



PROJECT INTRODUCTION

PROJECT SUMMARY

Funnel House is a suburban single dwelling unit, which purpose is to make a change in the existing traditional rural houses in the Amazon Region of Ecuador (Napo province), mainly on the sustainable and environmentally friendly perspective.

The project is structured through a module that could be repeated, allowing the house to increase its sizing over time. Its shape allows to catch the predominant winds for natural ventilation and the roof is designed to decrease solar incidence, improving the hygrothermal comfort of the intended occupants in this tropical weather zone, with high temperatures, heavy rains and high relative humidity. Funnel House is a cozy, comfortable, sustainable space, in harmony with the pre-existing biodiversity, which improves the sense of well-being of those who live in it.



FIGURE 1 EXTERIOR RENDERING

DESIGN STRATEGIES

The design process involved the selection of a site planned to increase urbanization to enhance replicability; modern and expressive aesthetics to improve customers' appeal; market potential definition based on the target user; form and orientation analysis adapted to local climate conditions, and passive design strategies. Once the desired design was obtained -one that approaches comfort the most- strategies were established using active systems and equipments that enables the effective decreasing of the relative humidity levels for the indoor environment.

PROJECT DATA

- Country: Ecuador. Province: Napo. Canton: Tena. Rural Parish: Pano.
- Geographical Coordinates: 77°50 8.16"W; S1°00 41.76"S. Altitude: 660 meters above sea level.
- Climate Region: tropical rainforest climate (Köppen climate classification).
- House: 157 square meters (m²) (1689,93 square feet / ft²). Site: 1000 m² (10763.9 ft²).
- 2 bedrooms, 1 complete bathroom, living room, dining room, kitchen, front porch/hall and terrace.
- Goal budget: \$62.800,00.
- HERS: House energy rating 54.
- UIE: Use Intensity Energy = 1139 BTU/ (PIE²) – 3,59 Kwh/(m²).

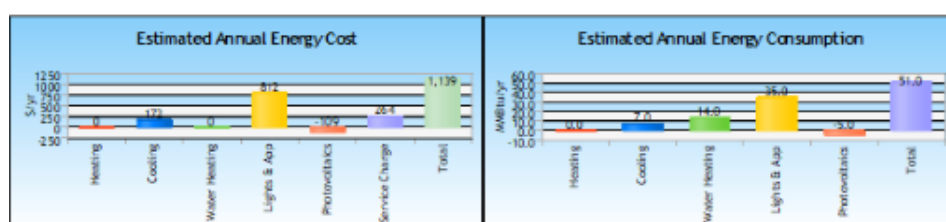


FIGURE 2 ESTIMATED ANUAL ENERGY COST-CONSUMPTION

TECHNICAL SPECIFICATIONS

- **Foundation Insulation:** Hydraulic Water-Stop Cement made foundation.
- **Walls Insulation:** The wall system consists of a 100mm (3.93inch) Angustifolia bamboo frame, 50mm (1.96inch) Palm Fiber for thermal control, Ecufoam S-1501, Polyurethane foam, 40mm (1.57inch) for humidity control, OSB 1.22x2.44x0.03m (4.00x8.00x0.09ft) panel for sound control and exterior base, one outer layer of Professional Stucco white, 10mm (0.39inch).
- **Floor System:** The Floor System consists of a 75mm (2.95inch) bamboo frame, an OSB panel for thermal and acoustic control, 40mm (1.57inch) Palm Fiber for thermal control and an Ecufoam S-1501-Polyurethane layer. Foam Spray System, 35mm (1.37inch), and a Bamboo Board Natural finish, 96x9.6x1.5mm (3.77x0.37x0.05inch).
- **Roof Insulation:** The Roof System is comprised of a 0.10m (3.28ft) sandwich panel, consisting of two layers of galvanized steel, pre-painted white, 5mm (0.19inch), and expanded polyurethane padding 37kgm³ 0.10m (0.32ft), of low thermal conductivity U = 0.18 and acoustic, with an absorption coefficient of 0.22 for 4000HZ, anchored to the bamboo structure with circular bolts of $\varnothing = 10\text{mm}$ (0.19inch).
- **Windows:** The window system consists of a 60mm (2.36inch) White PVC frame, a normal single glass Window, 6mm (0.23inch), an Ecufoam S-1501-Polyurethane foam Spray System sealant, 5mm (0.19inch) and a final coat of Professional Stucco 10mm (0.39inch).
- **Mechanical Ventilation System:** A double mechanical slowing system with heat recovery IDEO2 325 ECOWATT, with a “FREE COOLING” system.
- **Water System:** The Water System is made up of a network of rainwater and gray water collection, which are filtered and stored in a 1500-liter tank, and are reused in toilets and garden watering. Drinking water is stored in a 2500-liter tank, and brings drinking water to the entire home. The waste is taken to a septic tank.
- **Renewable systems:** Photovoltaic panels, FV system connected to the public electric grid, 10 technology photovoltaic panels PERC 400W, which dimensions are 102x2008x40 mm and 22, 5 kg for each panel.

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