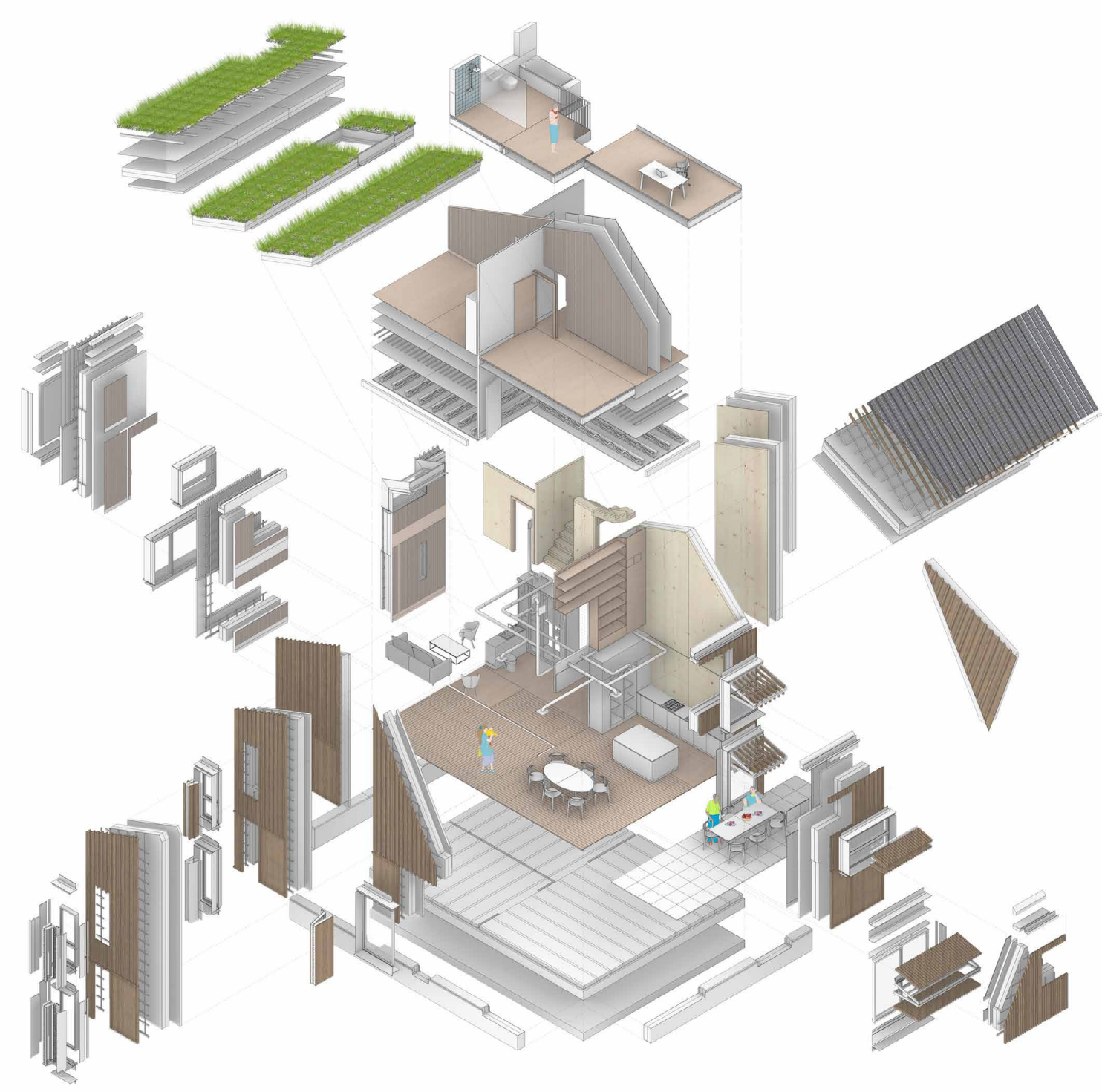
The Positive+ House

Home of our future



The Positive+House
Home of our future

The Positive+ House adopts regenerative design solutions in response to the increasingly urgent issue of climate change, biodiversity loss and the social challenges of our time - The Positive+ Collective.

The UK needs housing fit for our future. What is built needs to tackle some of the largest systemic challenges we share as a nation: improving human wellbeing, developing communities, meeting net zero carbon targets fast, increasing biodiversity and building homes that last and suit our changing climate and needs. Positive+ House is our desirable, affordable and deliverable response to this.

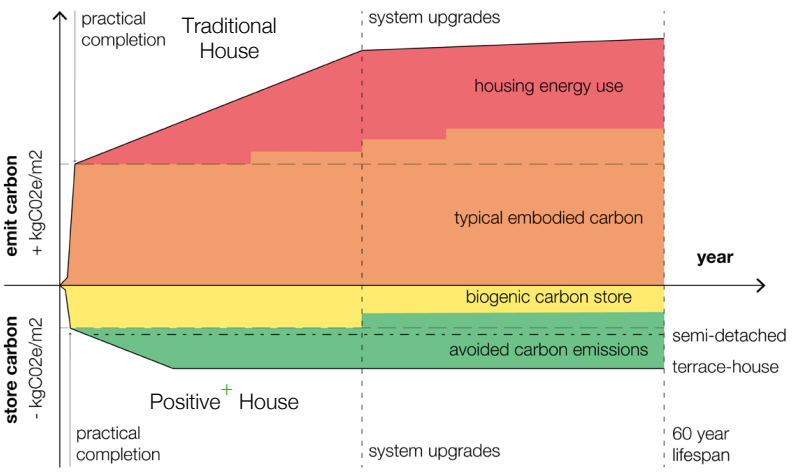
Our homes fit within a Positive+ Community urban approach that puts people at its very heart and helps communities reconnect to each other and to nature. It brings landscape into the site for a net biodiversity gain. Lifestyle changes are enabled through walking & cycling within and beyond the site boundary, growing food together, and facilitating the sharing economy that closes waste loops. These benefits to humans and the environment may be harder to quantify but have many benefits to our health and happiness as we have found out through the Coronavirus pandemic.

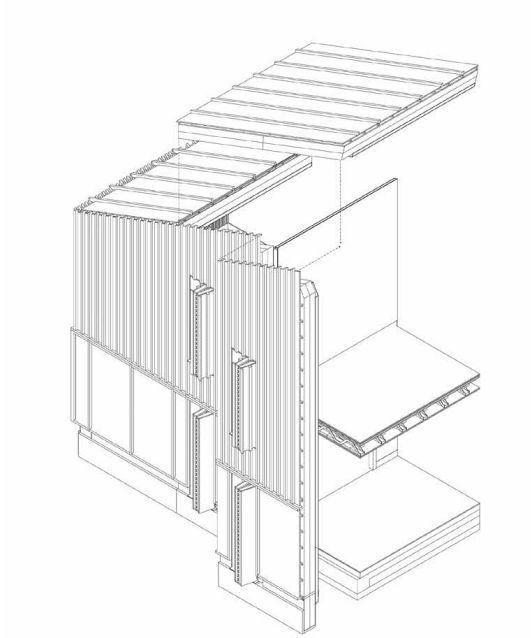
Positive+ House utilises the latest in industry digitalisation and a distributed offsite manufacturing model to harness and develop the supply chain in more advanced offsite production, and a near site 'flying factory' assembly process to deliver at speed, improve build quality, and allow job creation and skills improvement. It puts the human element back into offsite manufacturing whilst still providing a Premanufacturing Value (PMV) of about 77%.

The design is a modern interpretation of traditional balloon frame construction methods using home-grown Cross Laminated Timber (CLT) to produce an efficient, high performance, solid feeling and adaptable frame

Above: An example of our Positive House illustrating the natural materials used and focus on health & wellbeing.

Diagram 1: Carbon graph over 60-year reference period up until end of life: Typical house compared with a Positive+ House





that incorporates generous internal spaces for different lifestyles.

The home is Passivhaus quality to provide near zero heating bills and long term comfort. It produces more energy than it consumes by using a direct electric system and integrated photovoltaics, and stores more carbon in its materials than it emits to make them. It incorporates the whole life impact of the building[1], and goes beyond net zero to deliver the positive carbon[2] home today.

At 15 kWh/m².a, the semi detached Positive+ House consumes only 1830 kWh per year for heating, about 15% of the average (medium) UK household[3] and a saving of about £750/year on bills compared with a building built to today's regulations.

With the solar thermal system covering more than half the hot water demand, only 10 kWh/m².a goes into heating water. By providing top up heat through direct electric and a (PV-diverted) immersion heater, the costs are offset by the electricity produced by the PV array and sold to the grid, so that only fixed charges need to be paid over the year.

Taking into account other electricity uses, the in-use carbon impact of the semi-detached house is 3.4kgCO2(eq)/m2.a. In a mixed development, with a ratio of townhouses and semis of 2:1, the carbon impacts are more than compensated overall. When we take into account the avoided carbon through fabric and ventilation efficiency[4] the house performs at -2.3 $kgCO_2(eq)/m^2$, representing a carbon saving of 138kg over 60 years, or 230kg over 100 years.

Our estimate of the embodied carbon by Gross Internal Floor Area (GIFA) of a typical Positive+ House in production (A1-A3) is 198 kgCO2/m2, and biogenic storage of 340 kg/cO2/m2 meaning in use the building is net -142kgCO2/m2.

These values are significantly below the RIBA Challenge 2030[5] or LETI[6] targeted values of 300kgCO2/m2 for domestic residential buildings by 2030, showing how our focus on lean design and low impact materials can significantly reduce the impact of the homes we need to build.

Left: Cross Laminated Timber (CLT) Balloon frame offsite assembly process.
Lower Left: Design Flexibility in facade choices; all using local natural materials.
Below: External Landscape which promotes community interaction to create healthy places to live within.

1 *UK GBC, Net Zero Carbon Buildings: A Framework Definition (2019)*

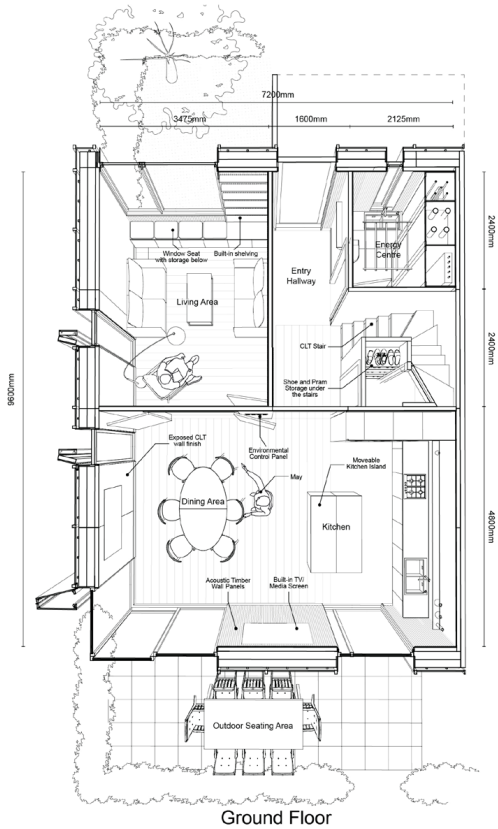
2 *https://mcdonough.com/new-language-carbon/*

3 *https://www.ofgem.gov.uk/gas/retail-market/monitoring-data-and-statistics/typical-domestic-consumption-values*

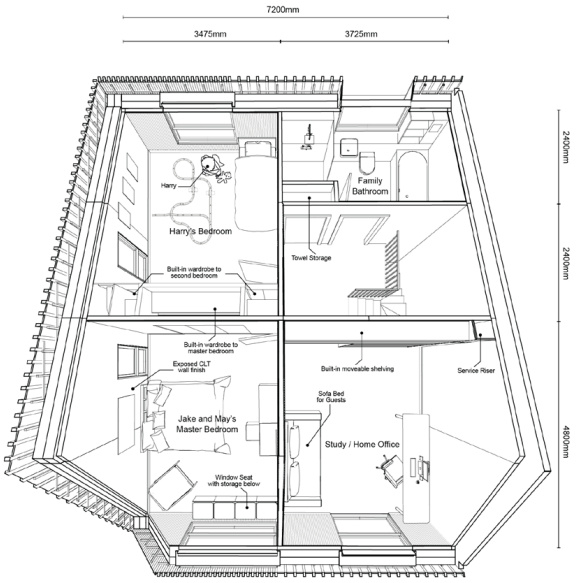
4 *Based on a "notional building" and the best proposed Future Homes Standard of 30% improvement over current regulations.*

5 *https://www.architecture.com/-/media/files/Climate-action/RIBA-2030-Climate-Challenge.pdf?la=en*

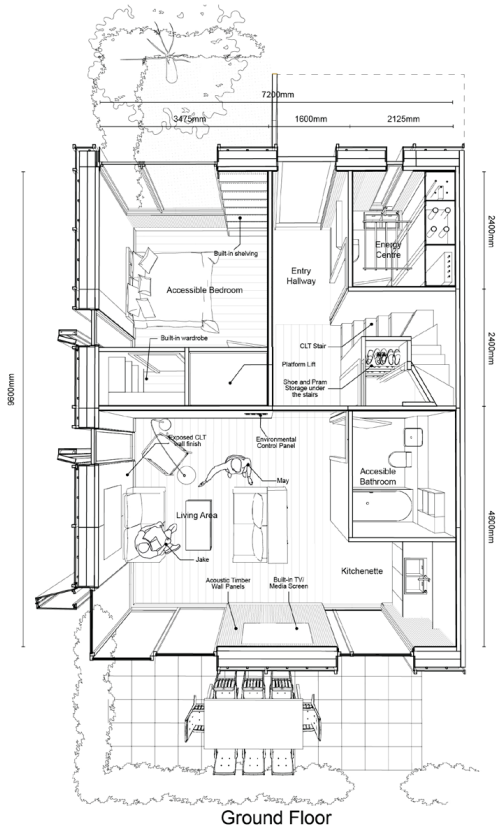
6 *https://www.leti.london/cedg*



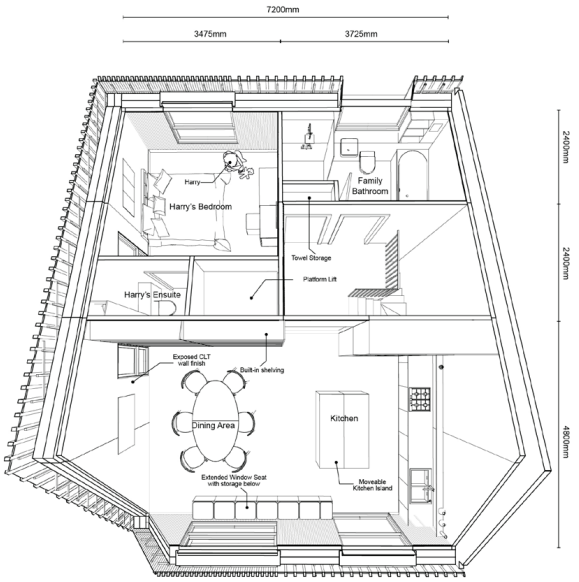
Ground Floor



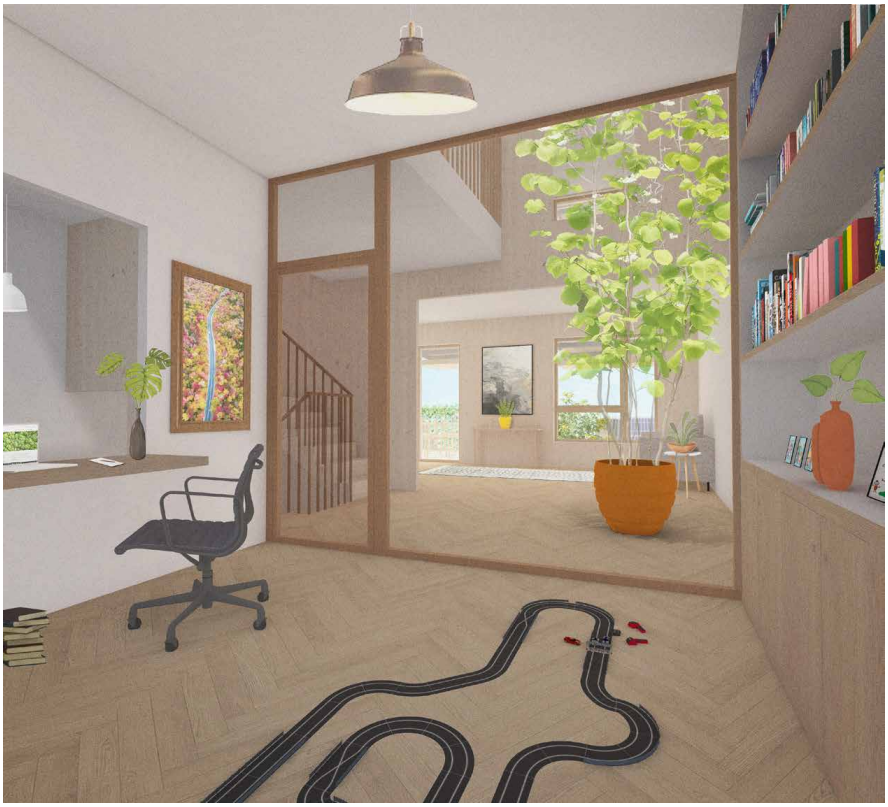
First Floor



Ground Floor



First Floor



Previous Page: Flexibility in layout and generous sizing.
This Page: Images of the interior and focus on community cohesion. We have prioritised healthy & inclusive living in our design approach.

Our design adopts a regenerative systems approach to strike the careful balance between realistic market-based delivery and our need to address the social and environmental challenges we face. It leverages demand-side changes to design and specification to bring larger system benefits to build quality, health, biodiversity, and use of the UK's skills and natural resources. We have made this explicit by defining these values across a Five Capitals model for sustainable development.

To deliver this ambitious approach, we have detailed both the house product and the manufacturing process of delivery. Both are needed. We use the Five Capitals approach as a basis for procurement on value as set out by both the Construction Leadership Council in Procuring for Value[1] and more recently the Construction Innovation Hub Value Tool-kit[2] based on other work by the ACE[3]. We believe this approach to sustainable development provides a realistic pathway to embed the Home of 2030 competition aspirations into future projects and realise the step change in quality it aims to deliver.

1 *https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2018/07/RLB-Procuring-for-Value-18-July-.pdf*

2 *https://constructioninnovationhub.org.uk/wp-content/uploads/2020/07/20200715_BR_09_ValueFrameworkReport_Digital_Pages.pdf*

3 *https://www.acenet.co.uk/media/5151/ace-five-capitals-report-2020.pdf*

Roof & Hidden Gutter

1. 80mm L3s CLT Balloon Frame Roof Panel with taped seams at all junctions
2. Two layers of 160mm tongue & groove rigid wood-fibre insulation fixed to CLT using appropriate insulation ties
3. Plywood boarding with roofing membrane layer
4. 30mm purlins overlaid onto 30mm rafters at 400mm nominal centres according to roof covering specification. Minimal void of 60mm.
5. Roof covering
6. Low profile anodised black recycled aluminium or galvanised steel gutter supported by plywood framing and rigid wood-fibre insulation fixed back to CLT structure
7. Black breather membrane lapped underneath gutter
8. Roof covering over-sailing gutter with sufficient opening to allow gutter access & maintenance
9. Gutter outlet leading to flush square profile downpipe

External Wall

10. Internal finishes (either exposed CLT surface, treated for surface spread of flame, or two layers of plasterboard on 25mm battens, or internal interchangeable timber acoustic wall panels with hidden fixings back to CLT)
11. 80mm L3s CLT Balloon Frame Roof Panel with taped seams at all junctions. 10mm construction tolerance
12. Two layers of 160mm tongue & groove rigid wood-fibre insulation fixed to CLT using appropriate insulation ties
13. Black breather membrane with no advertising
14. 30mm battens overlaid onto 30mm counter-battens at 400mm centres according to wall cladding specification creating a minimal void of 60mm for clear ventilation
15. Exterior cladding. Vertical solid wood timber lengths as shown or agreed alternative such as timber shingles, timber mathematical tiling

Windows and Doors

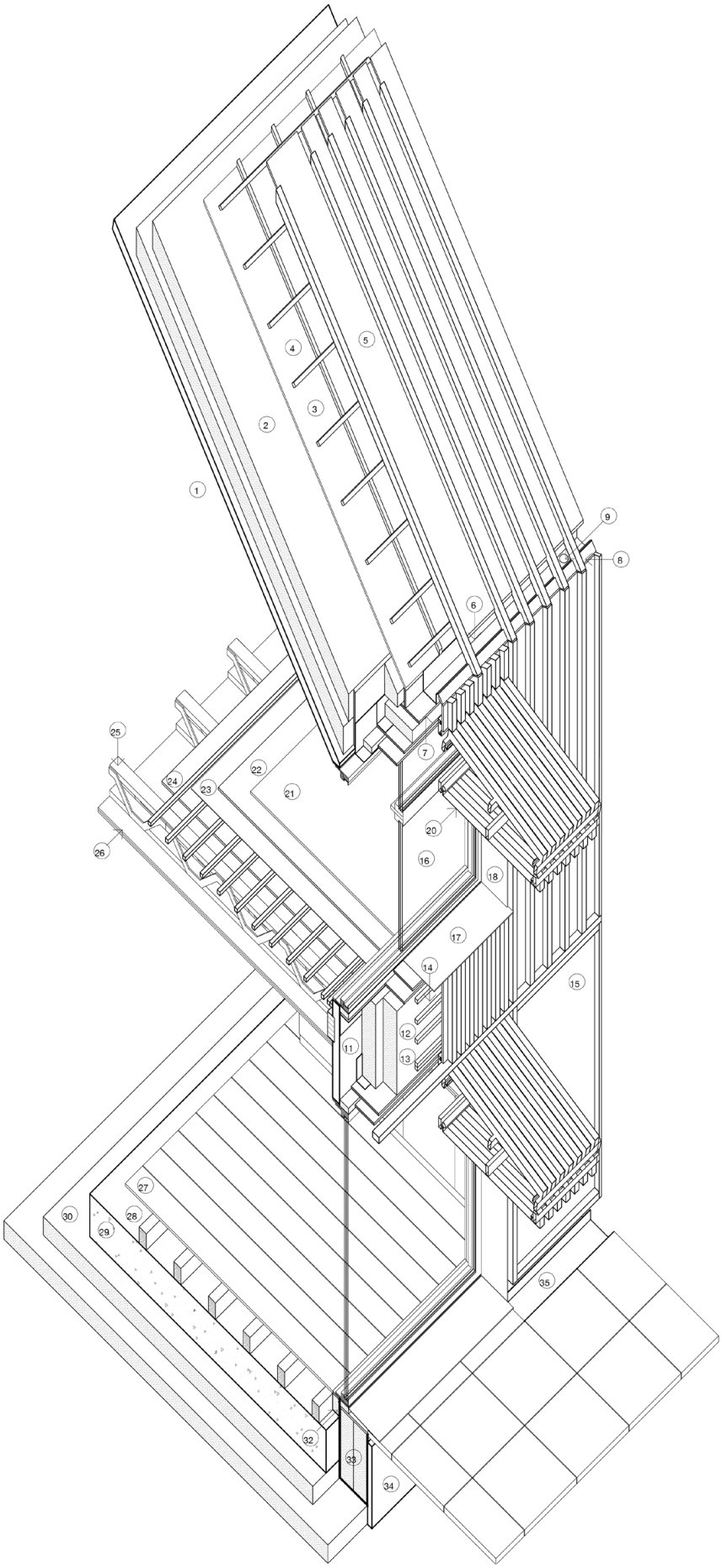
16. Triple glazed low iron timber framed inward opening windows for ease of access and maintenance. Nordan, ideal combi, Valfac or equivalent. Slender frames to allow light through. To Passivhaus accreditation or aspiring for accreditation. Fixed to CLT to manufacturers specification using appropriate brackets with thermal breaks.
17. Folded anodised recycled aluminium window sill with drip
18. Timber head and jamb to match facade cladding material. Fixed to CLT with appropriate thermal padded brackets.
19. Waterproofing lapped over breather membrane
20. Top or side hung manually operated (electric in apartments) folding shutters. Metal framed with timber cladding to match facade detailing. Guide rails to window/ door jambs. Enviroblinds /similar.

First Floor

21. Floor finish as required (natural wool carpet, natural rubber or engineered timber flooring)
22. 18mm tongue and groove backing board
23. 30mm floor battons over 6mm acoustic layer
24. 18mm tongue and groove backing board
25. Open-web joists to manufactuers details
26. x2 layers of plasterboard with skim finish

Ground Floor & Threshold

27. Engineered timber flooring
28. Joists on packers to make up level difference
29. 250mm - 300mm in-situ concrete slab
30. Waterproof membrance over 300mm insulation
31. 150mm fine,150mm coarse gravel as required
32. Treated solid timber CLT sole plate and CLT tie down strap face fixed to concrete foundation raft
33. Non-compressible threshold insulation with waterproof membrane lapped over foundation membrane.
34. Backing concrete slab
35. Slot drain at door thresholds to prevent flooding, encapsulated gravel tray elsewhere.



Above: Detail Axonometric illustrating key elements

The Positive+Collective

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hello@positivecollective.co.uk

A summary brochure illustrating The Positive Collective's design approach to tackle the most urgent issues of today.

Founding Members:

changebuilding
humblebee
perpendicular

Supporting Partners:

Centre for Offsite Construction + Innovative Structures
ARUP
DESIGNFIRE CONSULTANTS
ECOSYSTEMS TECHNOLOGIES LTD
GrowUp FARMS
GT EXTERIOR ARCHITECTURE
Edinburgh Napier UNIVERSITY