

CASE STUDY



# Many of Edinburgh's 170,000 flats are in tenements. Upgrading them to cut carbon emissions is essential for the city, and Scotland, to reach their net-zero carbon targets.

This study shows a listed terrace of Georgian tenements in Lauriston Place, within the UNESCO World Heritage site. The Lister Housing Cooperative carried out an innovative project including:

- Research and extensive negotiations with key organisations.
- An Energy Heritage pilot study: a series
  of improvement measures to listed homes
  and monitoring for impact.

Energy efficient improvements implemented:

- Secondary glazing;
- Draughtproofing;
- Shutter refurbishment;
- New A-rated condensing boilers;
- Floor insulation;
- Top-up loft insulation;
- Low energy lighting;
- Smart monitors;
- Home energy advice visits.

# Improved annual performance

- Energy savings ranged from
  1,194kWh to 1,291kWh.
- CO2 emissions reductions ranged from
  0.4 tonnes to 2.4 tonnes.
- Cost savings ranged from £70 to £404.

### Future challenges

- Tenement flats are usually in blocks of eight or more, with multiple owners, requiring agreement on upgrading works.
- Costs for many owners may be unaffordable without council or government support.
- Carbon reductions will vary significantly if the tenement is occupied/vacant or listed/ conservation area.

#### **Future opportunities**

- Current, low-carbon communal heating systems include solar panels on all the southfacing roofs and air/ground source heat pumps in the back green. City of Edinburgh Council is investigating district heating for some parts of the city.
- Improving the simple energy efficiency measures that all homeowners can undertake whilst in occupation, using constantly

 Production of best practice guidance, and promotion to encourage replication.

## The interventions

The Energy Heritage pilot study covered floors, roofs, and windows. Heating systems and lighting were also considered, together with awareness raising among residents.

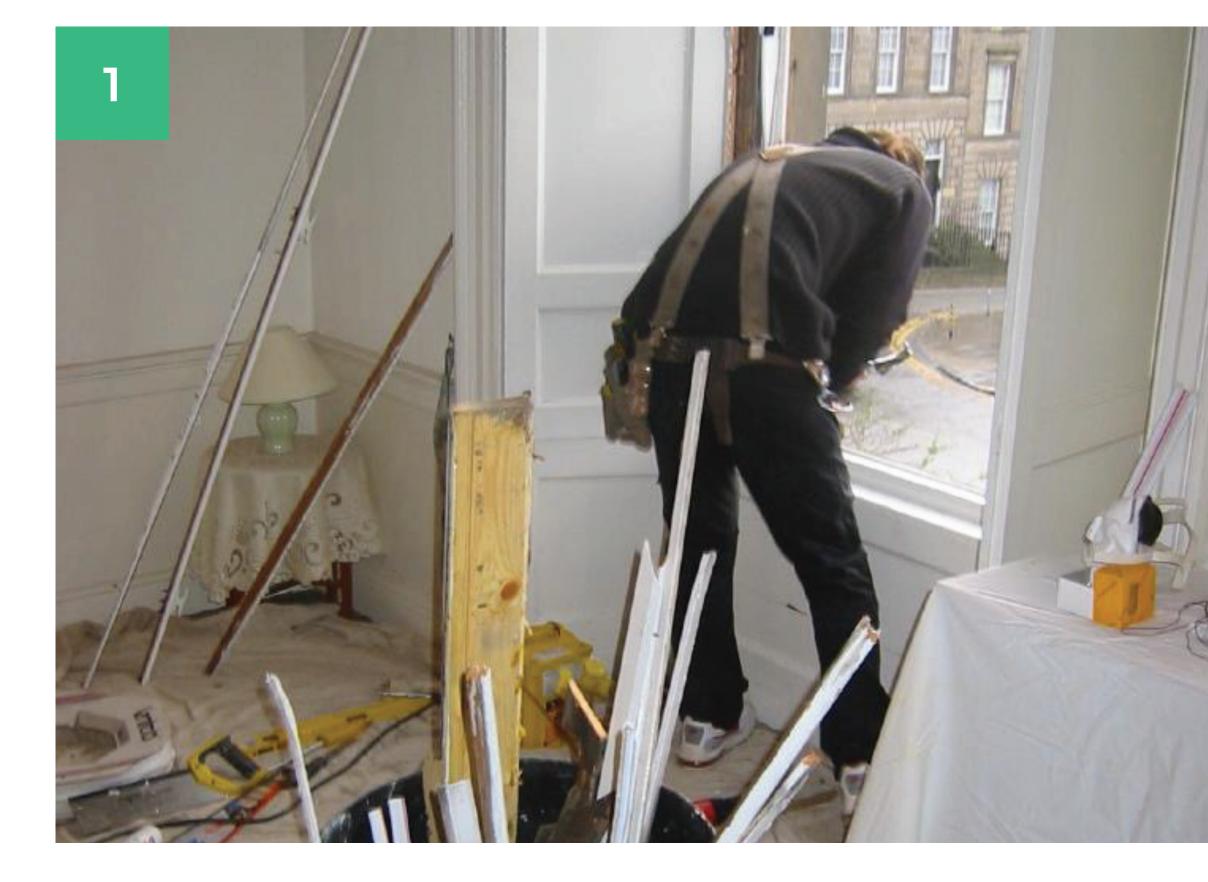
# Significant findings of the pilot

- The thick sandstone walls of traditionally built tenements are better insulated than sometimes claimed.
- Adding an appropriate insulation system to solid floors at the lowest level can improve their thermal performance by nearly 50%.
- The benefit of raising awareness of simple
  energy efficiency measures that homeowners
  can undertake. Fabric condition, heritage
  and cost.
- All households noted an improvement to their comfort levels and now pay more attention to their energy use.
- A repaired/draft sealed window with working shutters and a Victorian blind is equal to new double glazing, saving embodied energy and heritage value.

improving techniques.

- Developing better window options, responding to fabric condition, heritage and cost. These options can be reviewed in technical advice from Historic Environment Scotland.
- Collaboration with neighbours on renewable energy to replace gas boilers. Options include solar panels on all the south-facing roofs and ground source heat pumps in the back green.
- Upgrading works to vacated buildings, which would result in greater carbon savings but more disruption.

Initiative Lead: Changeworks
End Client: Lister Housing Co-operative
<b>Design Team:</b> Lorn Macneal Architects
Chartered Surveyors: David Adamson
Consulting Engineers: Robertson Eadie
<b>Funding:</b> Edinburgh World Heritage
Communities Scotland
Lister Housing Co-operative
Scottish Power

















10

	Reduction in heat loss	U-value W/m <sup>2</sup> K	Temperature of Interior (warm) room facing surface °C
Centre of glazing	-	5.4	12
Option 1. Heavy curtains fitted to rail on inside of insulated panel above window	14%	3.2	20
Option 2. Shutters	51%	2.2	19
Option 3. Modified shutters, with insulation inserted into panels and covered with 6mm plywood	60%	1.6	21
Option 4. Modern roller blind fitted at the top of the window case inner lining	22%	3.0	21
Option 5. Modern roller blind as option 4, with low emissivity plastic film fixed to the window facing side of the blind	45%	2.2	20
Option 6.Victorian blind fitted to the top of the recess formed by the window case pulley stiles at the side of the upper sash	28%	3.2	18
Option 7. A "thermal" Duette honeycomb blind manufactured by Hunter Douglas Europe b.v.	36%	2.4	21
Victorian Blind & Shutters	58%	1.8	19
Victorian Blind, Shutters & Curtains	62%	1.6	21
Secondary Glazing System	63%	1.7	19
Secondary Glazing & Curtains	66%	1.3	22
Secondary Glazing & Insulated Shutters	77%	1.0	21
Secondary Glazing & Shutters	75%	1.1	20
Double Glazing	55%	1.9	18

- Specialist draught-proofing from Ventrolla blinds.
- 2 Opening shutters which had previously been nailed and painted shut.
- **3** Secondary glazing from Storm Windows.
- 4 Slim double glazing from Pilkington Spaciavacuum Glazing.
- 5 Magnetic secondary glazing fitted into staff bead space, from Glaze & Save.
- 6 Injecting bonded bead behind the plasterboard in the 45mm gap between the back of the plasterboard and the inner surface of the stone wall.
- 7 Injection holes for insulation, going behind the lath & plaster to the gap behind the inner face of the solid stone wall.
- 8 Insulation laid in basement flat, ready for timber floor finish.
- 9 Solar panels on B-listed tenements.
- 10 HES table showing the effect of various options on reduction in heat loss through single glazing, the estimated U-values measured average suface temperatures.

Images © Lister Housing Cooperative HES public presentation.