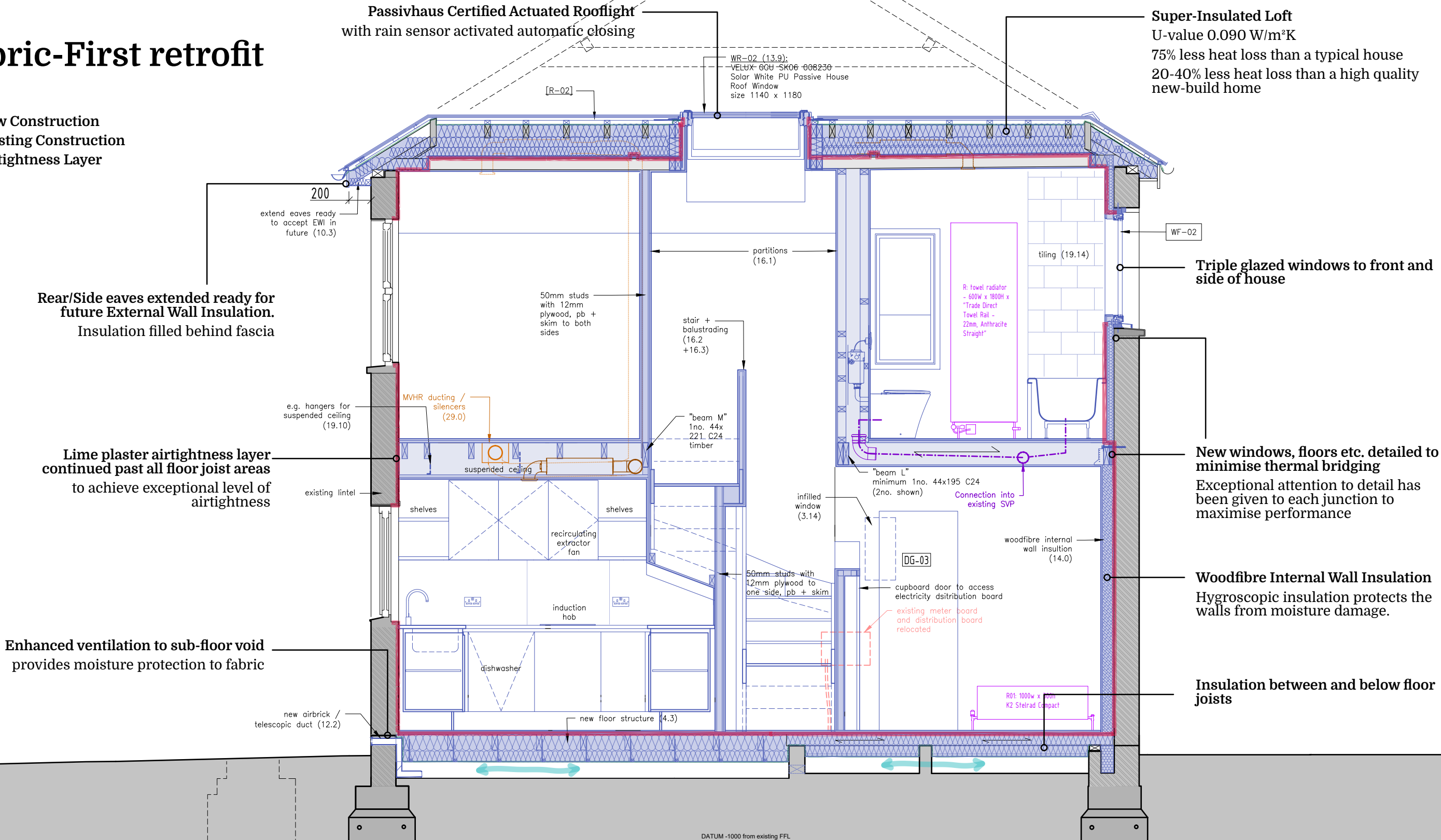


A Fabric-First retrofit

- New Construction
- Existing Construction
- Airtightness Layer



Reconfigured & extended to maximise daylight



Plywood Stair Guarding & Handrail

Earthbourn Clay Paints



Roof Batten Cladding

Using natural materials for a healthy home



Lime Plaster



Engineered Oak floors



Natural Osmo Oil finishes



Bio-based Linoleum Pin Board

Lime-based paints

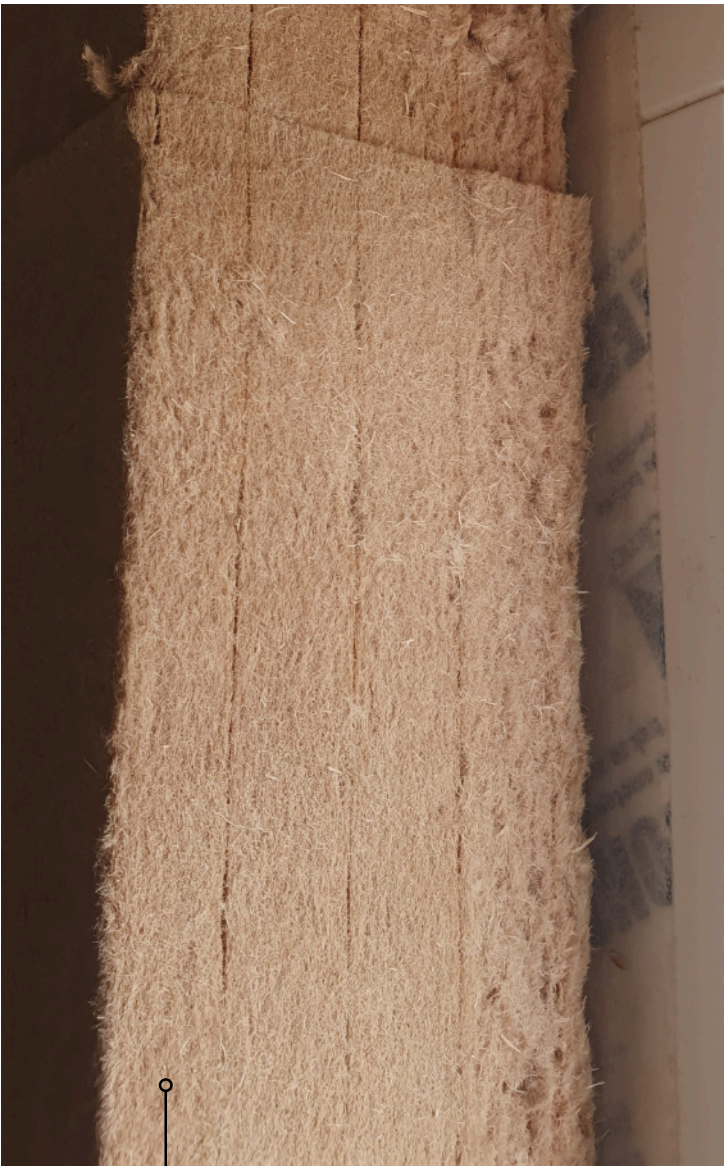
Made from components built to last



Completely Re-Roofed in Natural Slate



With matching In-line Photovoltaics



Natural Woodfibre Insulation



Durable, Passivhaus Certified Airtightness Components

Durable metal ductwork

Fossil-fuel free & powered by Air Source Heat Pump



Super efficient radial hot water distribution
Reduces waste heat and overheating

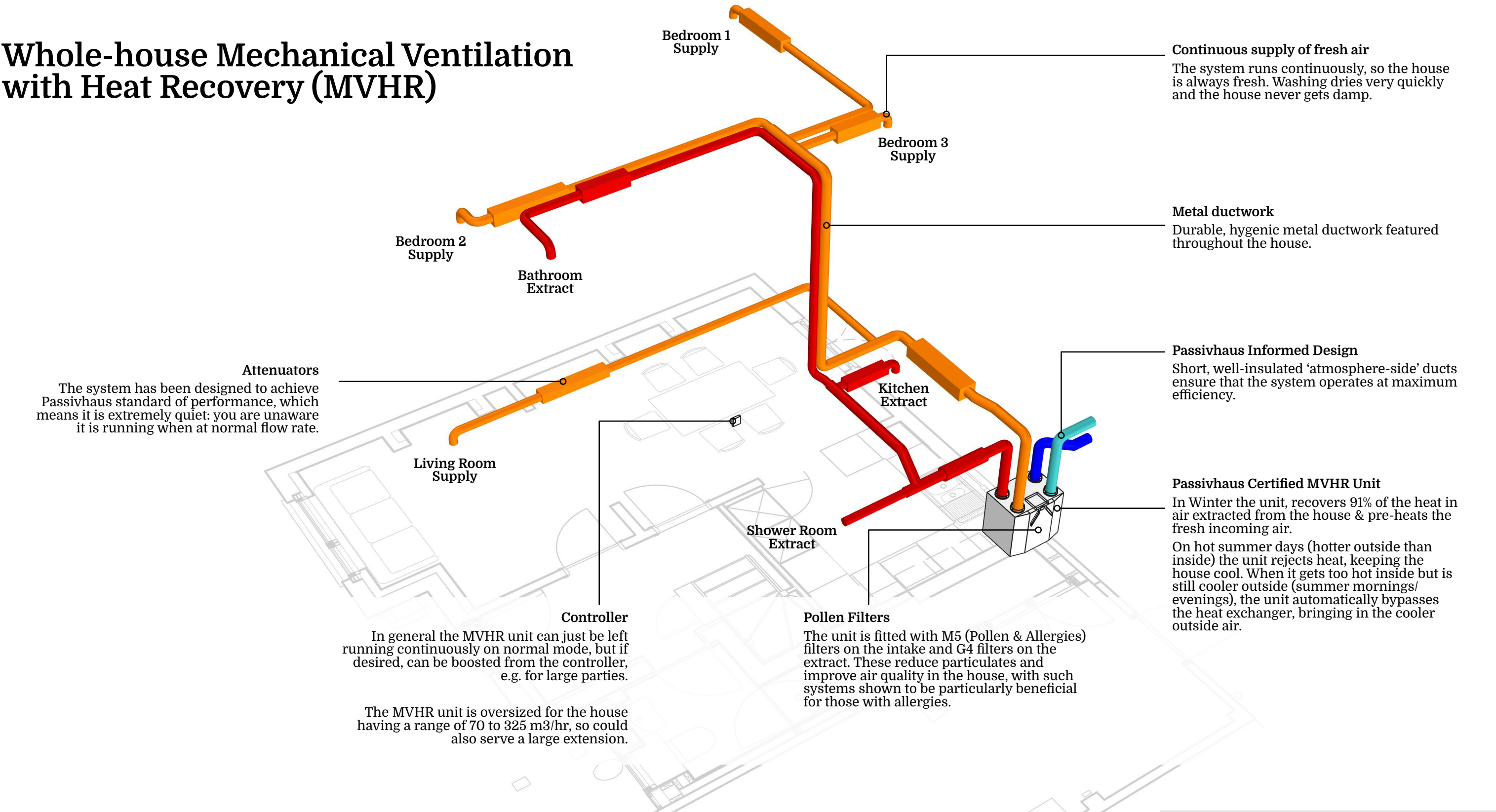
Short, efficient primary heat circulation
Reduces waste heat and overheating. Maximises ability of heat pump to run at low temperatures, improving performance.

Water softener
Easier cleaning, protects pipes & appliances, promotes healthier skin & hair

400% efficient Air Source Heat Pump
Delivers carbon-free heat & has been 20-30% cheaper than gas per kWh of heat delivered



Whole-house Mechanical Ventilation with Heat Recovery (MVHR)



Continuous supply of fresh air
The system runs continuously, so the house is always fresh. Washing dries very quickly and the house never gets damp.

Metal ductwork
Durable, hygienic metal ductwork featured throughout the house.

Passivhaus Informed Design
Short, well-insulated 'atmosphere-side' ducts ensure that the system operates at maximum efficiency.

Passivhaus Certified MVHR Unit
In Winter the unit, recovers 91% of the heat in air extracted from the house & pre-heats the fresh incoming air.
On hot summer days (hotter outside than inside) the unit rejects heat, keeping the house cool. When it gets too hot inside but is still cooler outside (summer mornings/evenings), the unit automatically bypasses the heat exchanger, bringing in the cooler outside air.

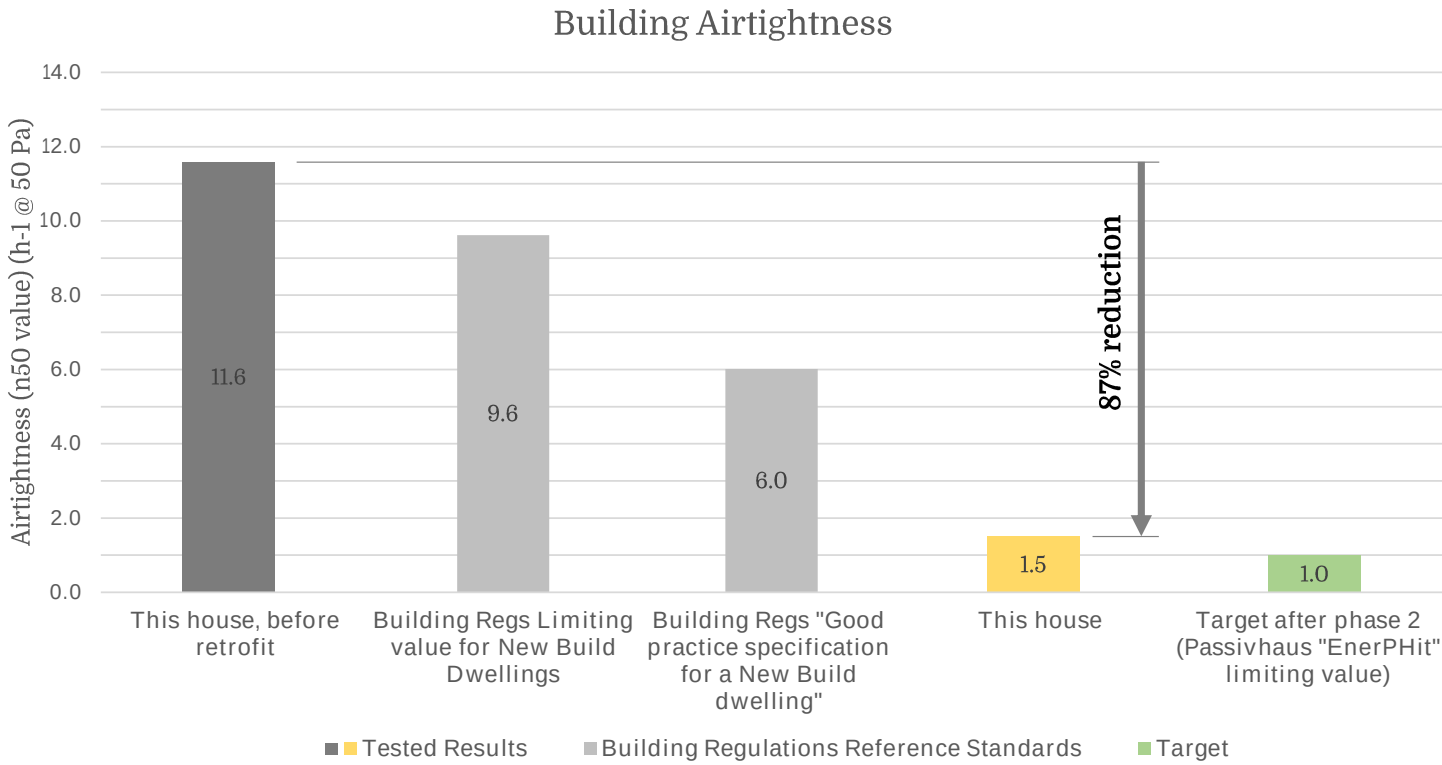
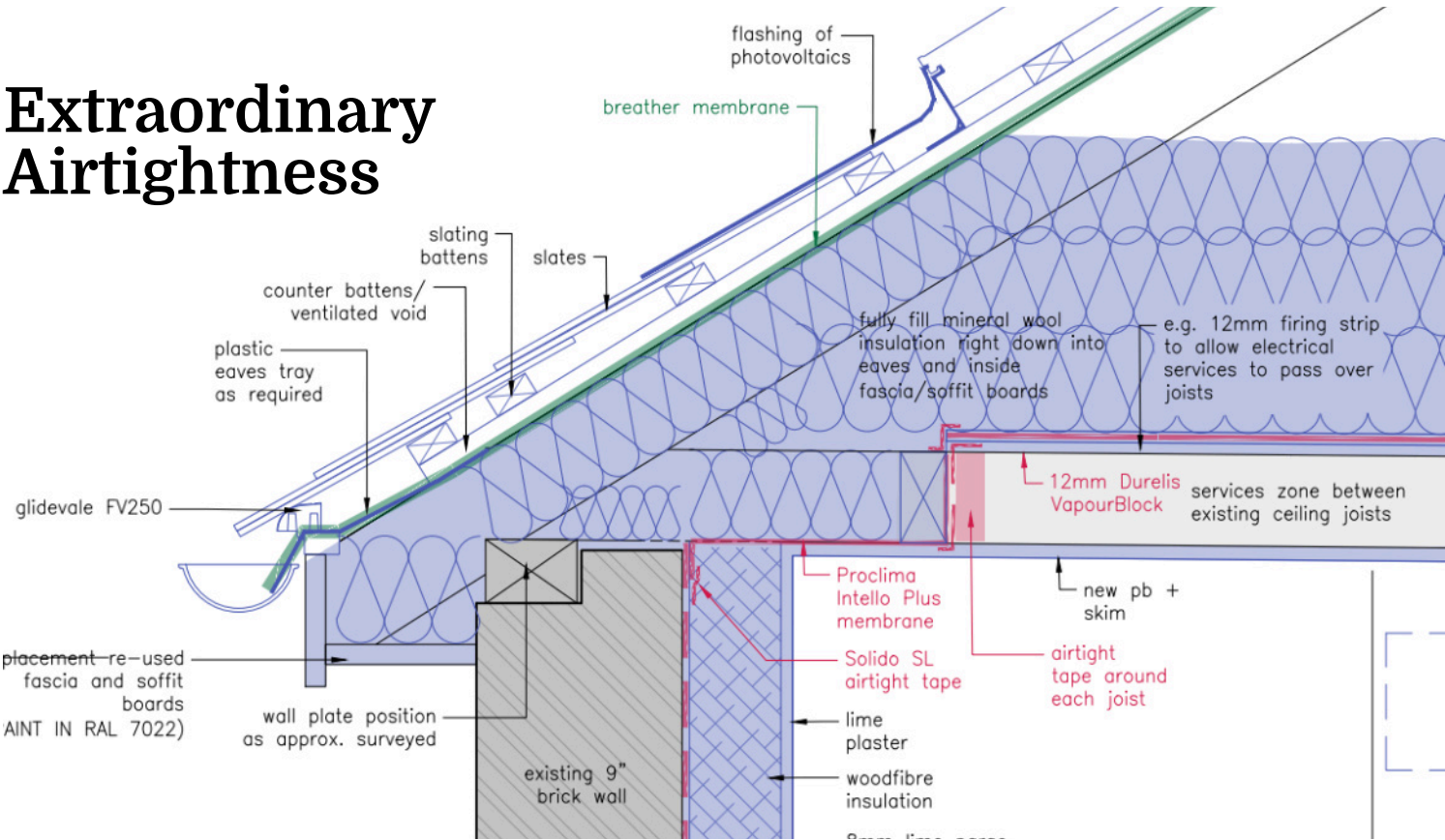
Attenuators
The system has been designed to achieve Passivhaus standard of performance, which means it is extremely quiet: you are unaware it is running when at normal flow rate.

Controller
In general the MVHR unit can just be left running continuously on normal mode, but if desired, can be boosted from the controller, e.g. for large parties.

The MVHR unit is oversized for the house having a range of 70 to 325 m³/hr, so could also serve a large extension.

Pollen Filters
The unit is fitted with M5 (Pollen & Allergies) filters on the intake and G4 filters on the extract. These reduce particulates and improve air quality in the house, with such systems shown to be particularly beneficial for those with allergies.

Extraordinary Airtightness



Building Regulations values converted from air permeability for the specific volume/envelope area of this house.



Airtight taping to loft deck using proprietary (age tested) airtightness products. As seen in this image, timber was primed to ensure good adherence.



Airtight taping at roof eaves using proprietary (age tested) airtightness products.



Airtight taping of joists using proprietary (age tested) airtightness products. Importantly, the lime plaster has been continued through the joist zone.



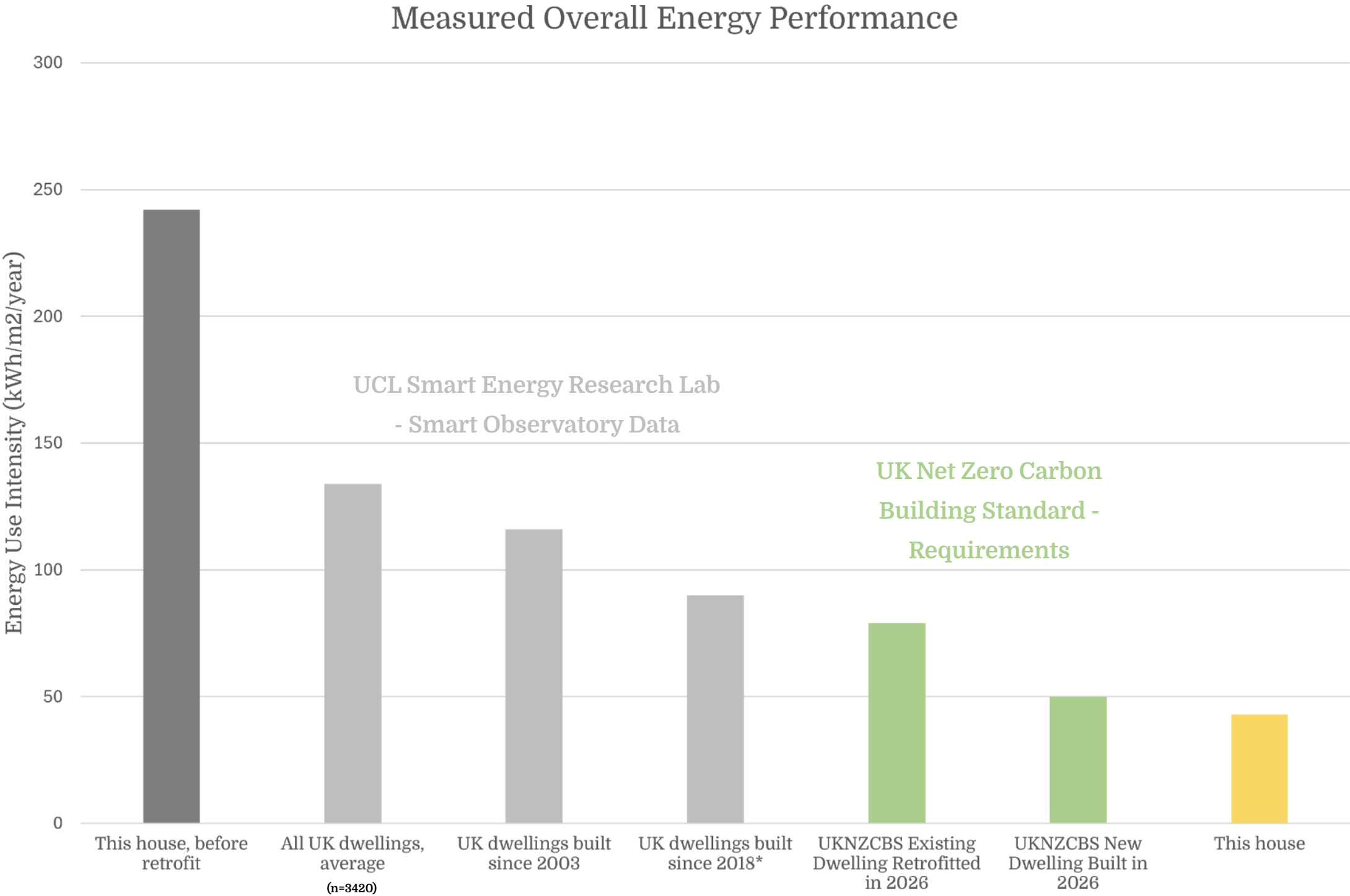
Airtight taping of windows using proprietary (age tested) airtightness products..

Ultra Energy Efficient Home

Over the first 2 years of occupation, measured imported energy was 43 kWh/m²/year, exceeding the operational-energy performance benchmark applicable under the **UK Net Zero Carbon Buildings Standard***

To enable comparison between large and small dwellings the industry uses “Energy Use Intensity” (EUI) which is measured in kWh of total energy used per m² of floor area per year.

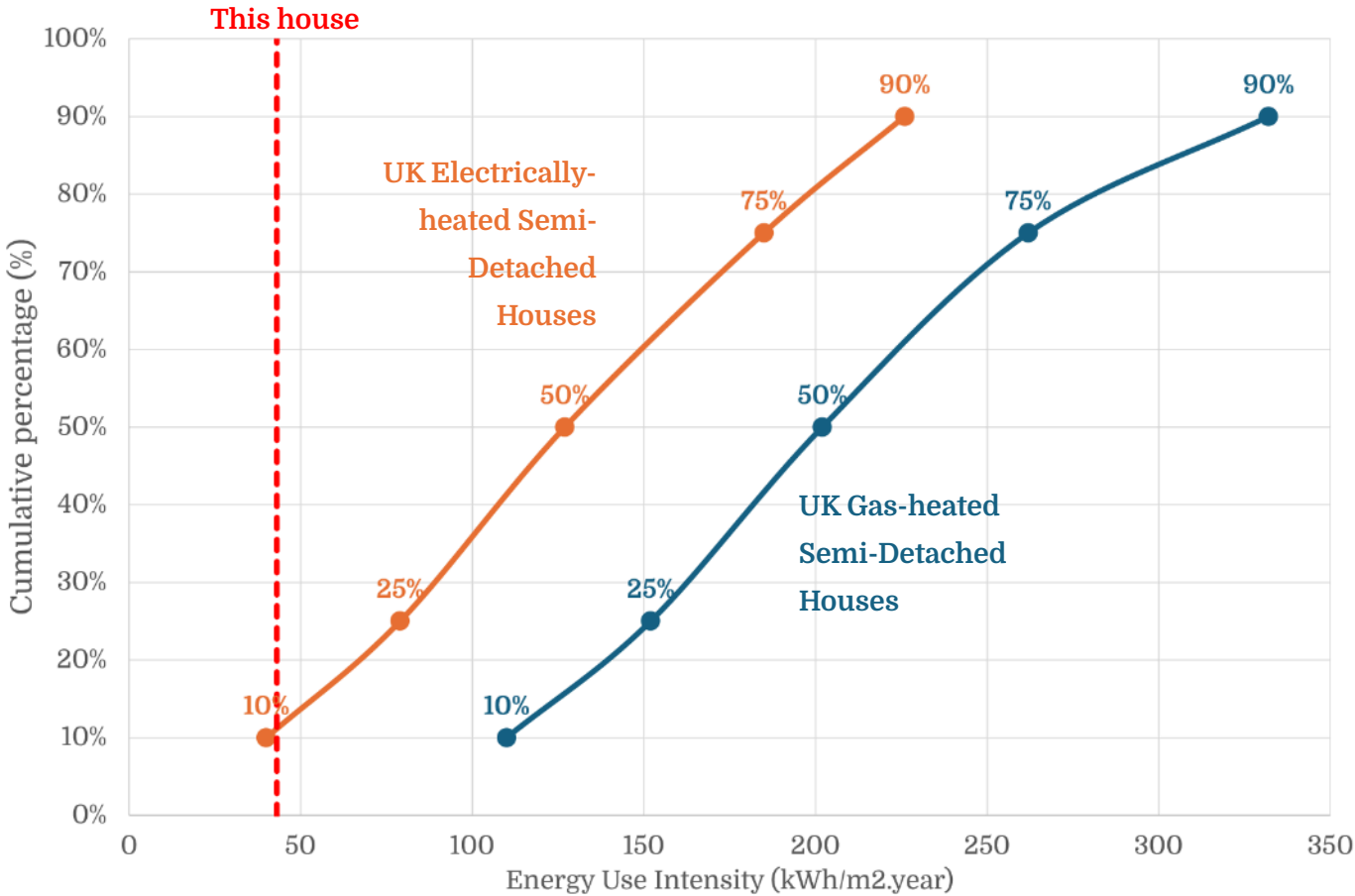
Passivhaus dwellings - widely regarded as the gold standard for building energy efficiency - are typically designed to achieve 35 - 45 kWh/m²/year.



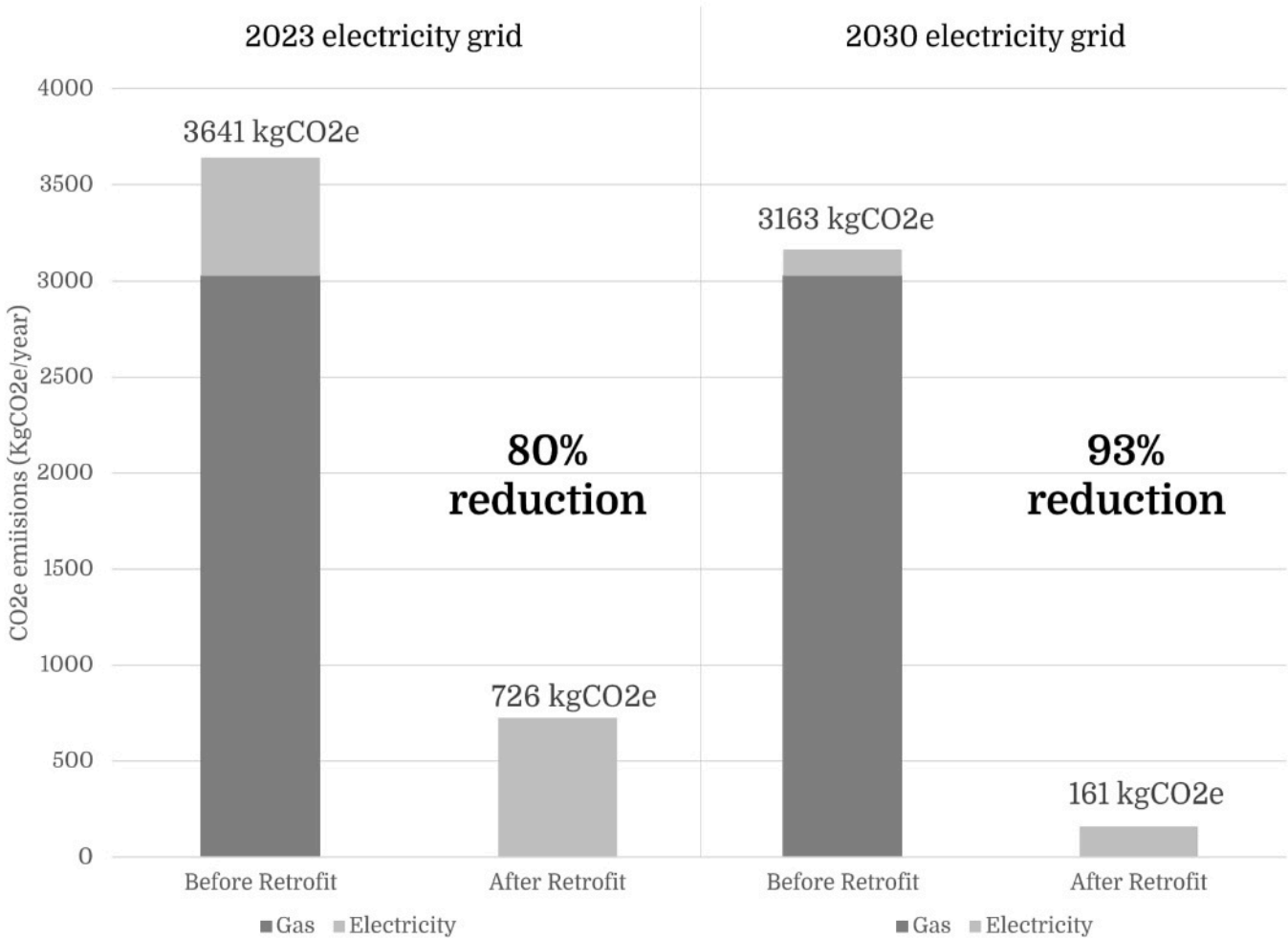
*This is a comparison of operational energy performance only and does not constitute certification or verification under the Standard. For certification against the standard, self consumption of PV electricity should be metered separately and excluded, this has not been done here.

Net Zero Enabled

The chart below uses data from the Chartered Institution of Building Services Engineers (CIBSE) to compare the energy performance of this home with the UK semi-detached housing stock as a whole. This home outperforms the vast majority of similar UK homes.



The chart below uses UK Government greenhouse gas carbon intensity figures to calculate annual CO2 emissions from the house using metered energy from before and after the retrofit.



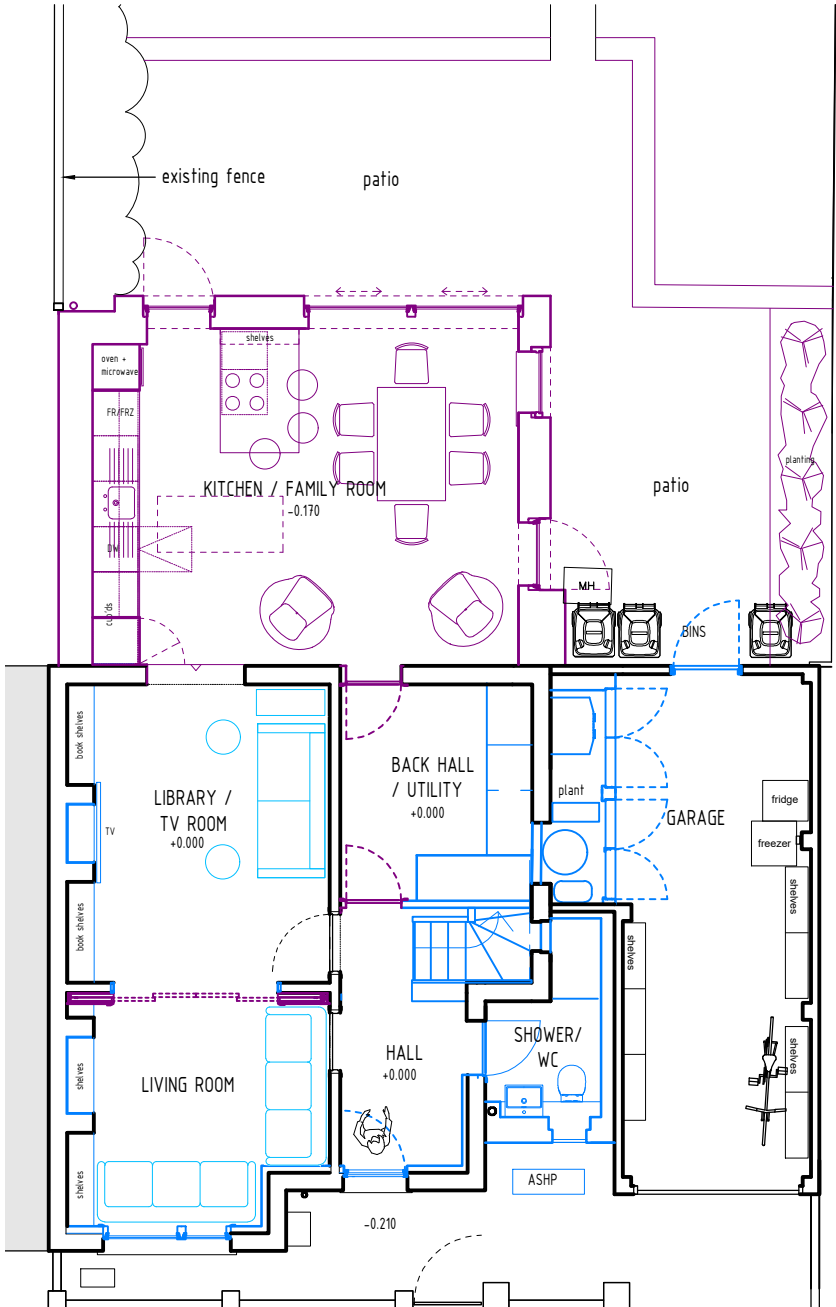
CIBSE Benchmark Comparison - data from <https://cibseenergybenchmarkingdashboard.co.uk/>

Grid carbon intensity:
2023: UK Government GHG Conversion Factors for Company Reporting
2030: BEIS 2022 projection

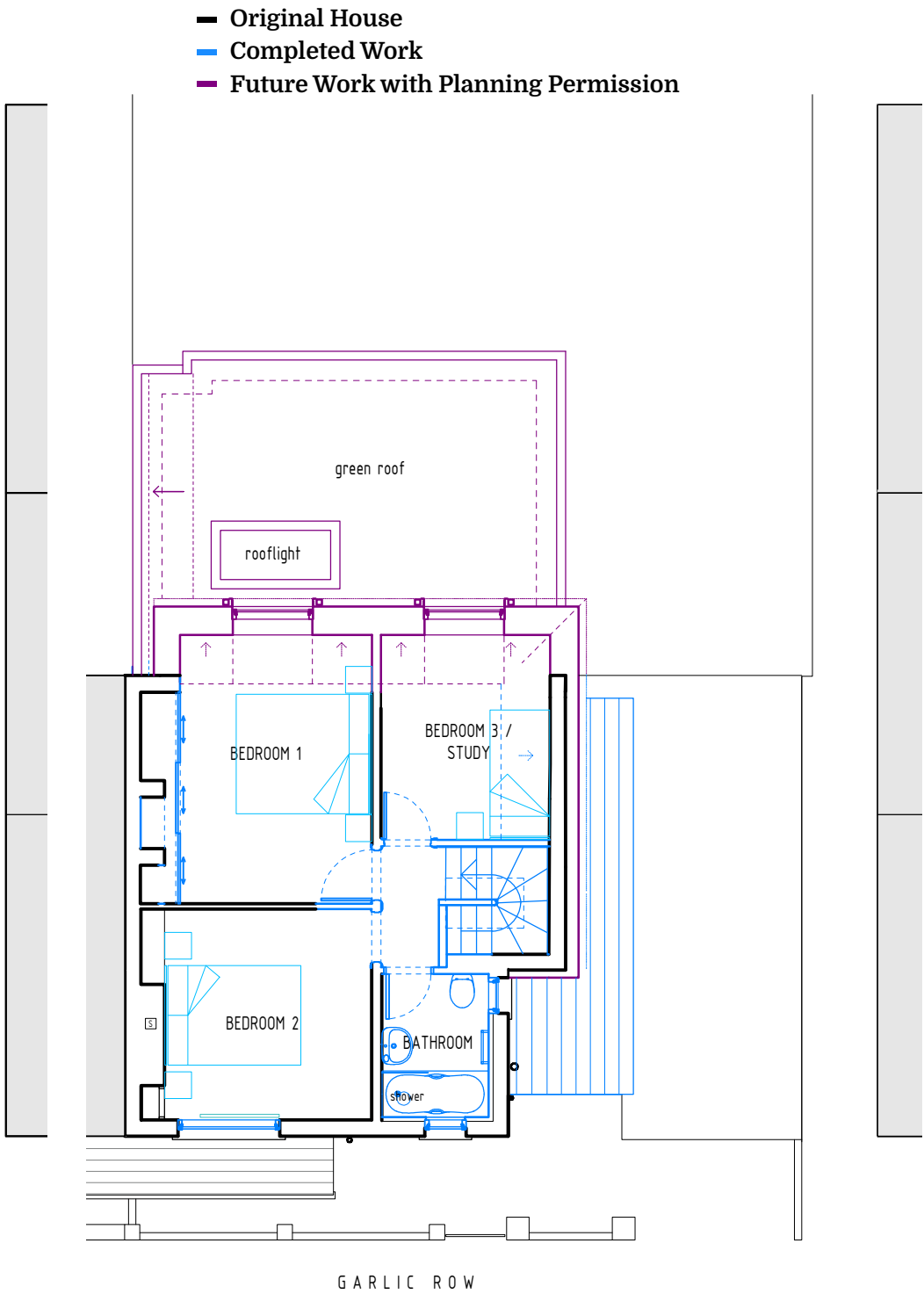
Planning Approved Extension



Proposed Rear Elevation

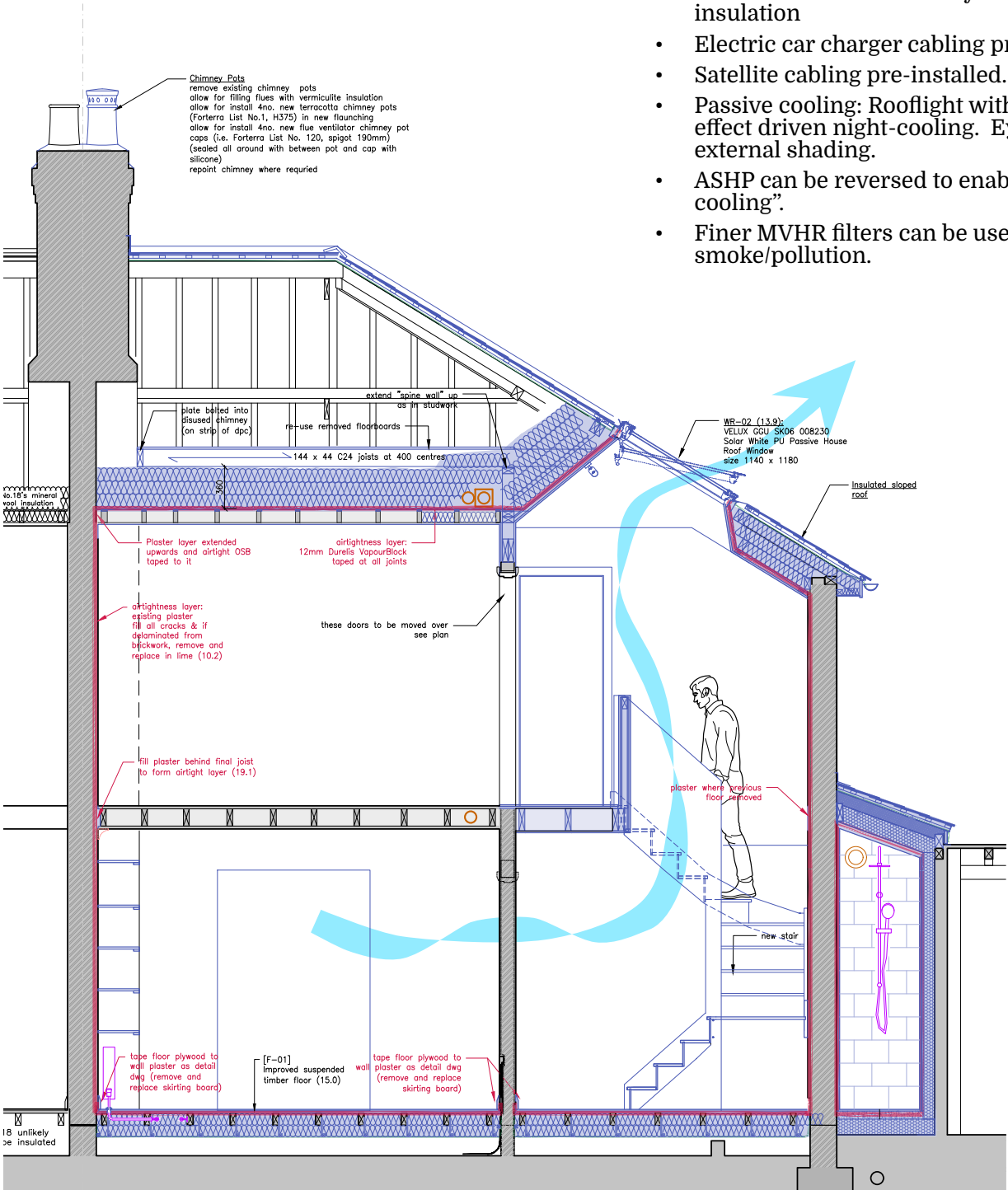
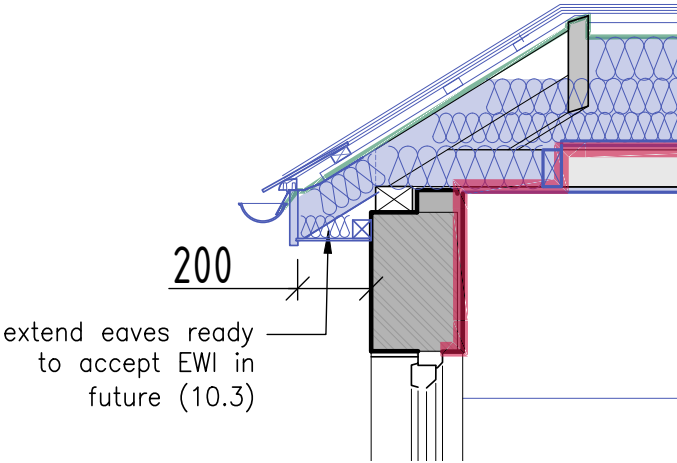


Proposed Ground Floor Plan



Proposed First Floor Plan

Future-proofed



- All lead pipework has been replaced (both supply pipe in street and all internal pipework)
- Rear eaves extended ready for external wall insulation
- Electric car charger cabling pre-installed.
- Satellite cabling pre-installed.
- Passive cooling: Rooflight with rain sensor for stack effect driven night-cooling. Eyelets fitted for external shading.
- ASHP can be reversed to enable retrofit of “trim cooling”.
- Finer MVHR filters can be used to filter wildfire smoke/pollution.





16 Garlic Row, Cambridge

[Limhūs | The Limed House]

© Oliver Cooper RIBA

Credits:

Photography - Ian Lambert Architectural Photography

