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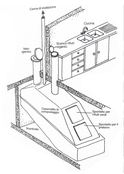

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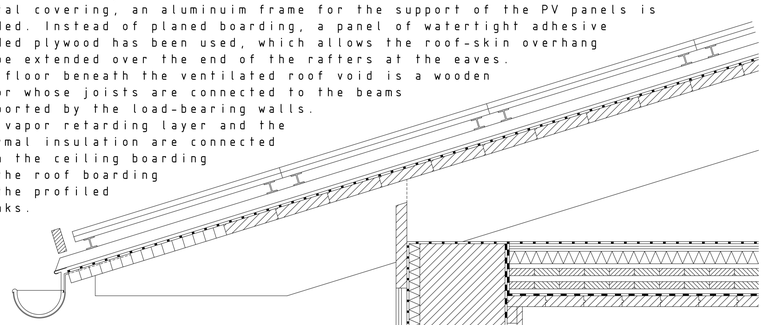
A photo of a prefabricated Modcell® panel wall system in assembly

Wooden roof

A sheet-metal covering joined with locked double-welt standing seams and laid on a separation layer has been chosen for the roof covering. On top of the sheet -metal covering, an aluminuim frame for the support of the PV panels is welded. Instead of planed boarding, a panel of watertight adhesive bonded plywood has been used, which allows the roof-skin overhang to be extended over the end of the rafters at the eaves. The floor beneath the ventilated roof void is a wooden floor whose joists are connected to the beams supported by the load-bearing walls. The vapor retarding layer and the thermal insulation are connected with the ceiling boarding to the roof boarding of the profiled planks.



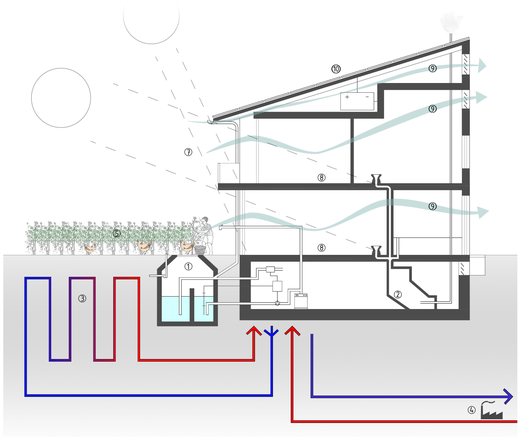


Diagram of house 1's systems 1 - 100

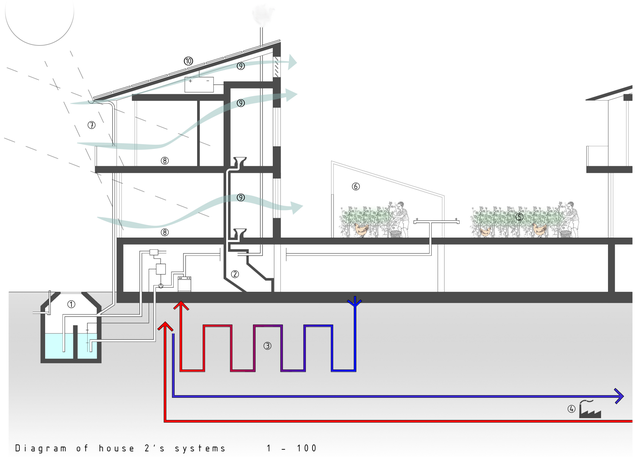


Diagram of house 2's systems 1 - 100

1.Rain water collection system composed of a cistern for rainwater storage, a filter, and a recirculation pipe system for use in house (washing machine, and irrigation of vegetable gardens)

2.A "Clivus Mulstrum" integrated organic waste and toilet composting system

3.Ground-source water heatpump system, which also functions as a cooling system in summer

4.Connection of the house's water piping to the community's central cogeneration plant for heating

5. A bio-intensive polyculture vegetable garden with integrated small livestock

6. North facing greenhouse

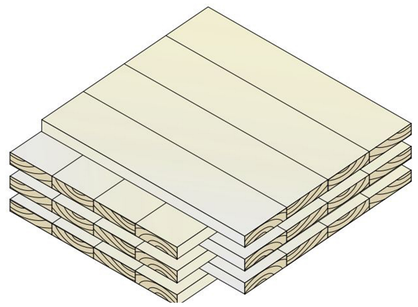
7. The house's facades are designed to masimise solar exposure in the winter and to minimise exposure during summer taking into consideration the different sun angles at the solstices.

8. The floor of the house that is exposed to the sun during the cold months is finished with a layer of high thermal capacitance materials for passive heating at night time

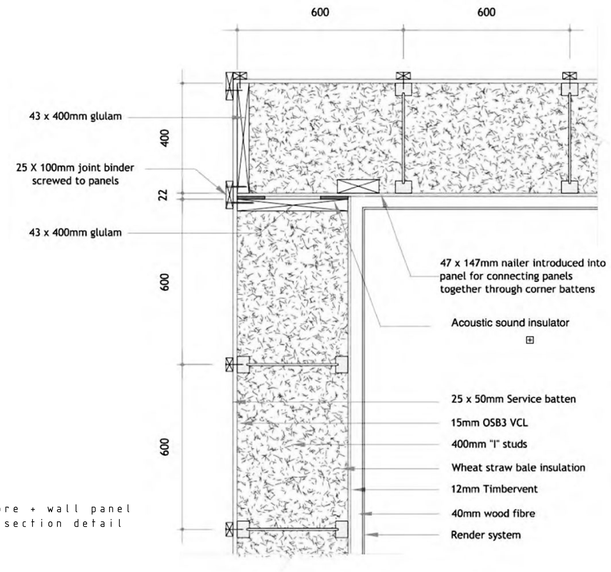
9. The house is designed to maximise flow of air between it's opposite side through the use of two exposures and automatically controlled ventilation openings in order to provide natural vientialtion for cooling

10. A photovoltaic solar roof geenrates electricty stored and used in the house.

Structural diagram 1 - 100

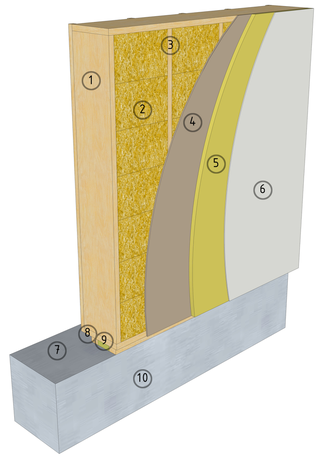


A detail of a CLT panel. The panels are formed by stacking together successive perpendicular adhesive-backed layers of wood.The layered stacks are then pressed in large hydraulic or vacuum presses to form an interlocked panel. The panel is then sized and shaped in some cases with a Computer Numerically Control machine into a fully articulated construction-ready component.



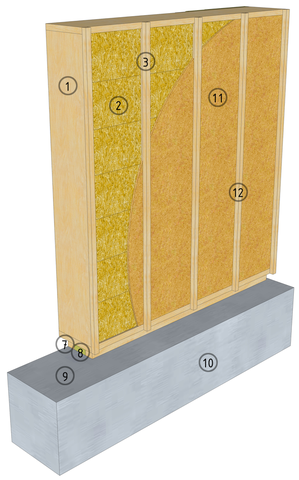
ModCell® Core + wall panel horizontal section detail 1 - 10

ModCell® Core + external view



1. 400mm deep ModCell® timber frame
2. 400mm deep strawbale insulation
3. Internal studs between straw bales
4. 12mm external breather board
5. 40mm wood fibre combined breather board and render carrier
6. 8mm breathable render build up - foundation coat, enforcement mesh, primer and finish coat

ModCell® Core + Internal view



1. 400mm deep ModCell® timber frame
2. 400mm deep strawbale insulation
3. Internal studs between straw bales
7. Two-part timber sole plate
8. Insulation between two part sole plate
9. Damp proof course
10. Foundations
11. 15mm oriented strand board vapor control layer sheathing board
12. Internal battens ready to accept final internal finish

A plinth height of 30 cm from the soil is used in order to protect the wood. A perimeter insulation is applied and is protected by a metal panel on top of which the finish coat of the wall continues in order to give the wall a seamless appearance. A waterproof layer separates the juction between the wall's wooden frame and the concrete plinth.

Prefabricated cross-laminated timber slabs are used for the floor and the roof. CLT wood panel construction enables much faster design and assembly of wooden floors and walls due to the simplicity of construction obtained by the elimination of rafters and wood joists and the components dimensional accuracy garanteed by the pre-fabrication process. Adhesives are not required for the construction of CLT walls and floors adding to the building's sustainability.

Politecnico di Milano - scuola di architettura e società
Architectural planning (progettazione architettonica) master's degree course

Degree dissertation: *Urban-farm eco-communities - A proposal for a new human settlement typology for resolving the global environmental crisis*

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