



Stack Effect House

An Urban Residence as a Field of Research

Project Overview

Located on a compact urban half-plot in Limassol, Cyprus, Stack Effect House explores a contemporary Mediterranean way of living that reconciles openness with privacy and environmental performance. The project is conceived around a clear architectural intention: to dissolve the boundary between interior and exterior through carefully framed views, controlled transparency, and a restrained material palette. Rather than treating the site's constraints as limitations, the design transforms them into opportunities for spatial continuity, daylight penetration, and climatic responsiveness.



Project Overview

The architectural composition is articulated through two clearly defined volumes. The ground floor forms a solid concrete base, accommodating the communal functions as a continuous living space that extends seamlessly towards the courtyard through a fully glazed façade. Above, the private spaces are enclosed within a white frame screened by vertical timber fins that regulate sunlight, privacy, and visual depth. The architectural language remains deliberately restrained, allowing proportion, materiality, light, and shadow to define the identity of the residence, while the central courtyard and its olive tree become the spatial anchor around which everyday life unfolds.



Architecture as Applied Research

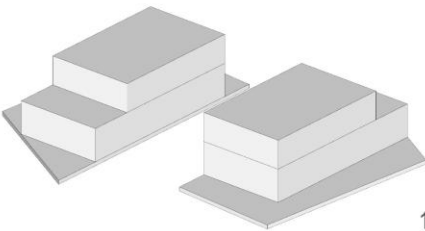
From its inception, the project was conceived as more than a private residence. It became an opportunity to investigate how contemporary housing in dense Mediterranean cities can integrate environmental intelligence into architectural design without compromising spatial quality or aesthetic clarity.

Throughout the design process, the residence evolved into an applied research project, where passive environmental principles, energy simulations, and construction technologies were continuously tested against architectural intentions. Rather than adding sustainable technologies as independent systems, environmental performance became an integral generator of form, organization, and spatial experience.

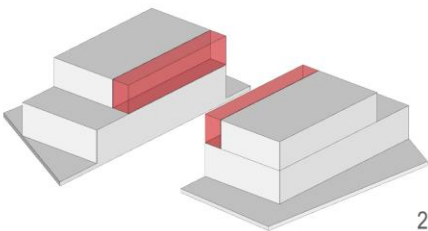




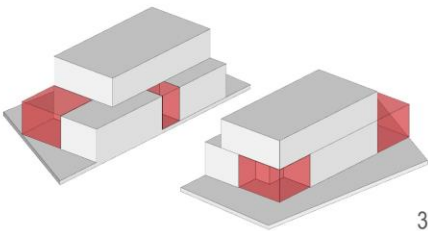
Spatial Composition



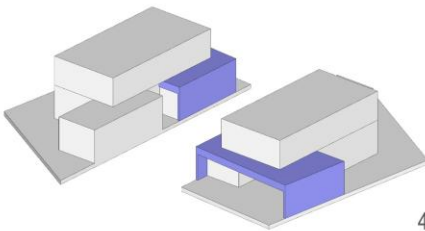
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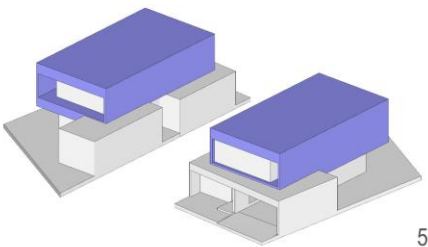
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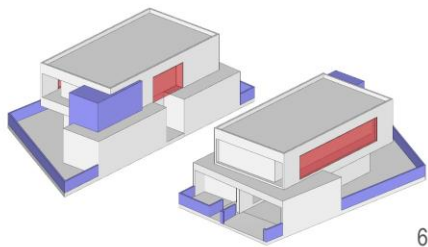
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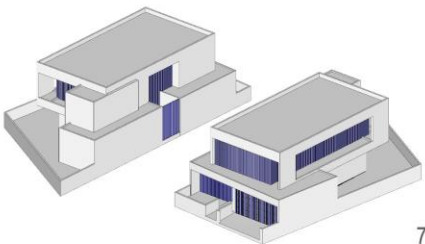
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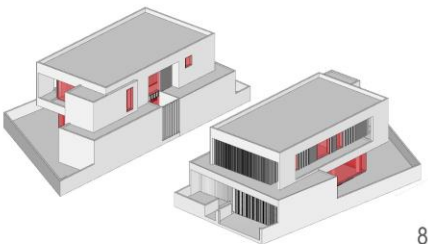
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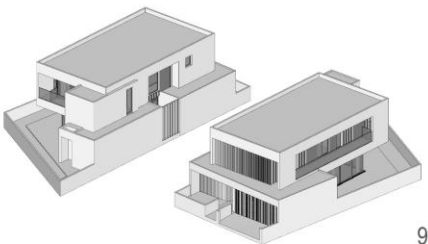
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Interior Design & Materiality

The interior extends the architectural principles established by the exterior. A restrained palette of exposed concrete, natural timber, white surfaces, and large glazed openings creates calm and luminous living spaces where material authenticity becomes the primary aesthetic expression. Carefully controlled natural light reinforces the continuity between indoor and outdoor environments, while the simplicity of the material composition allows everyday life to remain the central focus of the spatial experience.



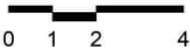
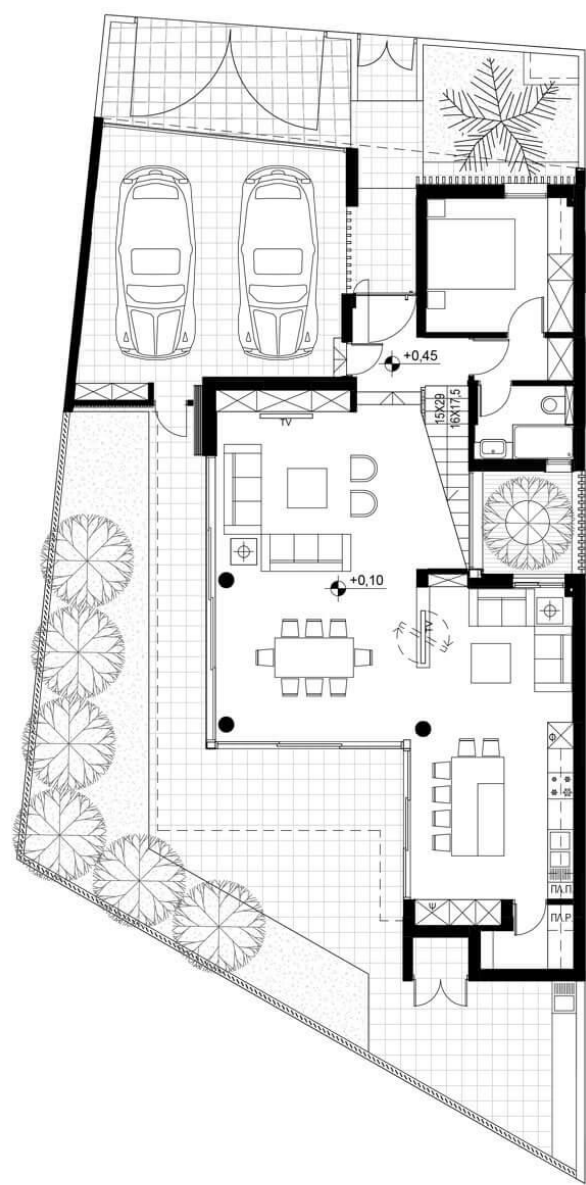






Floorplans

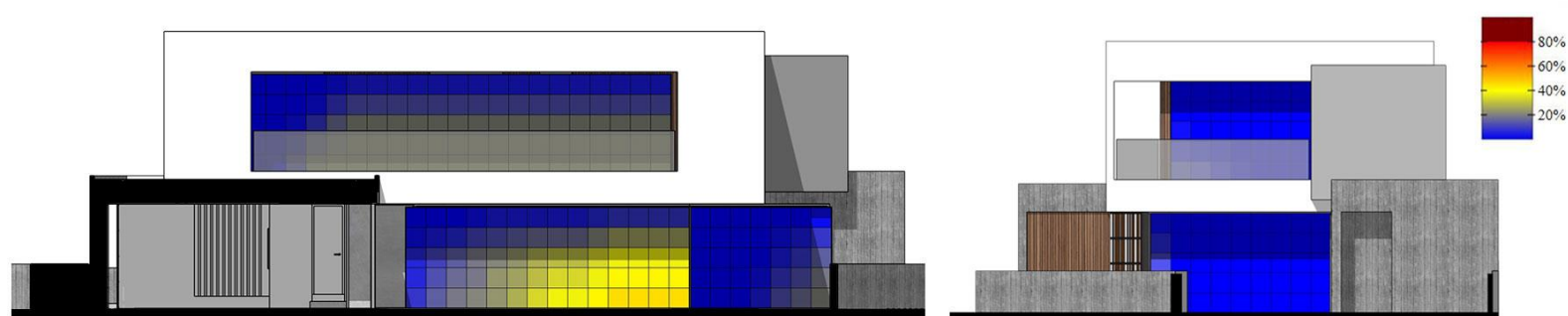
The ground floor and the 1st floor



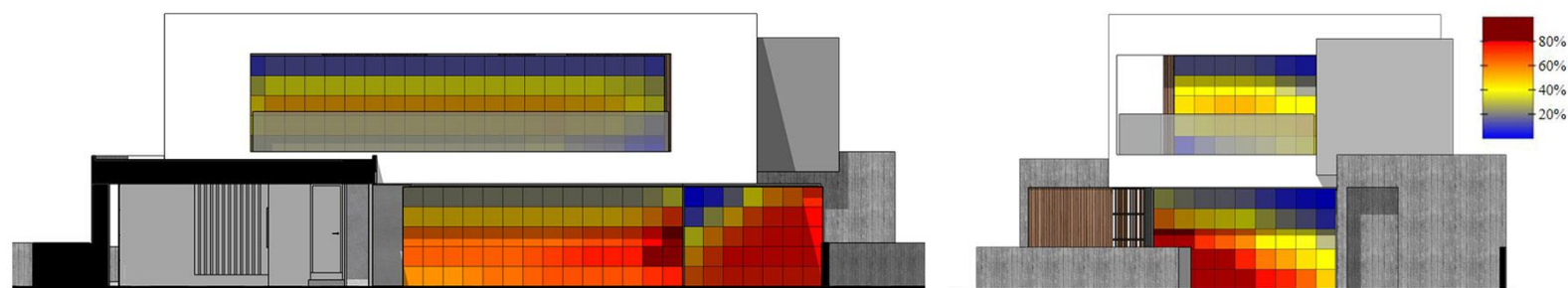
Architectural Bioclimatic Strategy

The environmental strategy of the residence is embedded within the architectural concept itself. Orientation, massing, spatial organization, shading devices, and the positioning of openings were developed as interconnected design parameters rather than independent technical solutions. At the center of the house, a courtyard organized around an olive tree becomes both the environmental and emotional heart of the residence. The communal spaces unfold around this planted void, allowing daylight, vegetation, and seasonal change to become part of everyday domestic life while promoting natural cross-ventilation and passive cooling.

The courtyard is not conceived as an isolated outdoor space, but as an extension of the interior itself. Continuous glazing dissolves the boundary between inside and outside, while the olive tree becomes a permanent spatial reference around which movement, views, and daily activities are organized. Together with the detached upper volume, this configuration maximizes daylight, winter solar gains, and natural ventilation, establishing a balanced relationship between climate, architecture, and habitation.



Θερινό ηλιοστάσιο / Summer solstice



Χειμερινό ηλιοστάσιο / Winter solstice

Research, Performance & Innovation

At the heart of the project lies the investigation of the stack effect as an architectural rather than purely mechanical strategy. The geometry of the staircase, combined with a motorised roof opening, generates natural buoyancy-driven ventilation that enhances summer cooling and reduces mechanical energy demand. Dynamic energy simulations demonstrated cooling energy savings in the range of 6–10%, validating the integration of research into everyday residential practice.

The project further incorporates high-performance aluminium systems selected through dynamic energy simulations and life-cycle cost analysis, linking technical efficiency with economic viability. As a result, Stack Effect House demonstrates how architectural design, academic research, and industrial innovation can converge within a single residential project.

