

1920s Extension & Retrofit: Still Enjoying the Fresh Air!



Property Overview

Property age: 1929

Project timescale: October 2018 - June 2019

Type: Semi-Detached

Wall type: Solid

Floor area: 85m² increased to 160m²

Cost of Renovations: £250k (incl £40k Eco features)

Occupants: 2 adults, 3 children

Meet your hosts, Hannah & Joe:

We bought our home in October 2013, and moved into the property knowing that it had been somewhat neglected for many years, but had a lot of potential. The original house was cold, draughty, expensive to heat and too small for a growing family, so we started planning a large extension. As part of this, we wanted to do as much as possible to improve the insulation of the existing property as well as create a warm, comfortable family home that was cheap to run and had as small an environmental impact as possible.

We see a lot of the benefits as being non-financial. A well insulated home is not only cheaper to run, but also much more comfortable, both in summer and winter. It also felt like the right thing to do as we were in the lucky position to be able to afford it.

Design, Financing & Construction

As part of our plans, the house is now well insulated with both internal and external insulation. We wanted to maintain the brick facade at the front of the building, so these walls were internally insulated with 50mm -75mm of PIR insulation (U-value= 0.3) that we fitted DIY using the warm batten method. The rest of the property was externally insulated with 90mm EPS and finished with render. We also fitted underfloor insulation throughout using 200mm of mineral wool under the suspended floor, held in with netting. Our new walls for the extension are built to better than building regulation standards, using a timber frame, 100mm mineral wool between the studs and 50mm PIR on the outside of the studs (U-value= 0.23).

For the new windows, we chose a mixture of double and triple glazing, all 'A' rated. To reduce overheating in the summer, we added a Brise Soleil over the bifold doors and all South-facing windows are either shaded, or fitted with Solar Reduction film. To manage indoor ventilation, we've DIY installed a mechanical ventilation and heat recovery (MVHR) system.



MVHR intake & extract vents



Brise Soleil over bifold doors

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We've also added a 2.2kW solar array which, at the time, was calculated to have a 12 year payback period. However, with the increasing cost of energy, this is now reduced.

Performance

Now that the extension and renovations have been completed, the house is much more comfortable to live in. Although our floor space has nearly doubled in size, from 85m² to 160m², the heating bills have decreased significantly.

Overall, the house performs as well as expected. The slight exception is that the builders (and ourselves!) did not pay as much attention to the airtightness of the new extension as they could have done, so there are still some minor air leaks which probably result in slightly higher heating costs. Other than that, the house is much larger, warmer and more pleasant to live in, with much lower running costs.

We feel that the MVHR has been really worthwhile. Although the house is not so airtight that MVHR is strictly necessary, it does mean that we never feel the need to open windows in the winter to bring in fresh air. We enjoy knowing there is a continual flow of fresh, warmed air, even with all the windows firmly shut.

In hindsight, we could have paid closer attention to the workmanship of the builders during some of the key stages that affect the airtightness of the house. In particular, we could have made sure we inspected the airtightness layers before the builders put the plasterboard layer on, as once that has been done, it is difficult and disruptive to retrospectively correct. We would also have made the brise soleil larger, to increase the area that is shaded. At the time, we simply took the measurements from the architect, rather than verifying them on site. We've now discovered a handy [calculator](#) that would help with this!

In future, we'd like to switch out the gas boiler for a heat pump. As a well insulated property, our home would be well suited to it, and we've already proven to ourselves that we can comfortably heat the house with relatively low flow temperatures.

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Key Specifications

Energy Consumption	Energy kWh/m ² /pa			Carbon kgCO ₂ e/pa	
	Gas	Electricity	Total	/m ²	/person
Before Renovation (85m ²)	176.5	31.8	208.3	37.9	644
After Renovation (160m ²)	62.5	16.9	79.4	14.5	464

Insulation & Glazing

- Underfloor insulation - 200mm mineral wool
- IWI to front walls - 50mm -75mm PIR (U-value= 0.3)
- EWI to back & side walls - 90mm EPS + render
- Extension - 100mm mineral wool + 50mm PIR (U-value= 0.23)
- 'A' Rated Double & Triple glazing
- Cooling strategies: Brise Soleil, shading, Solar Reduction Film

Heating & Energy

- MVHR (DIY installed)
- 2.2kW solar PV

Key Contacts & Products:

Architect: [Verve Architects](#)

Builder: [Green Hat Construction](#)

Solar Panels: [Solar Works](#) (~ £4k parts & installation)

MVHR: [BPC Ventilation](#) - Design and Supply
(~ £3k parts, DIY installation)

Brise Soleil: [Aluminium Systems Ltd](#) (£1.5k)

Timber Windows: [Bereco](#)

Information & Advice:

[Open Eco Homes](#)

[Buildhub](#)

Our Top Tips:

- *Understand that 'well insulated' and 'airtight' can mean vastly different things to different people. Many people assume that adding a minimal amount of insulation to a 1920s house is adequate, or that UK Building Regs are a sufficient standard for a comfortable home - they most certainly are not!*
- *Don't be afraid to challenge the builders, even where they are probably more knowledgeable than you - you may well need to push them to achieve better than the bare minimum.*

