MM HOUSE

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Categories: Energy and sustainability, Middle Density, OHLAB, Project

Tags: Comfortable environment, Efficiency, Efficiency measures, Energetic Approach, Low budget, Low-energy building, Palma de Mallorca, Passive house standards, Passive ventilation, PASSIVHAUS, Private housing, Project, Rain Water Harvesting, Singular Housing, Spain, Sustainable behaviours, Sustainable construction, Thermal comfort, Thermodynamic practices, Topography, Water recycling

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This house aims for the maximum energy efficiency adapting itself to the program, the solar orientation, the views and the slope of the terrain.

The project optimizes the program by grouping it into four boxes – kitchen, living-dining, main bedroom and guest bedroom – which can be used together or independently. Each box is placed carefully on the ground and rotated on its axis with precision to find the best views and orientation for its use. The bedrooms face the east, the garden and the Bellver Castle; the living and dining rooms face south-east, looking out toward the sea and the garden; the kitchen faces south and toward the vegetable garden; and over the living room, the attic terrace provides a view of the sea. The big window over the living room faces south, allowing the winter sun to warm the main

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space of the house while the eaves of the roof protect it from the summer sun.

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Each box has large openings toward the best orientations and views, and smaller openings on the opposite façade providing cross ventilation and taking advantage of the east-west breezes in the location. The southern openings are recessed to let the sun enter in winter and block it in summer, while the east- and west-side openings have exterior shutters.

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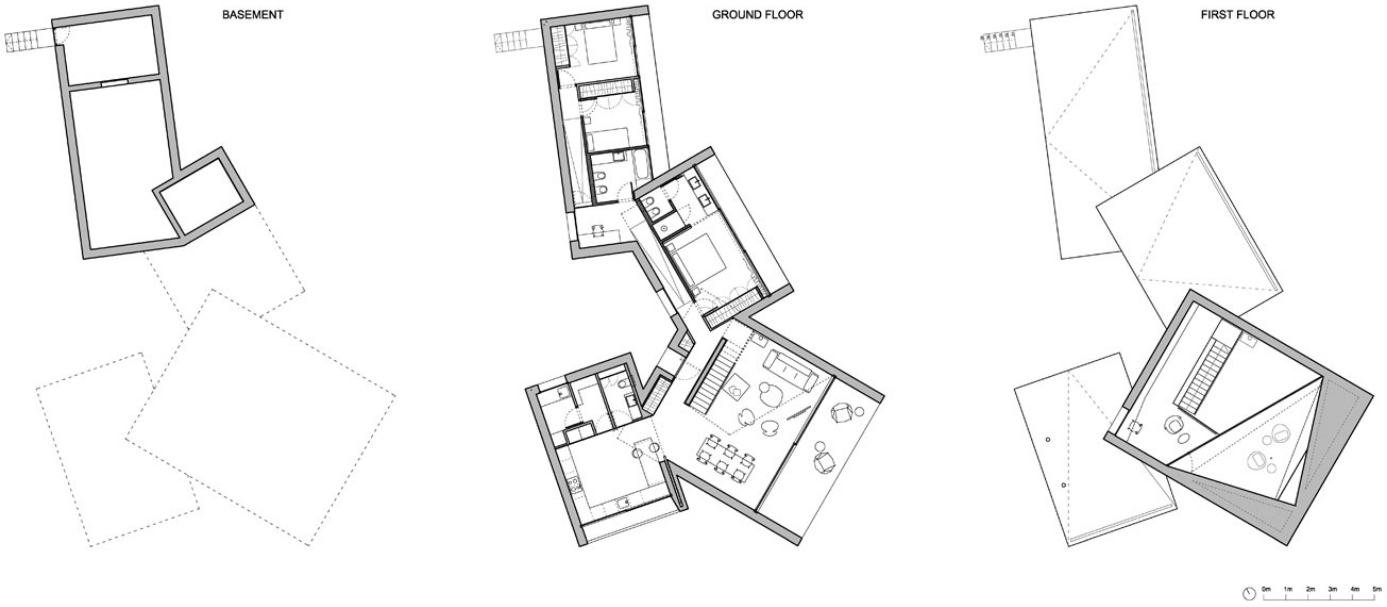

Plans

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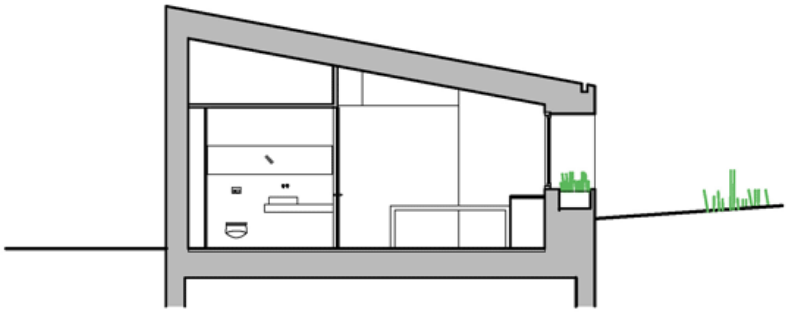
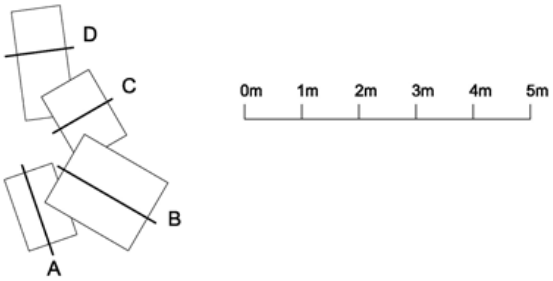


SECTION A



Sections

The house has been designed according to PASSIVHAUS standards to achieve the maximum energy efficiency.

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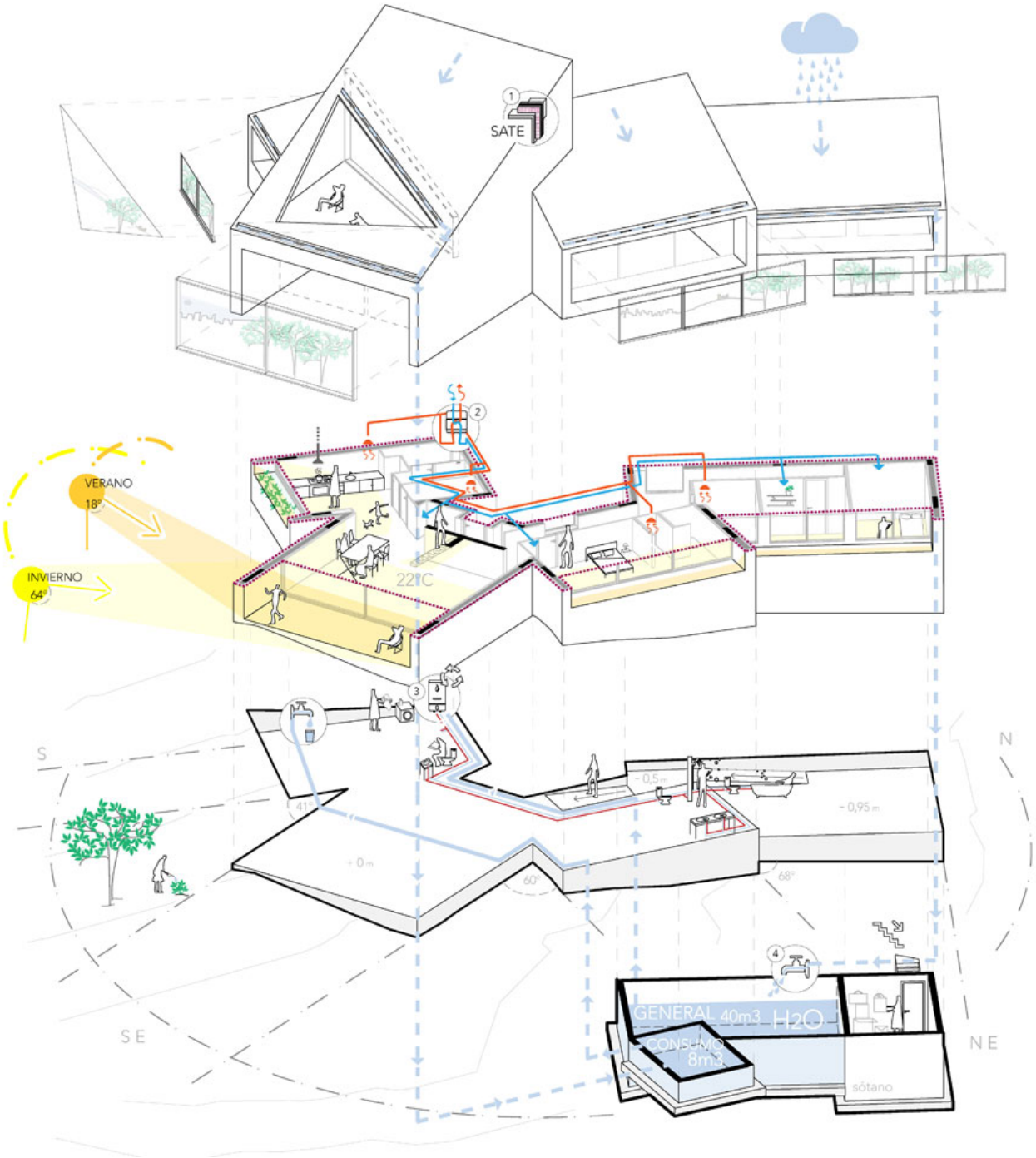

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PASSIVHAUS Diagrams

A rigorous infographic and thermal study was made to ensure optimal heat input, maximizing it in winter and minimizing it in summer.

The façade has an exterior insulation system that increases the insulation thickness up to 15cm, strictly protecting all joints to completely avoid any thermal bridge. The infiltrations through the façade have been reduced to a minimum, and the hermeticism of the enclosure has been maximized to stand up to pressurization tests in every space. The heat exchanger ensures air renovation, wasting no energy, and it is optimized to use the heat generated from shower steam and cooking to transform it into heating.

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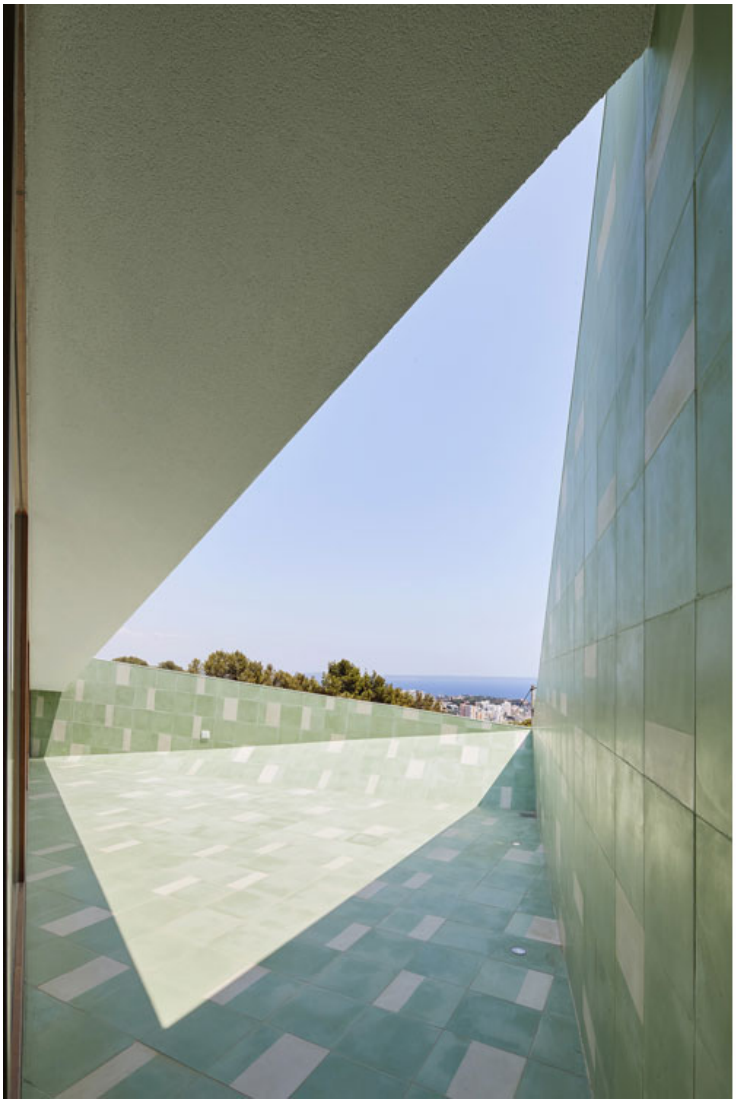

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Thanks to this design, cooling – which is typically an issue in the hot days of Mallorca's summer – is not necessary, and the heating demand is only 11kWh/m2a (a typical house of these characteristics in Mallorca would have a heating demand of 85 to 100 kWh/m2a), which is solved with a small perimeter underfloor heating circuit. The energy to heat the hot water is obtained almost entirely from the solar thermal installation.

The pitched roofs are fitted with a system for collecting rainwater: three of them collect water for irrigation and general use, while the fourth is the clean circuit and collects water for consumption.

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For this purpose two separate tanks, one measuring 40 m3 and the other 8 m3, are arranged to take advantage of the gaps created between the housing and the slope of the terrain. With these measures, the house is completely autonomous in terms of water. The garden includes a vegetable patch, low-maintenance native vegetation and deciduous trees along the southern side of the house to protect from the summer sun.

The project was completed with a low construction budget and a very low cost of energy maintenance. It is a home that promotes the values of environmental conservation and

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sustainability, reporting savings and comfort without incurring additional economic effort.

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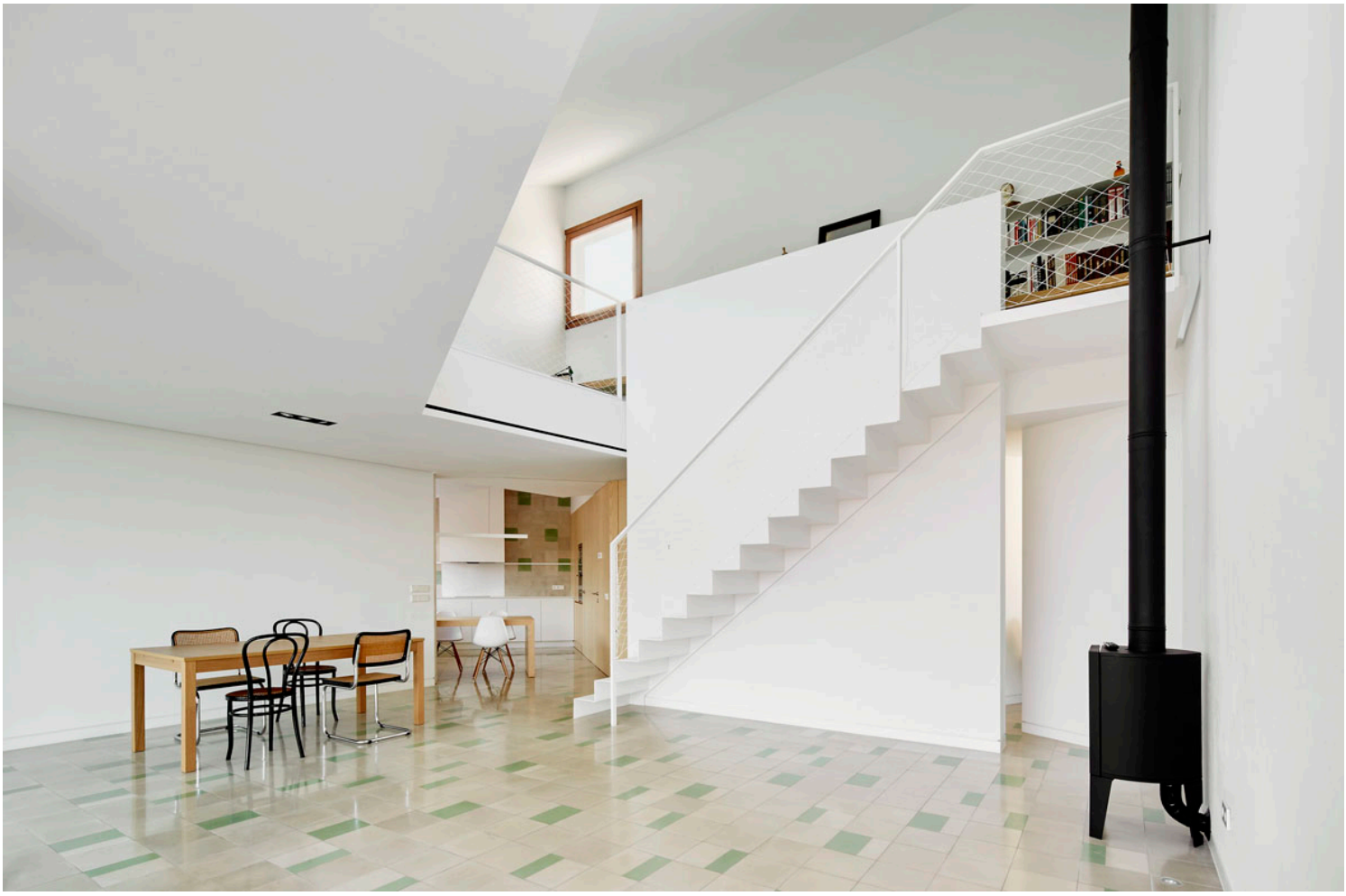

The house was finished last September and monitoring its performance has been key to assessing the results beyond the happiness and satisfaction of the clients. As of April, the clients have not turned on the heat at all, reporting an interior temperature (measured daily – day and night) for the winter between 21°C and 24°C, with exterior temperatures between 5° to 15°.

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First winter living in the house and it had ZERO heating consumption (100% passive) and ZERO water expense (100% rainwater).

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