Evaluating Tenement Retrofit in Glasgow

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UK COLLABORATIVE CENTRE FOR HOUSING EVIDENCE

Progressing Net Zero and Retrofit

- Something like 85% of the houses that will be inhabited in 2045 are here with us now. No escape the major net zero challenge of retrofitting the existing housing stock
- Turning the burden of such immense change into a positive through greening and restructuring the economy – see the Grant Thornton report for the Glasgow City Region
- The problems with our urban traditional sandstone tenements
- This presentation is concerned with a demonstration project about a high level deep retrofit to a Glasgow 1890s tenement, what we are learning from it, and begin to discuss the wider implications

The Niddrie Road Project

- Scottish Funding Council climate emergency competition
- GCC and social landlords support in high PRS locations
- Partnership between Southside, John Gilbert and CCG to refurbish an empty block
- Winning the evaluation supported the demonstration project for an Enerphit deep retrofit

107 NIDDRIE ROAD Glasgow

TENEMENT EnerPHit Passivhaus Retrofit

107 Niddrie Road is a pre-1919 red sandstone tenement in Govanhill in the south side of Glasgow owned by Southside Housing Association. Like most traditional Scottish tenements, it consists of eight flats and a communal close and back court. Each flat includes one bedroom, a living / kitchen, bathroom, hallway and store.

This project will achieve EnerPHit standard (the equivalent of Passivhaus for retrofit) and will have high levels of insulation and airtightness combined with new heating and ventilation systems. These energy efficient measures drastically reduce energy bills for the tenants while providing them with the healthiest possible internal environment.

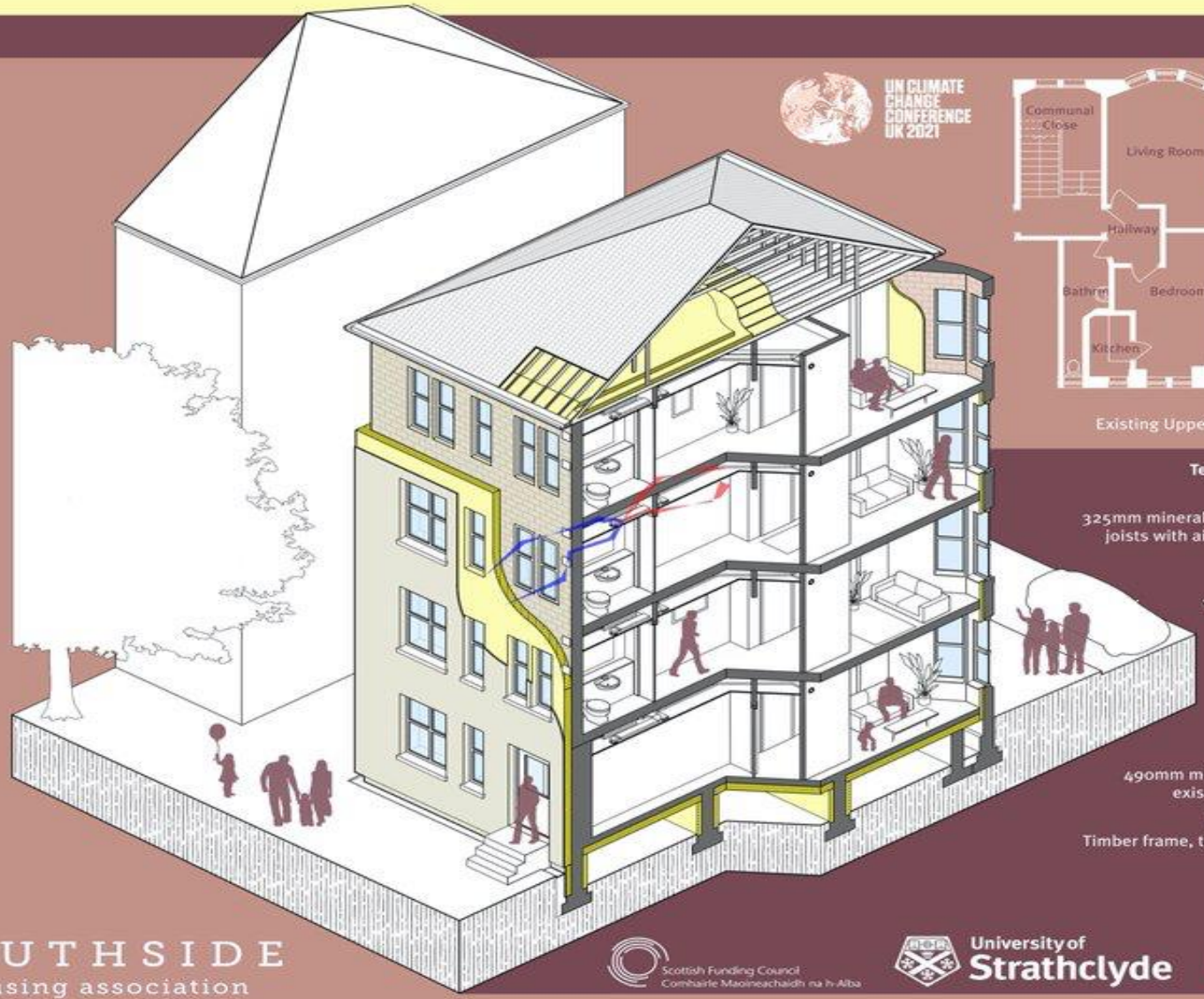
As well as the energy efficient measures, we will be cleaning and repairing the sandstone front elevation, improving the internal layouts and installing new kitchens and bathrooms.

'Fabric First Approach'
We have to improve the building fabric in order to minimise the heating demand and we have done this by ensuring the whole envelope is wrapped in high levels of insulation, minimising thermal bridging and ensuring there is a continuous airtightness line. The insulation and airtightness lines are continous at all key junctions (eg. at eaves level, windows, doors etc.) General building improvements have also been carried out.

Heating and Domestic Hot Water
The lower four flats will be heated by individual air source heat pumps (ASHP) which take heat from the external air and uses it to provide hot water for new radiators and domestic hot water. The four upper flats will be heated by new efficient combi condensing gas boilers which provide hot water for new radiators and domestic hot water.

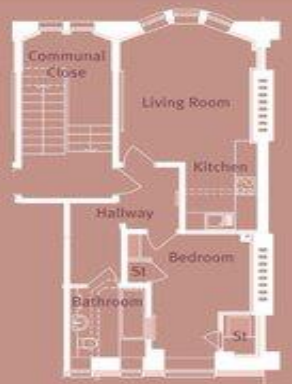
Mechanical Ventilation Heat Recovery
All eight flats will have their own mechanical ventilation heat recovery unit (MVHR) installed above the ceiling in the bathrooms. These will extract moist / stale air from kitchens and bathrooms while bringing in fresh air from the outside. The heat exchanger transfers the heat from the stale air to the fresh to minimise heat loss which reduces the heating demand.

Wastewater Heat Recovery
The upper six flats will have wastewater heat recovery units installed to the bath / shower so heat can be recirculated back into the hot water system which reduces the heating demand.



UN CLIMATE CHANGE CONFERENCE UK 2021

Existing Upper Plan



Proposed Upper Plan

Technical Data - insulation and airtightness

Ground Floor 0.11 W/m²K
325mm mineral wool insulation fixed between and below joists with airtightness membrane above and breather membrane below

External Walls (front) 0.38 W/m²K
120mm wood fibre internal wall insulation with two layers of natural lime parge

External Walls (rear) 0.18 W/m²K
200mm mineral wool external wall insulation with silicone render and a layer of natural lime parge internally as the airtightness layer

Loft Insulation 0.07 W/m²K
490mm mineral wool packed between and on top of existing timber joists and breather membrane

High Performance Windows 0.89 W/m²K
Timber frame, triple glazed Passivhaus certified windows from Green Building Store

CCG

John Gilbert ARCHITECTS

SOUTHSIDE housing association

Scottish Funding Council
Comhairle Maoineachaidh na h-Alba

University of Strathclyde

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Glasgow CITY COUNCIL

The retrofit and the evaluation

Retrofit works

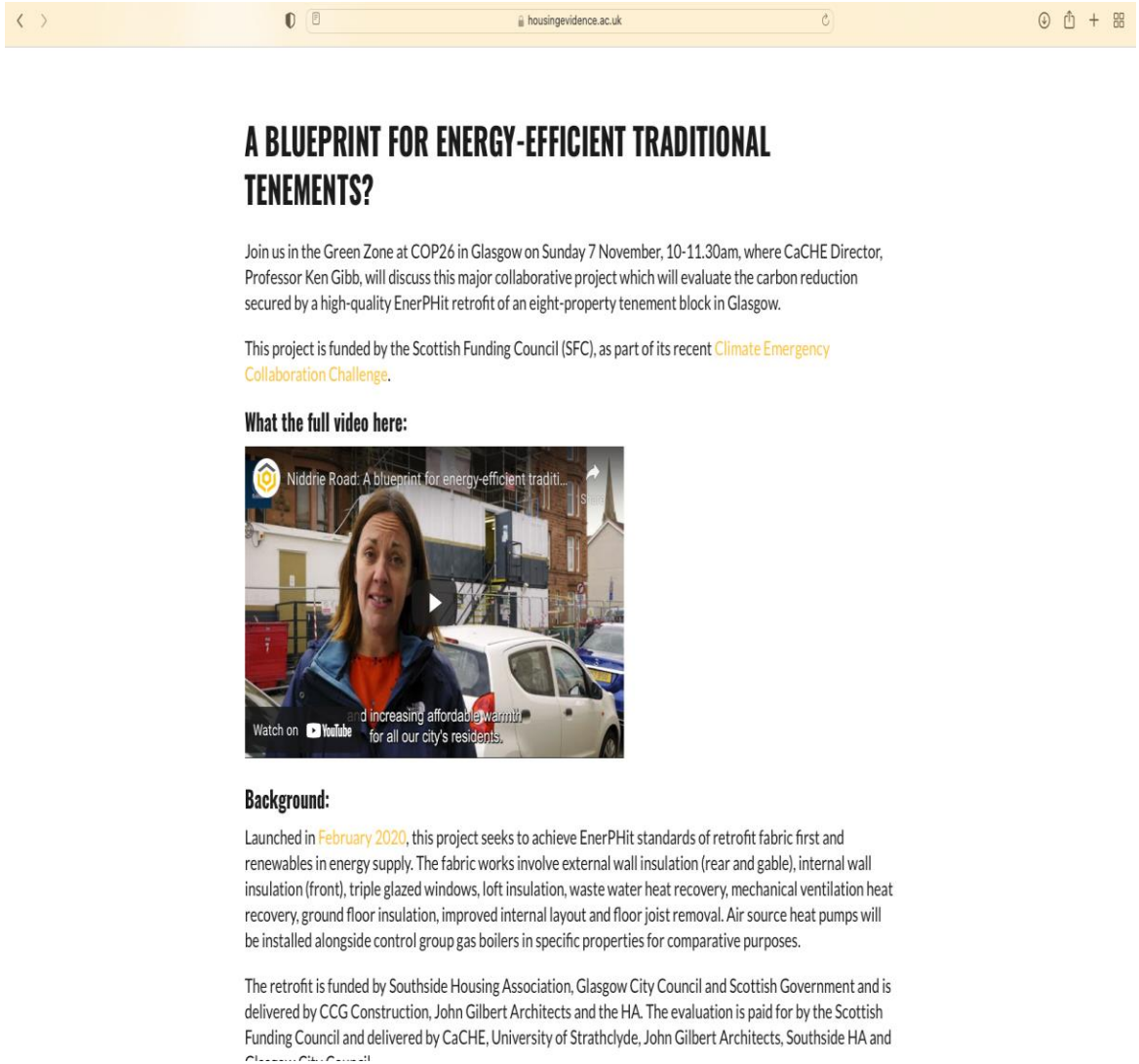
- Evaluation Funded in February 2020 and the impact of COVID
- Work did not start till May of 2021
- Considerable external interest and leading role at COP26
- Video widely watched form October onwards
- Handover to tenants in the next few weeks

Evaluation

- Real-time decision making recording and analysis
- Building performance
- Cost benefit analysis
- Pre and Post occupancy
- Synthesis and dissemination

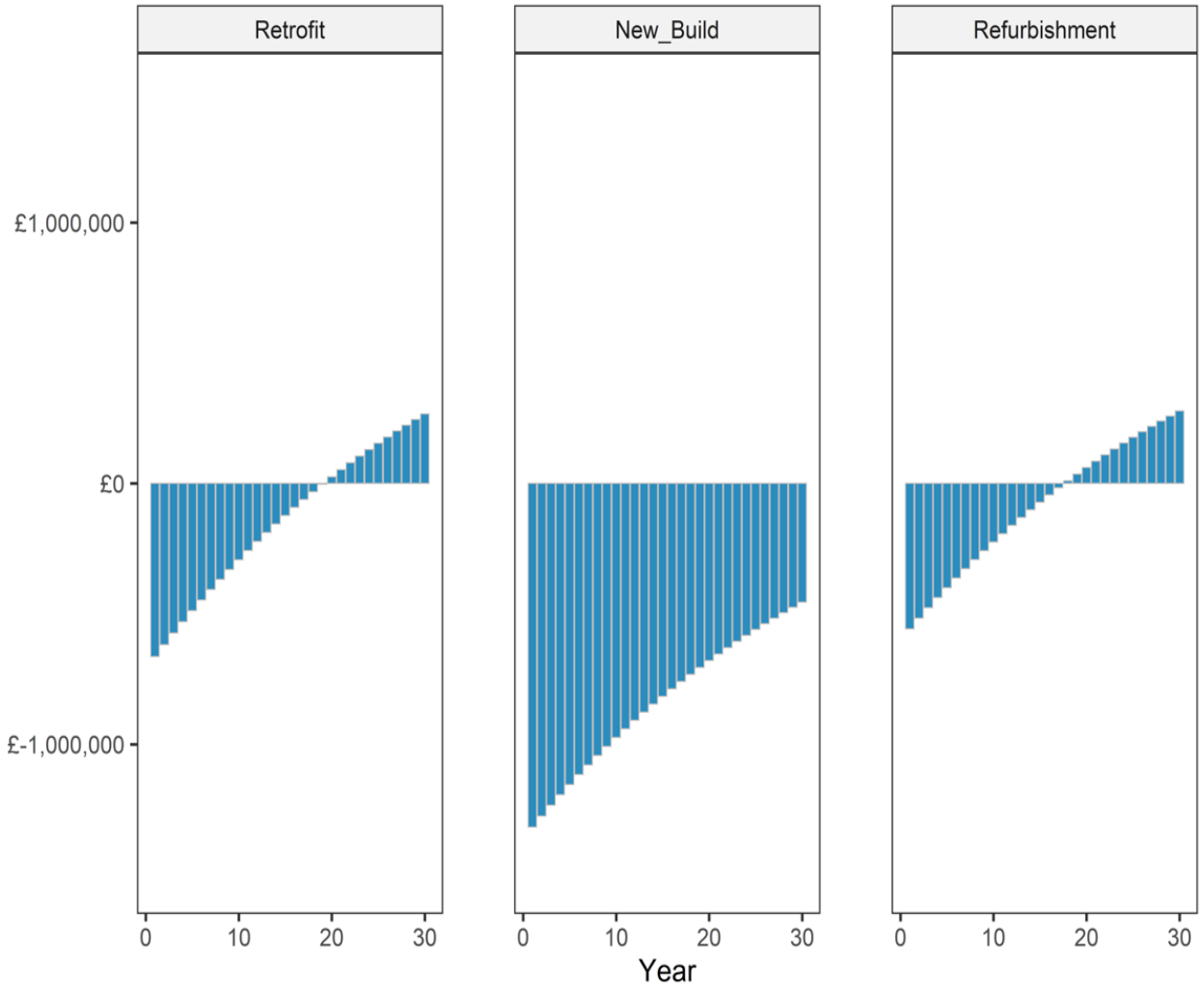
Lessons so far

- Partnership matters but so does perseverence
- Niddrie road is easy!
- Early adaptors set precedents
- Decanting and phasing or doing to scale
- Applies to multis too
- Need to tackle deep-seated issues abut the tenement



Initial Cost Benefit Analysis

- BCR and £NPV (real) comparison over 30 years comparing EnerPHit, basic refurb and demolish/new build
- Which costs and benefits
- Low central and high scenarios
- Sensitivity analysis
- Key draft findings
- Implications & Further research



Final Thoughts

- Macro public finances and policy design effectiveness
- Industrial organisation , labour skills and supply chains, and the demand challenges of a new retrofit sector
- Micro behavioural incentives on the demand-side
- Fabric first and renewables
- Lessons to come from the occupancy surveys and building performance
- Measuring progress to retrofit targets needs agreement on what is to be measured
- What works in retrofit and CaCHE2?