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Energy Efficiency Recommendations

[redacted]

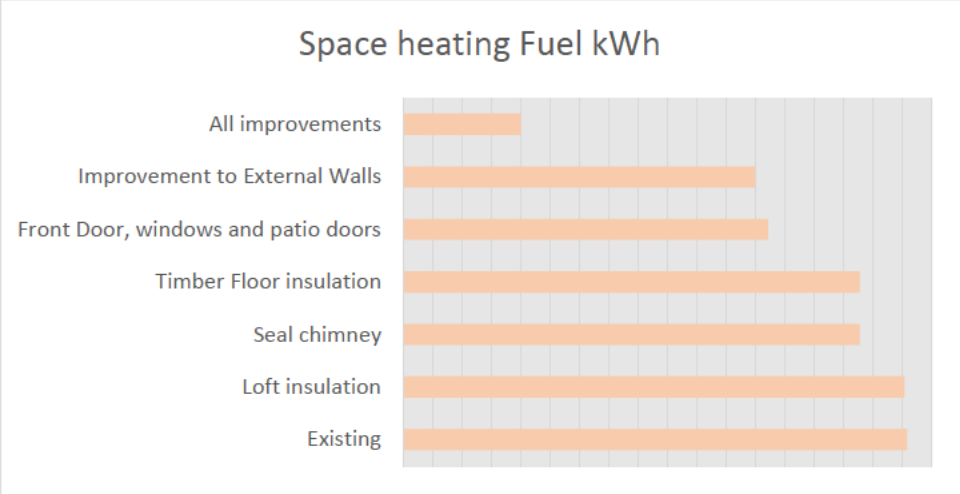
BACKGROUND `

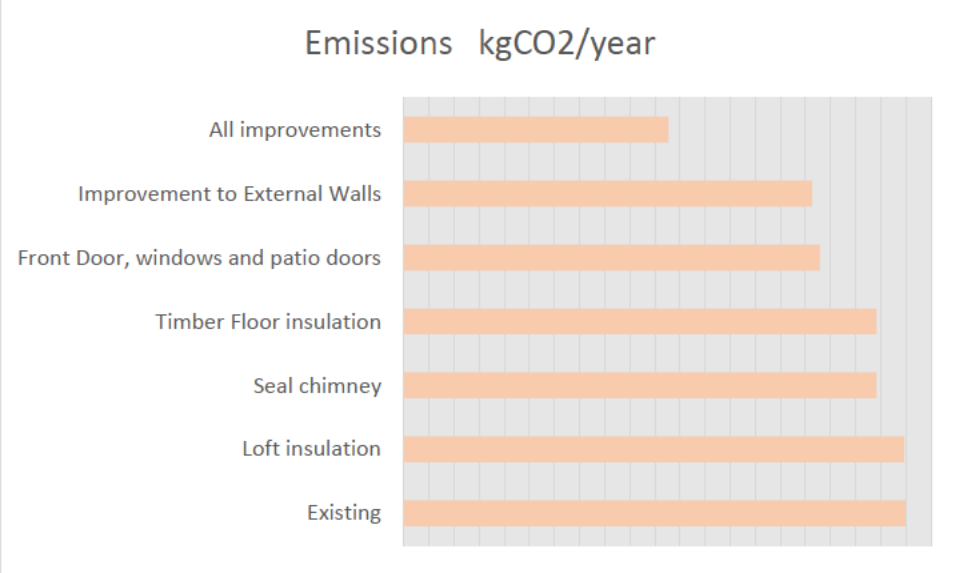
An Energy audit was carried out to understand the thermal performance of the existing property. The survey revealed some common concerns all around the house. Some of these critical issues could be resolved with a few quick, cost-effective measures, while some others would be a bit more intrusive and need to be looked at as a holistic, in-depth retrofit strategy.

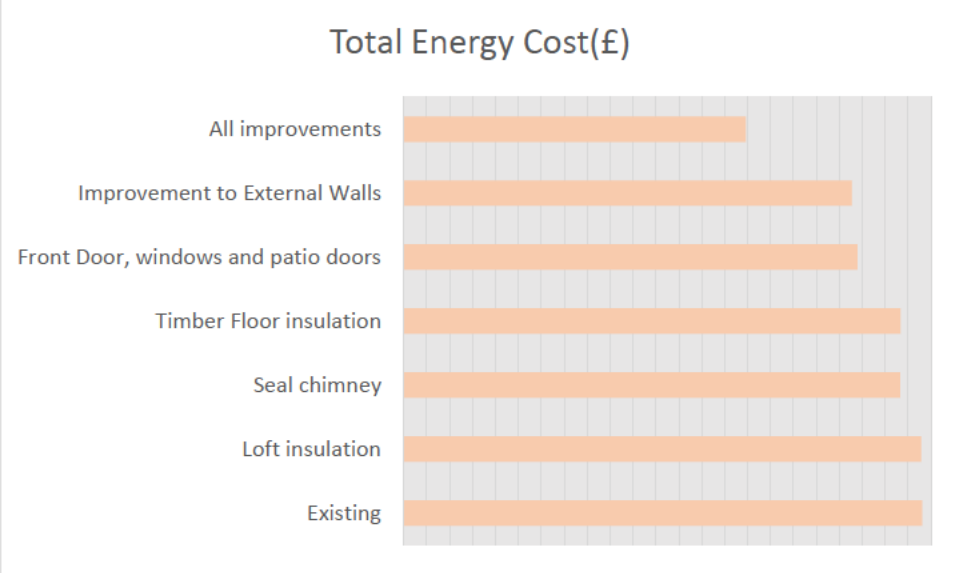
OUR RECOMMENDATIONS

Measures for a building-specific retrofit are listed below to improve the thermal performance, Indoor air quality, and comfort:

1. Loft insulation to be more airtight, especially around the perimeter. New insulated loft hatch to be installed with draught excluding seal.
2. Chimney to be sealed internally, to first floor ceiling level. Care must be taken to insulate at loft level to continue insulation wrap and to ventilate the top part of the chimney above the first-floor ceiling.
3. Insulating timber floor
4. Replace existing front door, windows in the rear with better performing double glazed or triple glazed windows with trickle vents.
5. Externally insulating the cavity walls as wells as the cavity.


Space heating Fuel kWh
All improvements
Improvement to External Walls
Front Door, windows and patio doors
Timber Floor insulation
Seal chimney
Loft insulation
Existing


Emissions kgCO2/year
All improvements
Improvement to External Walls
Front Door, windows and patio doors
Timber Floor insulation
Seal chimney
Loft insulation
Existing


Total Energy Cost(£)
All improvements
Improvement to External Walls
Front Door, windows and patio doors
Timber Floor insulation
Seal chimney
Loft insulation
Existing

Energy Modelling

Basic thermal modelling was carried out to analyse the effect of the proposed improvements on the energy use for the existing property. The graph above shows the effect of the proposed improvements on space heating, Carbon emissions and the total energy cost. The loft is reasonably insulated at the moment so the thermal model showed minimal impact when improving it. However, gaps in insulation were observed during the thermal survey, which can in practice exacerbate the heat loss through the loft. Making the loft airtight and insulating the gaps as well as loft hatch is therefore an easy and inexpensive win.

Sealing the chimney and insulating the existing suspended timber floor in living room both showed a 4% (approx.) reduction in space heating requirement. In practical terms, this is quite substantial and needs to be addressed to reduce the amount of heat loss. Any natural insulation like Woodfibre (with lower embodied carbon) could be used to insulate the floor. It is important to lay an airtight membrane below the floor joists and tape it fully around the perimeter to ensure airtightness.

The thermal modelling suggests that upgrading the front door, existing window and patio doors can reduce the space heating fuel requirement by approximately 13% and insulating the cavity wall and providing external insulation can reduce it down by 14% approximately which as expected has the biggest impact. To improve the external walls, retrofitting cavity wall insulation is crucial when externally insulating, as when left empty it can lead to interstitial condensation and thermal bypass. Unfortunately, the most effective cavity fillers, such as EPS beads, have higher embodied carbon. However, for external insulation, there are more natural insulation options such as wood fibre.

Air Tightness

According to BRE, a house achieving airtightness of 5m^3/hr will use 40 percent less energy on space heating than a house built to 2005 standards of 10m^3/hr. The air tightness test revealed a result of 6.3 m^3/ h/m^2@50PA. Although it is difficult to quantify exactly the effect of the proposed measures on the airtightness rating, improving the elements as suggested above will inevitably make it more airtight reducing the space heating requirement. It will be useful to get an air tightness test done once these measures have been adopted which will give a more accurate indication whether this property is heat pump ready.

However, it is important to note that, a high level of airtightness below 4.5m^3/hr can lead to poor air quality and condensation issues, if not coupled with strategies for ventilation. Installing an MVHR system is important in this case which is disruptive and is not an option that many clients are keen to adopt. As mentioned in the thermal survey report, a localised MVHR for bathroom extracts and cooker hoods is recommended to prevent the warm air from simply being expelled from these rooms. Ensuring that the new improved windows have trickle vents will also help to maintain good air quality and reduce any condensation issues.

Costings

Approximate costings are provided below for the suggested improvements for your property. However, it is important to note that actual costs may vary and depend largely on the choice and availability of materials, the escalating construction cost, and the availability of contractors.

Improvement 1 (Loft insulation)	£ 500
Improvement 2 (Front Door)	£ 2,500
Improvement 3 (Seal chimney)	£ 1,000
Improvement 4 (Timber Floor insulation)	£ 5,000 + making good / decs etc.
Improvement 5 (Windows and patio doors)	£12,000 - £15,000
Improvement 6 (Cavity Wall & External insulation)	£40,000 - £50,000

FINAL THOUGHTS

We would suggest implementing all the above improvements as only doing it in a piecemeal way may exacerbate heat loss and condensation issues elsewhere and lead to unintended consequences. For example, whilst sealing the chimney and improving the insulation of the timber floor have relatively modest impacts in terms of carbon fuel savings, omitting them from the work when improving all windows and wall insulation will in fact increase heat losses from these areas and result in an uncomfortable living space.

We are more than happy to work with you to detail these solutions and find suitable products to help you make your house heat pump ready and substantially more energy efficient.