Retrofit for flats: Example block level review of options

Preparing London for a clean, green energy future

November 2023

This work has been prepared and developed by Repowering London in collaboration with Future Climate, and made available for public information, thanks to the generous support of the MCS Charitable Foundation. It is intended to complement the Greater London Authority's Toolkit for Blocks of Flat Retrofit, hosted on the GLA website, with additional detail on two aspects of the retrofit journey for blocks of flats: an example review of options and an example initial business case.

NOTE: THIS IS A FICTIONAL EXAMPLE CREATED TO SHOW THE STRUCTURE AND LAYOUT OF A SIMPLE REVIEW OF SOME OF THE ISSUES, COSTS AND OPPORTUNITIES FOR RETROFIT IN A TYPICAL BLOCK OF FLATS. THE HYPOTHETICAL BLOCK WE USE IN THIS EXAMPLE IS THE SAME AS THE EXAMPLE INITIAL BUSINESS CASE. INFORMATION ON MEASURES, COSTS AND OTHER INFORMATION PRESENTED SHOULD NOT BE TAKEN AS TYPICAL OR IN ANY WAY INDICATIVE.

REPOWERING LONDON

Creating Local Energy

Future Climate

MCS CHARITABLE FOUNDATION

Example block level review of options

Basic Information on the building and occupants

(For more information on initial review and gathering data, please see Section 5.1 and 5.2 of the GLA Toolkit for Blocks of Flat Retrofit.)

The property is owned under share of leasehold. A property manager takes responsibility for day-to-day operations.

The following summary has been produced through a combination of information and data shared by management committee, leaseholders and the property manager, as well as a survey and analysis conducted by a retrofit expert.

As well as surveying the building and a selection of individual flats, and assessing potential retrofit options, the expert has been working with leaseholders to establish what issues and challenges are of most concern. It has been made clear that reducing energy bills is the priority.

Building Information

Type of information	Notes
Basic building features	• 4 storeys • 20 flats in total, with 5 flats per floor • Built in the 1980s
Building construction and features	• Mostly double-glazed windows • Uninsulated cavity walls • Flat roof • No balconies • Communal grounds
Basic Building Dimensions	• 390m^2 – Building footprint • 1,560m^2 – total floor area • 78m^2 – average floor area per flat
Broad information on residents	• A mix of leaseholder owner-occupiers and tenants. • Predominantly leaseholder owner-occupiers
How much of the building is residential and how much commercial?	• All residential

Building Information cont.

Type of information	Notes
Who is the landlord of the block?	• Ownership of the block is on a share of freehold basis. • The freeholder is a company in which each leaseholder owns a share, and the Directors of the company, who form a Management Committee, appointed by Leaseholders, take management decisions.
Who is responsible for managing the block?	A property manager takes responsibility for the day-to-day operations working with the management committee.
Existing plans or proposals for building upgrades.	From condition survey: • Damp patches in wall need to be remedied • Guttering needs to be repaired and damaged downpipes replaced • Damaged pointing needs to be repaired
Energy and Carbon related problems identified by occupiers and managers	Energy bills are high – reducing them is the priority for the retrofit.
Energy and carbon related features of the building	• EPC – all C or D, mostly D • Gas fired boilers in each flat

Opportunities and issues for potential upgrades

The focus of the review is to identify three options for possible upgrades.

Insulation

The fabric of the block performs fairly well in terms of thermal performance, with some insulated walls and mostly double-glazing. However, the airtightness and ventilation systems could be improved.

Insulation upgrades for this building could include cavity wall insulation, external wall insulation (though unless there are problems with the wall cavity, cavity wall insulation is likely to be a more cost-effective option), floor insulation, flat roof insulation,

ensuring all windows are at least double-glazed and in good condition, upgrading external doors, draught proofing and air-tightness, and mechanical ventilation and heat recovery (MVHR) systems.

The block has no balconies which will make wall insulation easier. Balconies can often be a hard-to-insulate weak spot (a 'thermal bridge') in the building.

Option 1 has been developed to illustrate the most appropriate and cost-effective package of fabric upgrades which all other options are built upon.

By focusing on a fabric first approach, the block and flats will be made more comfortable, easier to keep warm through reducing heat loss, and easier to keep healthy and well ventilated. Most importantly, this will reduce energy bills as energy demand will be reduced, thereby meeting the leaseholders' main priority.

Boiler upgrades or heat pumps

The flats are currently heated by individual gas fired central heating systems. These could be upgraded to new, more efficient boilers. Replacing old gas boilers with modern, more efficient, models will cut heating costs and reduce the carbon footprint of the building.

Option 2 reviews the possibility of an upgrade to existing boilers in addition to the fabric upgrade of Option 1.

Leaseholders have expressed a desire, if possible and feasible, to transition away from gas or fossil fuel. However, this may not necessarily be the cheapest option as electricity is more expensive than gas. In scenarios where low-carbon heating solutions are not possible or feasible, upgrading existing boilers can be a good compromise.

Low-carbon heating solutions, such as heat pumps, were discussed with leaseholders. Unfortunately, as there are no balconies, there are no easy places to install air source heat pumps for individual flats. Individual air source heat pumps could be installed at ground level or on the flat roof, but the cost of scaffolding required to install the pipework required for each flat would be high, so this option was discounted.

If scaffolding was being used to install other measures, such as external wall insulation or solar panels on the roof, then the cost of the scaffolding could be shared, and this may make individual measures more financially viable.
In the communal garden there is space for a new ground source heat pump to be installed. Additionally, there is also space internally (in the lift shaft and services cupboards) for new communal pipework to be installed and thereby provide communal heating to each flat.

Therefore, Option 3 reviews the replacement of individual gas boilers with a new communal heating system using a ground source heat pump. This will be significantly more expensive than Option 2, as it will include the removal of old boilers and radiators, the installation of heat meters and connections in each flat, and a heat network from the garden into the lift shaft and service core.

Solar panels for electricity generation or heating

As the roof is flat, it is potentially a candidate for solar panels to be installed, as the panels can be orientated to be south facing which will maximise the energy production. It could also be possible to install solar thermal panels which heat water that is stored in a hot water cylinder, which can provide the hot water needed for bathing, showering and hot taps.

However, due to shading from adjacent buildings and trees, it was decided that solar panels are not feasible for this site and have not been considered in any of the options.

Opportunities and issues for potential upgrades

Stakeholder consents

The management committee have agreed that – as part of the options review process - a legal review is needed to ensure that all necessary consents can be in place for the works to proceed. This will need to consider statutory consents, as well as the consent needed from all parties with an interest in the building. The legal review will help ensure they comply correctly with Section 20 processes, and that the rights and interests of all residents will be recognised and complied with through any installation process. As such costs of legal review are included in the estimate of the total project cost.

Statutory consents – planning

The building is neither listed nor in a conservation area. However, planning consent may be required for some of the possible measures. These include:

- External wall insulation – planning application would be required.
- Cavity wall insulation – this is unlikely to require planning consent as it does not change the external appearance of the building. For this reason, and being cheaper and easier to install, cavity wall insulation is a more attractive option than external wall insulation in this instance.
- Air source heat pumps – planning permission may be required as there would be more than one air source heat pump attached to the building. Air source heat pumps are a difficult option to pursue at this building for the reasons noted above.
- Double-glazing – the local council guidance states that planning consent is required where the external appearance will change. In this building, this is not the case and so no planning consent is thought likely to be required.

The building managers will work with a planning consultant and with the council to ensure that their understanding is correct and all necessary planning permission is sought. Costs of these processes are included in the estimate of final costs.

Overview of upgrade options

Option 1 is a fabric upgrade with a focus on cavity wall insulation, floor and roof insulation, draught proofing, new mechanical ventilation system and replacing windows and external doors. Option 1 also includes additional easy-to-install control and appliances improvements.

This option tries to minimise costs and major works requirements, and has the potential to make significant reductions in energy bills and carbon emissions (by increasing efficiency and lowering energy demand).

Options 2 and 3 complement this fabric upgrade with improvements and upgrades to the heating system – Option 2 replaces old gas boilers with new, more efficient ones, while Option 3 replaces them with a communal heating system using a ground source heat pump.

Preliminary repairs and maintenance

The condition survey showed that enabling works to remedy damp patches in the walls would be needed before the retrofit work could begin to make sure insulation was installed into dry cavities. The quoted total cost of this work was £9,500, and consisted of:

- Repair to guttering,
- Replacement of damaged downpipe,
- Repair to damaged pointing.

Budget considerations

The management committee would like to see what options are available and their associated total costs before making any decision.
However, it has been agreed that a budget of £150,000 (total cost, including enabling works, retrofit works, and any other legal costs) could be feasible.

The following table shows the review of retrofit options for the building produced by the expert:

Example block level review of options

Options review

Option 1	Option 2	Option 3
• Cavity Wall Insulation (CWI) • Floor and roof insulation • Draught proofing and air tightness • Replacing windows • New external doors • Energy-efficient lighting • Heating controls • Mechanical ventilation with heat recovery*	All of option 1, plus • New gas boilers	All of option 1, plus • Replacing heating system with a new communal heating system powered by a ground source heat pump
Total Capital Cost: £103,900 Total Annual Savings: £5,017 Total Carbon Savings: 20.15 tCO2e/y	Total Capital Cost: £137,500 Total Annual Savings: £5,217 Total Carbon Savings: 20.65 tCO2e/y	Total Capital Cost: £255,900 Total Annual Savings: £14,057 Total Carbon Savings: 71.65 tCO2e/y

* Replace aging mechanical extract ventilation with humidistat-controlled fans. The payback is low, but the fabric improvements will make the building more air-tight or 'sealed'. This reduces accidental uncontrolled draughts, but requires ensuring there is sufficient deliberate controlled ventilation for health and moisture management.

Decision – Retrofit actions

Working closely with the expert, all available options were explored, assessing what their benefits and outcomes were, how that matched with original objectives, and what was within budget.

Leaseholders wanted to reduce energy bills as a priority so the expert looked at which measures would be within budget and secure the biggest annual savings within budget – Option 1. It was agreed that option 1 would achieve the desired reductions in bills and increases in comfort levels.

They also looked closely at upgrades to existing gas boilers and at a deeper low-carbon upgrade to the heating system. Modelling suggested that upgrading the boilers (Option 2) would provide marginal improvement to efficiency. This would reduce bills but it was decided that the extra cost of this work meant it was not

desired. The Management Committee were also aware that the Government plan is for the UK to move away from gas heating towards low carbon heating alternatives, and did not want to "lock in" gas heating at this stage.

While Option 3, a new ground source heat pump, was technically feasible and produced the greatest carbon savings, it also had to be ruled out on financial grounds, as this would have doubled the budget.

The decision was to continue with Option 1 and fabric upgrade only as this was the most cost-effective solution that still provided the desired improvements.

Expected outcomes from these measures:

- Energy bills are estimated to be reduced from an average of £770 per year to £655 per year for each individual flat, noting that this is a modelled estimate and each flat has different patterns of energy use.
- CO2 emissions for the whole building are estimated to be 68tCO2e/year after the works are completed, a reduction of 12tCO2e/year or 15 per cent.
- The project costs will be <£150,000 – including the enabling works and structural repairs before the project begins – within the agreed budget.
- The whole retrofit project will be completed within two years, and residents will not have to move out during the project.

Full Costs for chosen option: Option 1

Area	Upgrade	Costs (including material, labour and prelims)
Preparatory works	• Repair to guttering • Replacement of damaged downpipe • Repair to damaged pointing	£9,500
Ventilation and related works	• Replace mechanical ventilation in kitchens and bathrooms • Replace ductwork and seal penetrations	£4,000
Insulation	• Cavity wall insulation • Flat roof insulation • Floor insulation	£73,000

Example block level review of options

Full Costs for chosen option: Option 1 cont.

Area	Upgrade	Costs (including material, labour and prelims)
Doors, windows and draughtproofing	• Draught-proofing and air-tightness • New windows designed to avoid cold bridges and with cavity closers and insulated • New external doors	£24,000
Controls and lighting	• Heating controls • LED lighting	£2,900
Sub-total works		**£113,400**
Other fees:		
Professional advice		£10,000
Legal advice		£2,000
PAS 2035 training for Management Committee		£500
Resident liaison officer		£3,600*
Sub-total works and fees		**£129,500**
Contingency @ 10 per cent		£12,950
Total		**£142,450**

* A resident liaison officer is assumed to work 2 days per month through the delivery process, to help ensure effective engagement and communication with residents.

Note: The work packages outlined above are in order, i.e. preparatory works happen first, followed by ventilation upgrades, with controls and appliances being the final work.