RETROFIT OPTIONS SURVEY

customer: [redacted]

site location: [redacted]

[redacted]

[redacted]

survey carried out by charlie baker and tom procter 14th November 2023

YOUR HOME BETTER
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Manchester
M21 8UP
www.yourhomebetter.co.uk

1. INTRODUCTION

Your Home Better is an independent retrofit delivery service. We support homeowners to make their home better by improving comfort and reduce energy bills and carbon emissions associated with home energy use and heating.

As energy prices soar and security of supply becomes increasingly volatile, carrying out home retrofit can put yourself back in control of your own energy use and supply. This can be done by installing insulation, new heating systems or solar panels that can generate renewable energy.

Your Home Better is a collaboration between various organisations linked with Greater Manchester all working towards finding ways to deliver retrofit now and innovate to make retrofits even better in the future. Our collaboration is led by the cooperatives RetrofitWorks and red.coop. It is supported by the Greater Manchester Combined Authority.

This retrofit options survey is the first step in our service and is made in a way we hope will enable you to select those retrofit measures that are best for you and your home at this point in time. It is based on information gathered during an assessment of your home and identifies various retrofit measures that can be suitable to install to make your home better. It also advises on the order these can be installed in.

We hope this plan will enable you to select those measures that suit your needs.

2. METHODOLOGY

Retrofit Option Survey

This is the basic level survey service Your Home Better offers providing a narrative of the property and what retrofit options are suitable. All aspects of the property will be considered including fabric measures, glazing, heating, renewable technologies, and ventilation.

Whole House Plan

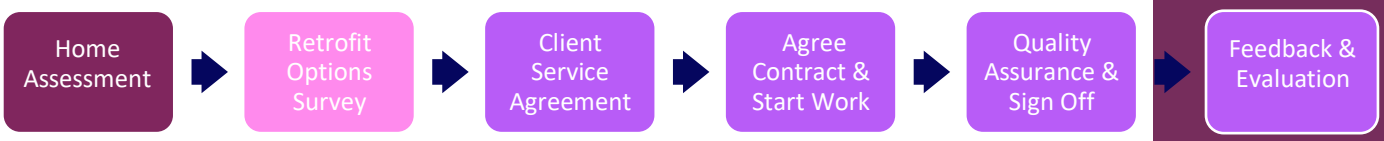
The next level up is the Whole House Plan. As with the Retrofit Survey Option it looks at all aspects of the property. With this survey, detailed measurements of the property are taken and run through our software to produce an accurate model of how the property is performing at the present time. A range of retrofit options are then considered showing estimated costs and benefits achievable.

Thermal imaging / Borescope investigation

In addition to the above surveys there is the option to have a thermal imaging or cavity wall borescope survey carried out. A thermal imaging survey will use a thermal camera to identify cold areas of the property that could benefit from increased levels of insulation or cold bridge / cold spot mitigation, it will also identify areas at risk of damp and mould.

A borescope survey involves drilling small holes in the external wall and inserting a small camera into the cavity. The results will show the depth, condition, and insulation level of the cavity and whether it is suitable for cavity wall insulation.

3. THE RETROFIT JOURNEY



Client Service Agreement

This agreement covers how we will work throughout the retrofit process of your home. This includes what we will do and what you need to do. It typically covers the creation of Building Performance Requirements that outlines what contractors need to take into consideration when they are quoting for your retrofit project.

Agree Contract & Start Work

Once you have your quotes and accept them, the contractors will start ordering materials and schedule in your project. We will be doing site visits and providing technical supervision as applicable. If you are doing major works, we will also support you in when it is appropriate to pay for works in progress and deposits.

Quality Assurance & Sign Off

We will ensure that contractors do what they have promised in your contract both during site visits and remotely using evidence provided by contractors. We will support you in dealing with complaints if you are unable to resolve potential issues between you and your contractor. Once your project is complete, we will sign it off by checking the quality and let you know when final payment can be made.

Feedback & Evaluation

We will update your Whole House Plan to reflect the changes completed as well as gather and share feedback with the contractors to make the retrofit journey even better in the future.

4. YOU + YOUR HOME

Your key concerns and interests for you home:

- Improve comfort and reduce bills.
- Cold loft and living areas.
- Some mould issues.
- Solar PV and battery.

About your home:

Your house is a 1905 semi detached house with a cellar and attic room.

The house does not appear to be in a Conservation Area

The walls are constructed of solid brick with no insulation (250mm thick).

The cellar floor is solid with a suspended timber floor between the cellar and ground floor. The rear of the property has a suspended timber floor.

The attic room has little or no insulation, limited insulation to the storage areas and the outrigger loft has had the insulation topped up to 300mm.

There is a 5-year-old side extension which has been built to meet Building Regulations.

The Ideal Logic C30 combi boiler was replaced 5 years ago and has full controls. There is a wood burning stove in the living room.

There is double glazing throughout, of varying ages and in good condition. There are no trickle vents on the windows except for the Velux windows.

The house faces west and there is little overshadowing.

energy bills

Electricity	1850	kWh/A
Gas	13505	kWh/A

moisture/mould risk

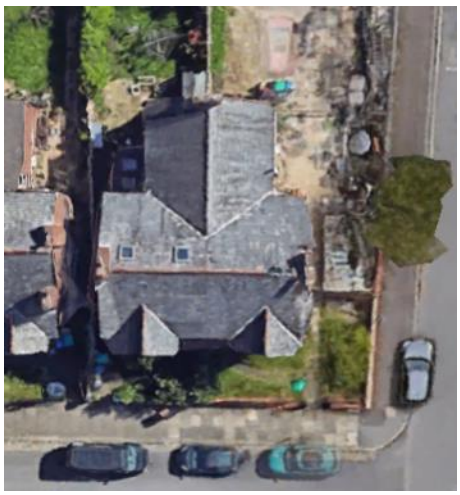
On the day of the visit the outside temperature was approximately 11°C. The temperature inside the house was between 18 and 19°C with a relative humidity of 68%. Ideally relative humidity should be between 40-60%, so this is high and will be contributing to the mould issues in the property.

The temperature on the sloping ceilings in the attic was only 10.8°C, colder than the outside air temperature and below dew point, therefore a condensation risk. The cold section of wall below the window in the front bedroom was similar, at 15°C compared to 20- 21°C on surrounding surfaces (see image).

Possible measures

1. Photovoltaic panels & battery

The front roof of your property is west facing and the rear east facing, both orientations offer potential for a PV array. The outrigger roof is orientated north and would not be viable for PV.



Depending on the format of the panels you can get 5 panels on the front and 6 panels on the rear producing around 3.5kWp at panels power ratings of 420W up to 440W.

To make the financial proposition work we recommend you also have a battery installed. This allows you to keep power when it is generated either for use yourself later or for sale to the electricity grid at peak times when it is most valuable.

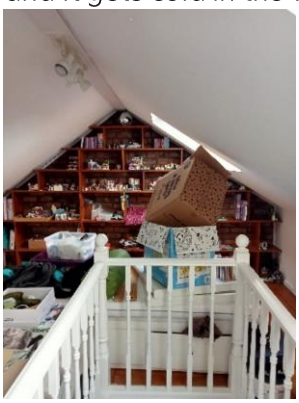
In winter when there is little sun it also enables you to charge the battery when energy is cheap if you move to an energy tariff that allows that.

Your Home Better is also developing a project across the Northwest that will allow our customers with the right inverter and battery to jointly access other parts of the energy market through what is known as a Virtual Power Plant. While it is not yet possible to accurately predict revenues from this we are anticipating about £100-150/battery per year. It would not affect other revenues from the time of day or agile tariffs so would be a win/win.

We can provide you with more analysis of this for £50 or send you straight through to a couple of our installers for quotes.

2. Roof insulation

The main roof of the property has an attic room unofficially installed. You have stated that the room is not really used except for storage, the radiator is normally turned off and it gets cold in the winter and hot in the summer. This combined with the thermal images and surface temperature readings suggests that there is little if any insulation in this area.

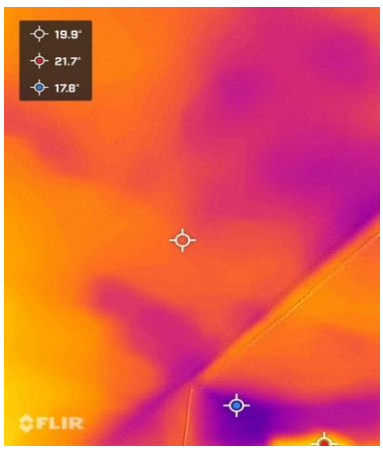


The sloping ceiling areas could be treated in several ways depending on budget and disruption levels.

- Insulation backed plasterboard installed over the existing ceiling – cheapest and easiest option but will only add a small amount of insulation.
- Wood fibre boards installed over the existing ceiling – more expensive option with little disruption, limited amount of insulation thickness without compromising ceiling heights.
- Remove existing ceiling and install wood fibre between and over the rafters and replaster – more expensive and disruptive, allows a thicker layer of insulation and wood fibre would help towards equalising summer overheating.
- When the roof needs replacing, strip back tiles, insulate between rafters and re-roof.

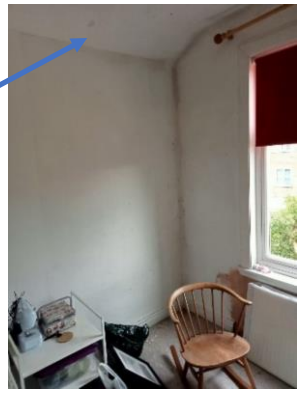
The small knee walls could be insulated from behind via the void area if accessible. Wood fibre insulation could be used between and over the stud timbers.

Either side of the attic room there are void areas. There is some insulation present in these areas but the thermal imaging shows that this insulation is patchy and will contribute to the front bedroom being cold. These areas should have the insulation at ceiling joist level increased to 400mm of loft wool insulation. If the area is still wanted for storage, then loft legs should be used to prevent the insulation being compressed.



The loft area over the outrigger has recently had the insulation topped up to 300mm. It is important that the insulation covers all areas, including the difficult to reach areas beyond the purlin timber. It is also important to maintain adequate ventilation to the loft space. Loft hatches should be insulated and draught proofed.

The rear bedroom and bathroom also have skeilings, small areas of sloping ceiling where the external walls and roof meet. These areas should also be considered for insulation, especially if the walls and roof are being upgraded as it will become a cold spot and at risk of condensation and mould. These areas can be internally insulated using the same options as the sloped ceiling in the attic room.



3. Wall insulation

The original walls of your home are solid brick and would benefit from wall insulation. This would be best done internally (IWI) on the front of the house given the streetscape. While this does take a small amount of space off the room, experience has suggested that even in houses smaller than yours once in it is not really noticed. IWI in the front bedroom would help with the cold issue and the cold section below the window.

The rear and side walls of the property would benefit from external wall insulation (EWI). EWI has the advantage of being less disruptive internally, can be thicker to achieve greater energy savings, as well as keeping the floor joists and thermal mass of the masonry inside the heated envelope. To maintain the character of the building the external chimney stacks could remain exposed, insulating them with glass beads inside the chimney, and then EWI installed to the surrounding wall areas.

In both cases we would recommend a woodfibre solution as this enables much better moisture management over time and has a greater thermal mass of its own than other insulations. This means that not only does it insulate it also slows the heat down. This can be especially advantageous in summer as wood fibre can be 10x better than polystyrene at slowing down heat transfer and 5x better than mineral wool.

4. Floor insulation

Most of the house has a cellar below. As the cellar is ventilated and unheated this will be an area of heat loss. Ideally the thermal envelope of the building would be between the cellar ceiling and ground floors. The best option would be to insulate from below by removing the existing cellar ceiling and insulating between and over the joists and reboarding. A breathable insulating material such as wool or wood fibre would be required. It would be important to ensure that the cellar is adequately ventilated. The cellar door will also need to be draught proofed.

The section of kitchen floor at the rear is suspended timber. This area could also be insulated from below if accessible. An alternative could be to use a robot to spray foam insulation from below (Q-bot).

5. Windows

Fitting wall insulation especially externally is the ideal time to replace windows as replacing them later can be disruptive to the finishes. Red.coop has developed a method using timber reveals for IWI that can enable windows to be replaced later.

When it comes to later window replacement, tilt and turn, inward opening, single casement (as in not subdivided), triple glazed timber framed windows offer the best performance in terms of insulation from both heat and noise. The inward opening allows them to be left slightly open more securely despite it being the whole pane that opens. The whole pane opening increases the amount of light and reduces the heat loss from the frame parts which are the least efficient elements of a window.

The ventilation solution proposed should make the need to leave windows open less necessary anyway.

6. Ventilation

The property has quite a high relative humidity level and there is evidence of mould growth in some upstairs rooms. There are manually operated extractor fans in the kitchen and bathroom and some trickle vents on the Velux windows. It would be advisable to upgrade the current ventilation system, this would be a requirement of the Building Regulations (Part F) should you decide to move ahead with major measures to the building fabric.

As a minimum we would recommend upgrading kitchen and bathroom extractors to continuous humidity-controlled extractors. As there is a tumble drier in the cellar it would also be a good idea to fit one here as well. To bring fresh air into the property trickle vents should be fitted to all windows.

An alternative would be to have a centralised ventilation system, probably in the loft, extracting moist stale air from all wet rooms and delivering fresh air to all habitable rooms. These systems are more expensive and can be disruptive to install but could utilise the chimneys for ducting and prevent the need for additional vents (wall or trickle).

7. Boiler to ASHP

Switching to electrical forms of heating such as storage heaters or heat pumps can be an impactful way of reducing carbon emissions particularly as the national grid decarbonises at an increasing rate.

Heat pumps work most efficiently in well insulated houses where a flow temperature of between 35° to 45° is sufficient to keep the house warm. It is important to carry out insulation and draught-proofing changes prior to installation to ensure the heat pump is correctly sized for the heat demand of the house.

A technical survey must be carried out prior to the installation, to inform the design, and to make sure that all the correct equipment is ordered in advance to make the installation as seamless as possible.

The technical survey looks at the logistics of where the new equipment can go, and if the space used for existing equipment can be used in the same way. There is also a heat-loss calculation for each room, assessing the existing radiators to determine if they are correctly sized for the lower-temperature heat from the ASHP. It is usual for some radiators to require replacement to make a heat pump work efficiently.

It is not necessary for you to replace your gas boiler with a heat pump yet but in the future an air source heat pump (ASHP) is likely to be the most viable non-fossil fuel heating option for you. ASHPs are 250-300% efficient which means that for every unit of electricity used to power them they produce 2.5-3 units of heat. They are an effective way of reducing carbon emissions because the national grid is decarbonising at an increasing rate. Depending on the type and efficiency of the boiler they replace, ASHP can be cost neutral (but can also be more expensive) in terms of running costs vis-à-vis mains gas, because electricity prices are much higher than gas. Therefore, we recommend making insulation improvements, to reduce the heat demand of the house, before installing a heat pump.

5. NEXT STEPS

We will call you in a couple of weeks to see whether you would like to proceed with any of the measures suggested here if you have not already contacted us.

We can get contractors to quote for the measures discussed here.

Should you wish to move from this qualitative assessment to a quantitative one then the Whole House Plan would be £90 cheaper as we have already done some of the work on it.