- Planning guidance to be updated and written around leaflet not other way round
- The planning guidance to be split into two – one specifically for conservation zone properties
- Allow like for like replacements for windows in looks but not necessarily function
- Provide library of standard methods supported by the Council for retrofitting to a high standard
- Mandate for forced ventilation as part of wall insulation upgrade



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