



## La Capanna



Operazione co-finanziata dall'Unione Europea, Fondo Europeo di Sviluppo Regionale, dallo Stato Italiano, dalla Confederazione elvetica e dai Cantoni nell'ambito del Programma di Cooperazione Interreg V-A Italia-Svizzera. (Codice progetto 603882)

## Introduction

La Capanna is the new “technological pavilion” annexed to a building constructed in the early 1900s, presumably for the processing of tobacco leaves. The original building is part of a building complex that includes the factory and the villa with 18th-century chapel, typical of the farms that characterise north-eastern Tuscany and in particular the Lucca area. La Capanna was annexed as part of a conservative restoration project, offering technological solutions that responded to the building’s energy requirements. Photovoltaic modules were integrated into the roof, together with hybrid modules that combine photovoltaic technology and thermal solar technology.

## Design approach

The conservative restoration project set in motion was aimed at restoring the building for habitation, in order to rediscover the potential of a forgotten area and creating the conditions for other restoration works and the reactivation of agricultural activities in the area. The entire area, part of the Developed Areas of Historical and Architectural Interest in the municipality of Capannori, is subject to environmental restrictions and authorisation pursuant to Italian Legislative Decree no. 42/2004 - Code of Cultural Heritage and Landscape. The structure of the technological pavilion is built over the basement floor of a pre-existing secondary agricultural building constructed more recently than the main villa.

## Aesthetic integration

The project for the BIPV system focused on two criteria for integration:

- aesthetic integration with the new building, in terms of coplanarity with the panels, the complete coverage of the surfaces, the type of panel chosen, the choice of monochromatic cells, as well as in the study of construction details concerning the joining of the modules and the roofing material, and the rainwater drainage system.
- integration with the landscape, in terms of the chosen form of the building, which respects the typical architecture in the area, in the chosen colours and the reflectivity of the panels in contrast with the surrounding landscape.

## Energy integration

The BIPV system is combined with a heat pump system coupled with hybrid modules that provide hot water.

## Technology integration

The BIPV system is composed of 20 modules (Eclips SOL250P), combined with 4 hybrid modules (Eclips TWINSUN SOL250P). All of the modules are connected in two strings (one with 12 FV and one with 8 FV + 4 hybrids) and connected to a three-phase 6 kW inverter (Fronius SYMO 603M). The roof surface involved is bordered by perforated sheet metal that provides ventilation for the modules and serves to collect rainwater.

## Decision making

The technological pavilion was designed from the outset to integrate solar technology. The choice of photovoltaic and hybrid modules was a result of collaboration with the company TechnoService Srl.

## PROJECT DATA

<b>Project type</b>	Extension
<b>Building use</b>	Residential
<b>Heritage constraint</b>	Listed building
<b>Building construction technique</b>	Pre-industrial
<b>Building address</b>	Via dei Lazzaroni 20, Capannori (LU), Italy

## BIPV systems

### BIPV SYSTEM DATA

<b>Architectural system</b>	Opaque roof
<b>Integration year</b>	2017
<b>Active material</b>	Polycrystalline silicon
<b>Module transparency</b>	Opaque
<b>Module technology</b>	Glass layers, recognizable PV, standard modules
<b>System power [kWp]</b>	5
<b>System area [m<sup>2</sup>]</b>	32.8
<b>Module dimensions [mm]</b>	1,655 x 990 x 45
<b>Modules orientation</b>	East, West
<b>Modules tilt [°]</b>	17

### BIPV SYSTEM COSTS

## Stakeholders

### Main building designer

Angela Chiantelli

### BIPV components producer

Eclipse Italia Srl  
C.so Venezia 3, Milano (MI), Italy  
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<https://www.eclipseitalia.com/?lang=en>

### Collaborators

Stefano Finelli, Francesco Ferretti

### Consultants

Jacopo Baldini, Raffaele Massoni

### Works supervisor

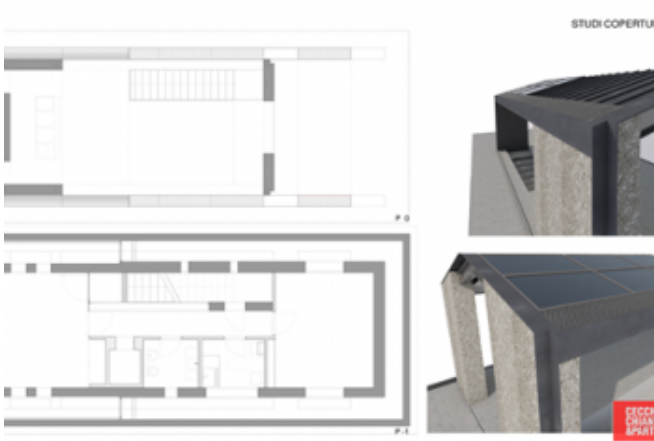
Elvio Cecchini



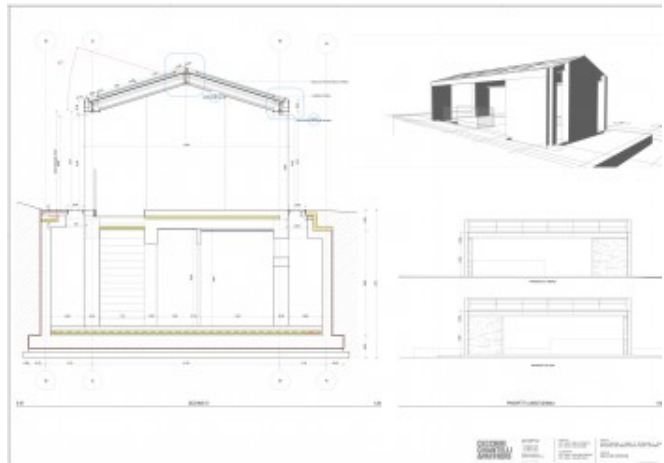
Technological pavilion with a BIPV roof annexed to the original twentieth-century building © Francesco Ferretti



Relationship between the technological pavilion and the original main building © Beatrice Speranza



Study of the BIPV roof © Cecchini Chiantelli & partners



Technical design for the technological pavilion © Cecchini Chiantelli & partners

Case study author:

Eurac Research