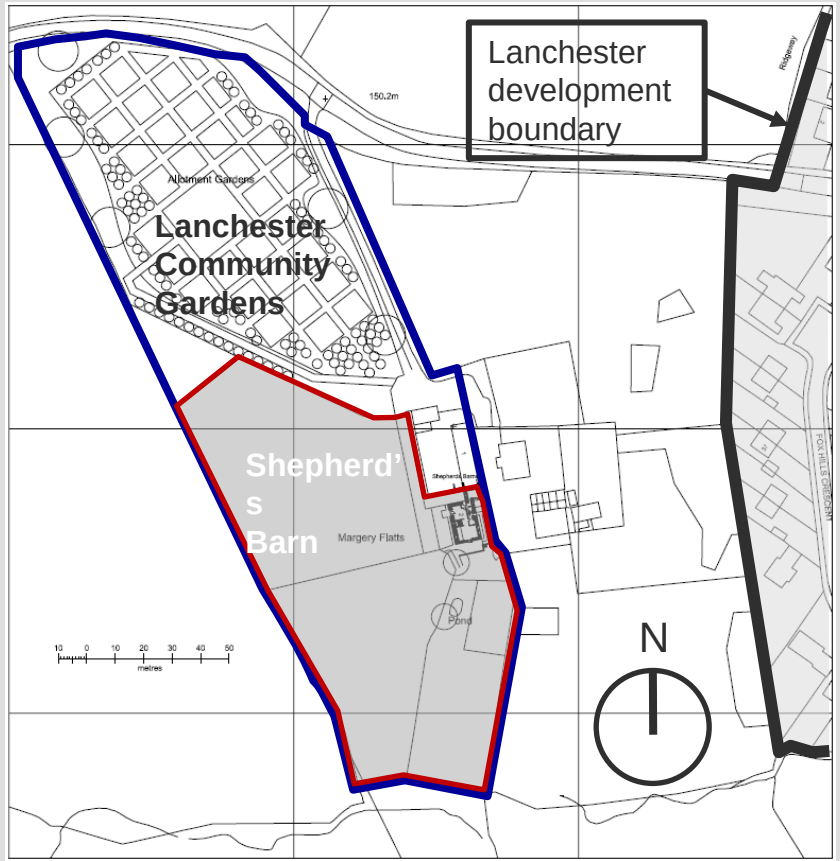

UK PASSIVHAUS AWARDS 2023
CATEGORGY I APPLICANT NAME
#PHTawards2023
UK Passivhaus Awards 2023
Shepherds Barn
LEAP
Lovingly Engineered Architectural Practice





UK Passivhaus Awards 2023

DESIGN PHILOSOPHY

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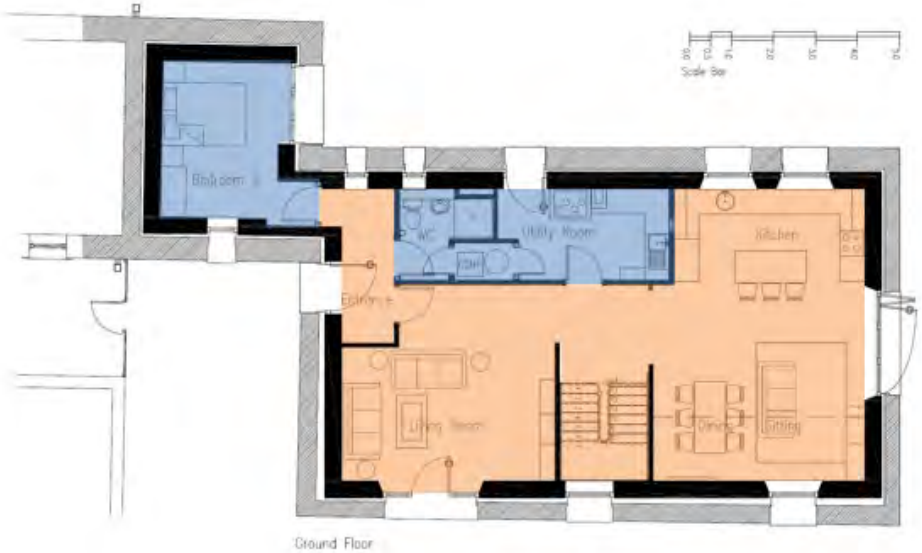
KNAUFINSULATION
MUNSTER JOINERY

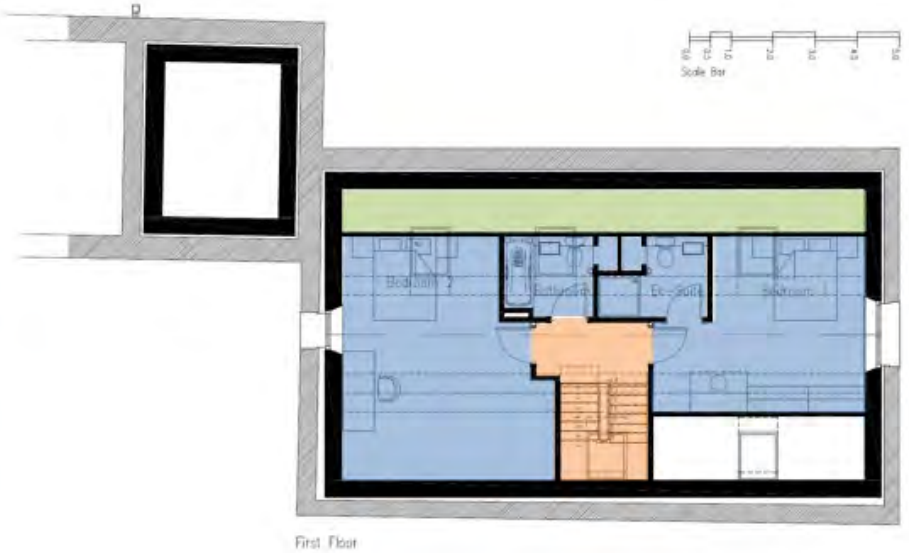







Before


Scale Bar
Utility Room
Kitchen
Ground Floor


Scale Bar
First Floor


Bedroom 1
Utility / Kitchen
Scale Bar



Looking south – kitchen/dining/sitting room

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Sitting room:
View to staircase



Staircase:
View to sitting room



Bedroom (north)



Landing – sisal carpet



Ariel view: South-west



Ariel view: South-east



Ariel view: South



South façade – making use of the old barn



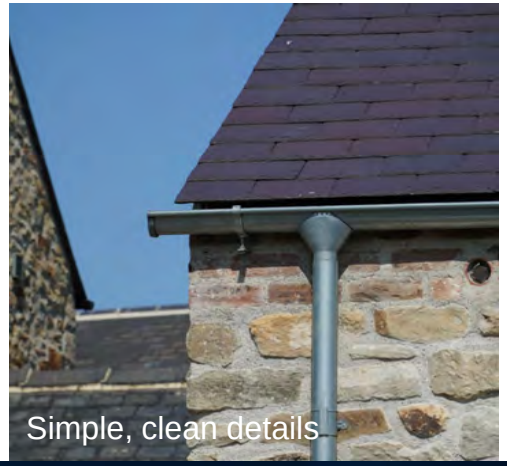
Sliding folding doors to south facade



South facing living room



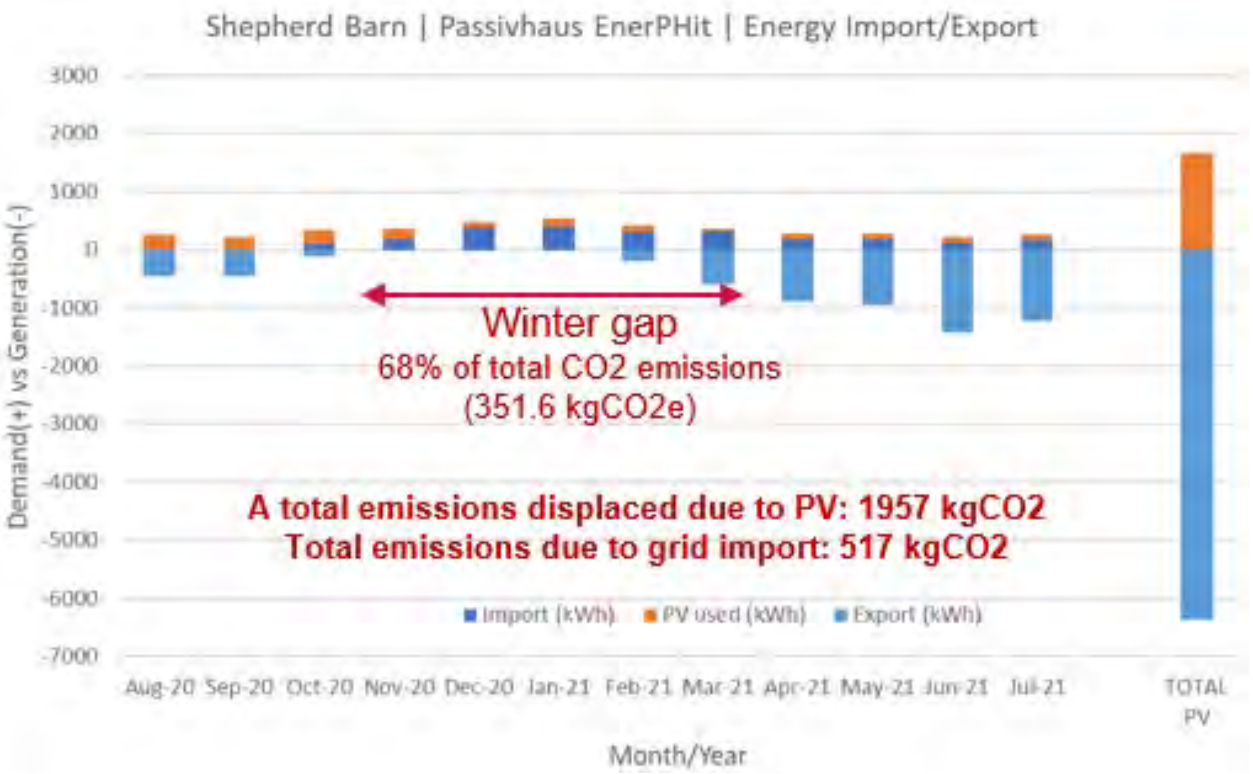
West façade



Simple, clean details



South façade



Between 1st August 2020 and 31st July 2021
PV array generated £1107 of income.
Household electricity bill £524/yr.
Net-profit £584/yr.

PV Utilisation Factor:
39%

Peak Heating Load
12 W/m^2

Primary Energy Demand
30 kWh/m^2/yr

Primary Energy Generation
76 kWh/m^2/yr

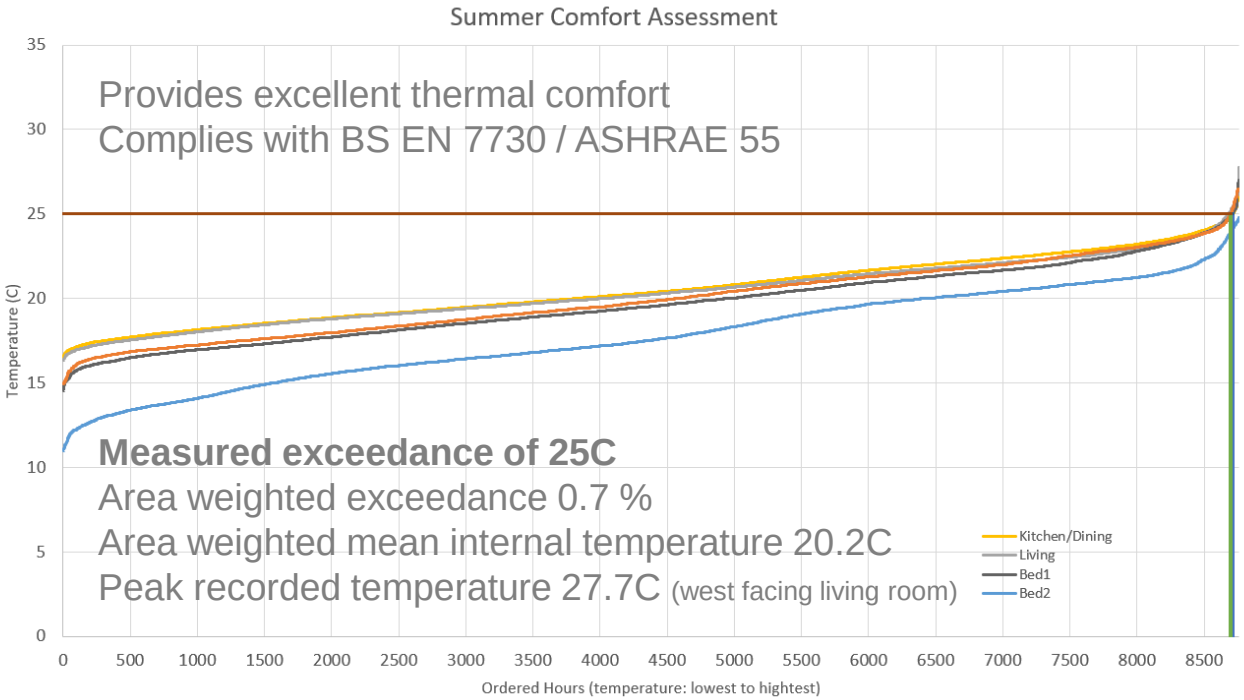
Heating Demand
24 kWh/m^2/yr

Air Changes/Hr
0.18 @50 pascals

Summer Comfort:

Design for daylight
0.75m deep reveals
Night ventilation

Openable windows
Summer bypass
Rooflight shading (west facing)



No. Occupants:
PHPP: 3.4
Actual: 2

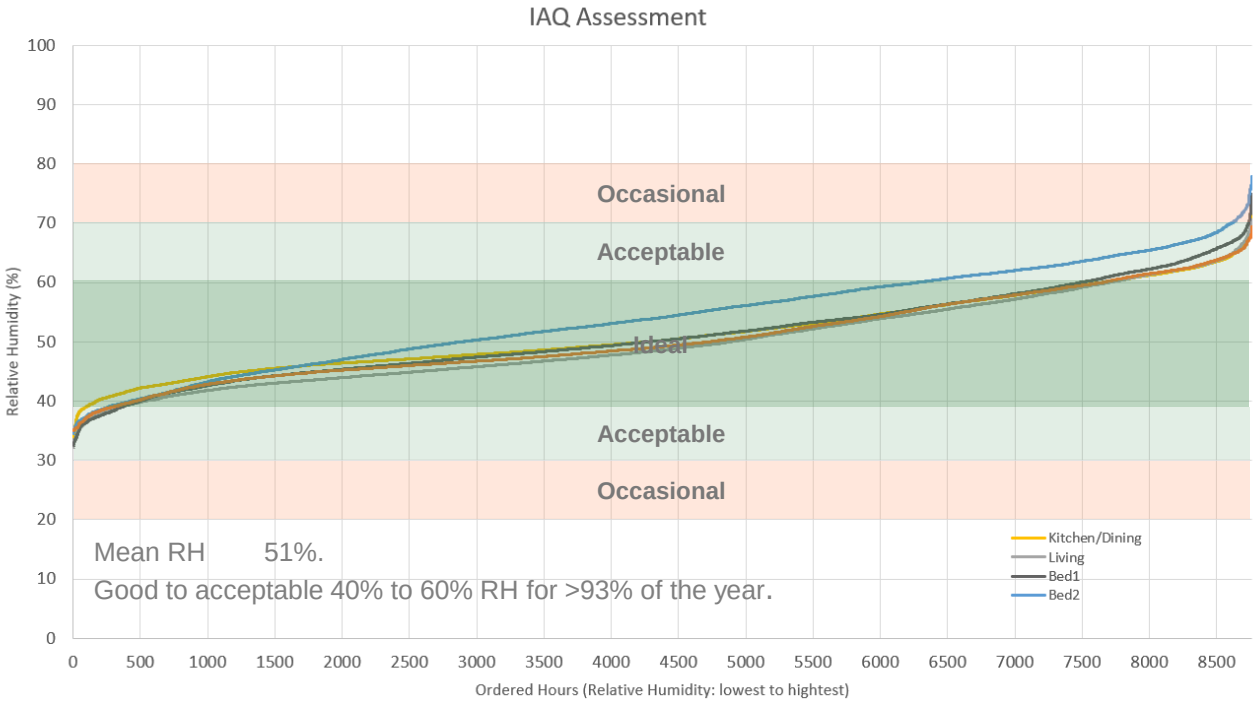
Exceedance of 25C:
PHPP: 2%
Actual: 0.7%

Glazing: 26% of TFA

"We didn't feel uncomfortable during the heatwave.
"The most important lesson was attention to closing windows when the outside temperature was higher."

-Paul Shepherd

Air Quality:



Passivhaus I THRIVED Challenge

February 2021
After 10 days without heat the average temp was 18.5 ºC

"We feel very comfortable in the house. It's very resilient. What's so good is the lack of draughts!!

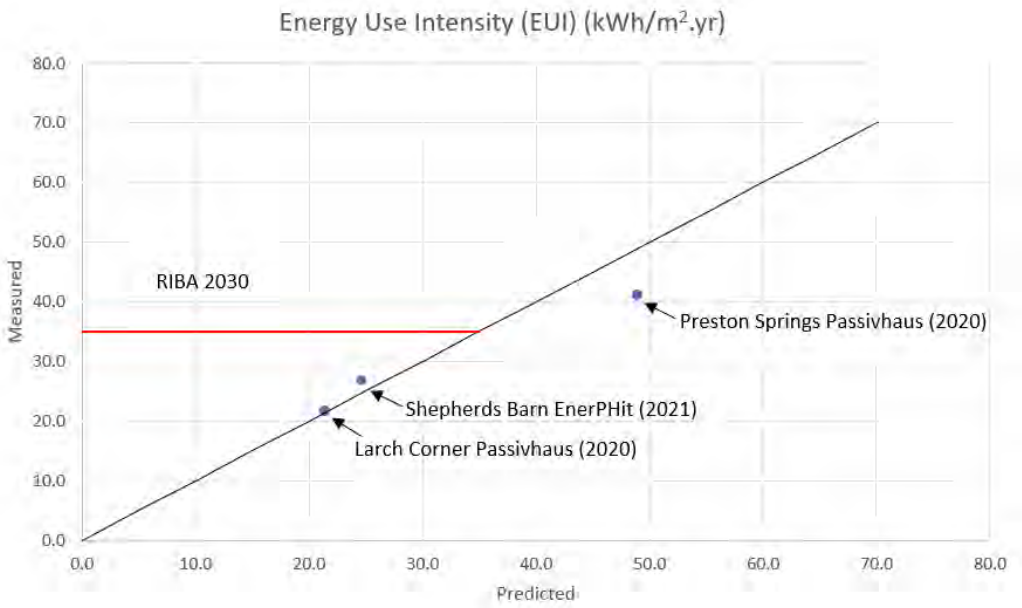
We can redo experiment if you wish."

- Sonny Shepherd

Other Standards

- 30% reduction compared to RIBA 2030 residential target
- LETI ‘A’ rating for Upfront and Whole-life carbon
- According to SAP Shepherds Barn achieves Zero Carbon
- Finnish/REHVA duct cleanliness standards





RIBA CHALLENGE (includes ●)

	Building Type: Domestic
Operational Energy RIBA level met	21 kWh/m2.a GIA 2030 Target
Embodied Carbon RIBA level met	443 kg CO_2e/m^2 GIA 2030 Target

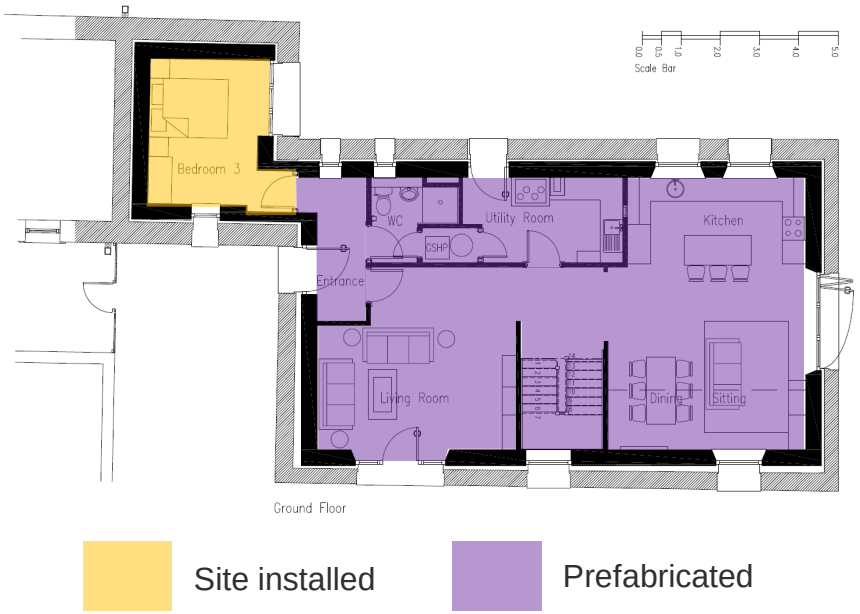
LETI (includes ●)

Upfront Carbon A1-5 excl Sequestration	208 kg CO_2e/m_2 GIA
Embodied Carbon A1-5, B1-5, C1-4	380 kg CO_2e/m_2 GIA
Sequestered Carbon	247 kg CO_2e/m_2 GIA
Module D	-49 kg CO_2e/m_2 GIA

RIBA/LETI Lifecycle carbon assessment (PHribbon)

Buildability

- Reduce exposure to health and safety risks
- Save time - change critical path
- Reduce on site skills / enable pure self-build
- Client (novice builders) attend Passivhaus Trades course



Buildability

- Insulated raft foundation system (reduce thermal bridging)
- Airtight: Equivalent Leakage Area: 12 cm^2 vs 752 cm^2 for B. Regs new build (e.g. 4x £1 coins compared to 175x £1 coins)
- Low toxicity / low-VOC paint finishes used throughout



Prefabrication saved time, reduced self-build site skills.



Timber frame by Eden Insulation

Materials efficiency strategy

Typical new build house = 10 tonnes of construction waste

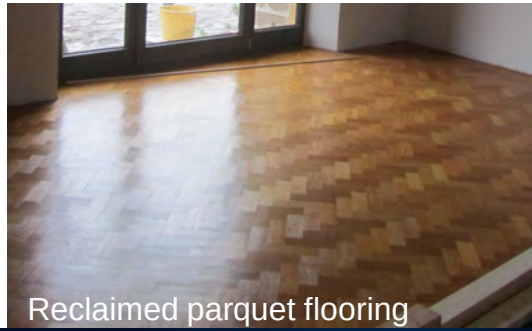
The following materials efficiency strategy was followed:

- Low-grade hazardous asbestos roof sheeting was carefully removed, packaged and taken a hazardous waste tip
- Off-site prefabrication allowed offcuts to be reduced/recycled
- On site, reclaim, reuse and repurpose prioritised. e.g. additional stone recovered from the site
- Avoid over-ordering, materials only bought after measuring-up.
- Once all materials had been used, additional materials ordered.
- Some spare materials stored for reuse or repurposing
- Recycling Centre: 1 load by campervan (a small quantity of wood fibre insulation off-cuts, some leftover EPS)





Materials stored for reuse on site

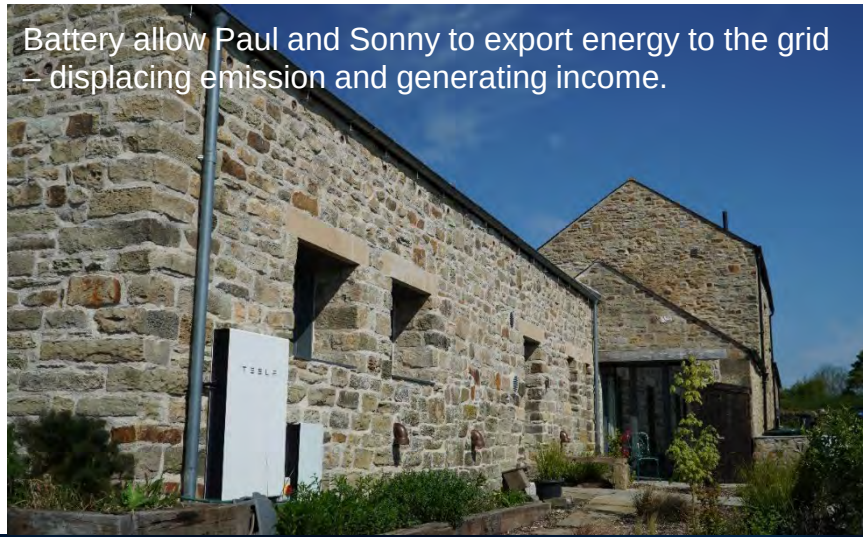


Reclaimed parquet flooring

Lessons learned

- Attention to detail high standards of airtightness achieved with relatively little effort
- Tackling up-front carbon is difficult, even with timber-based products.
- PHribbon offers an easy way for designers to assess up-front carbon.
- Upfront carbon of PV reduced by 8.5x i.e. 88%
- A GSHP included because the client had installed the slinky before engaging with a Passivhaus Architect – it would have been more cost effective to use an ASHP.













wildflower meadow, beehives, a small, planted wood of 110 trees and four Miyawaki forests

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For more lessons learned, watch the Shepherds Barn documentary at:

PassivhausSecrets.co.uk