

Category : Public Building Green Construction

Case study : Parc Eco-habitat



Project cofinanced by



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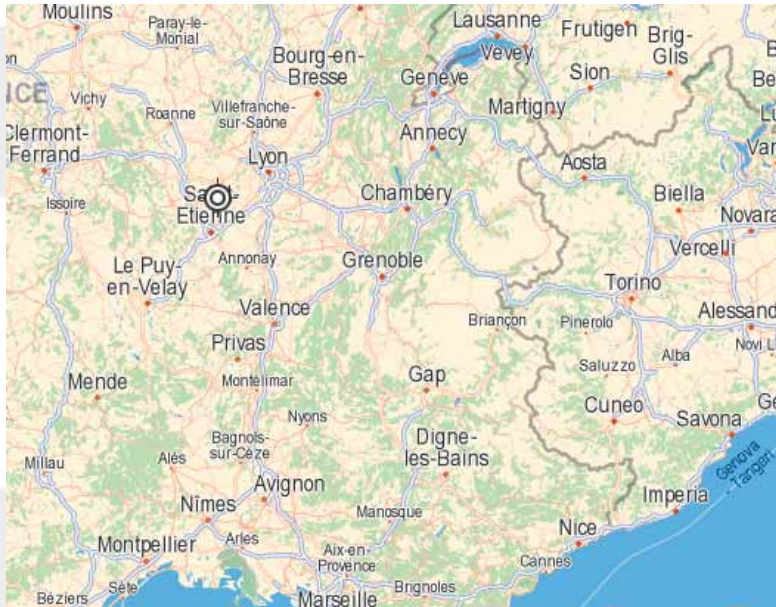


Provincia di
savona



Sustainable
Construction
in Rural and Fragile Areas
for Energy efficiency

●●● Project location



The project is located west from Lyon, approximately 40 km from the city center. Saint Symphorien sur Coise is a 3000 inhabitants town spreading over 4km². The site itself is situated 500m north of town.

The climate is continental with below zero temperatures in winter and high temperatures in the summer months ($\approx 25^{\circ}C$).

The average rainfall precipitation ranges around 825mm/yr with peaks in May and during the fall months.

The major winds have North and South orientations (cold and dry from the North, hot and humid from the South).

The climate is inclined to a wide range of natural events, ranging from frost to snow to thunderstorms to fog and haze.



●●● Project goals



The Parc Eco Habitat is the product of a collaboration between « la Maison Familiale Rurale du Val de Coise » and « la Communauté de Communes les Hauts du Lyonnais ». This project takes shape precisely at a time where the construction industry needs a new breath. The project's goals will be to promote and support new and environmentally friendly construction technologies

The Parc Eco Habitat will consist of:

- Awareness center: Promotion, outreach and vulgarization pertaining to energy efficiency in buildings
- Resources Center for Technical Documentation: raises public awareness; delivers customized and specific consulting services for homeowners and local communities regarding their rehabilitation and construction projects; provides publicly open work spaces for non-profit organizations and institutions involved in the green building industry.
- A show room with exhibitions of techniques, products, tools and materials open to the public
- The Business Home: office spaces available to construction related industries

●●● **Environnemental goals**



The Parc Eco Habitat's goals are to:

- Provide information and exhibit techniques and products to a public that ranges from professional builders to homeowners:
- Deliver training on sustainable housing to professional contractors
- Enable networking and develop skills

In this regard, the Parc Eco Habitat will bring together a learning center (la Maison Familiale Rurale du Val de Coise), construction businesses and a resources and information center.

Through this cluster of expertise, les Monts du Lyonnais will become the **center of excellence** for green housing.

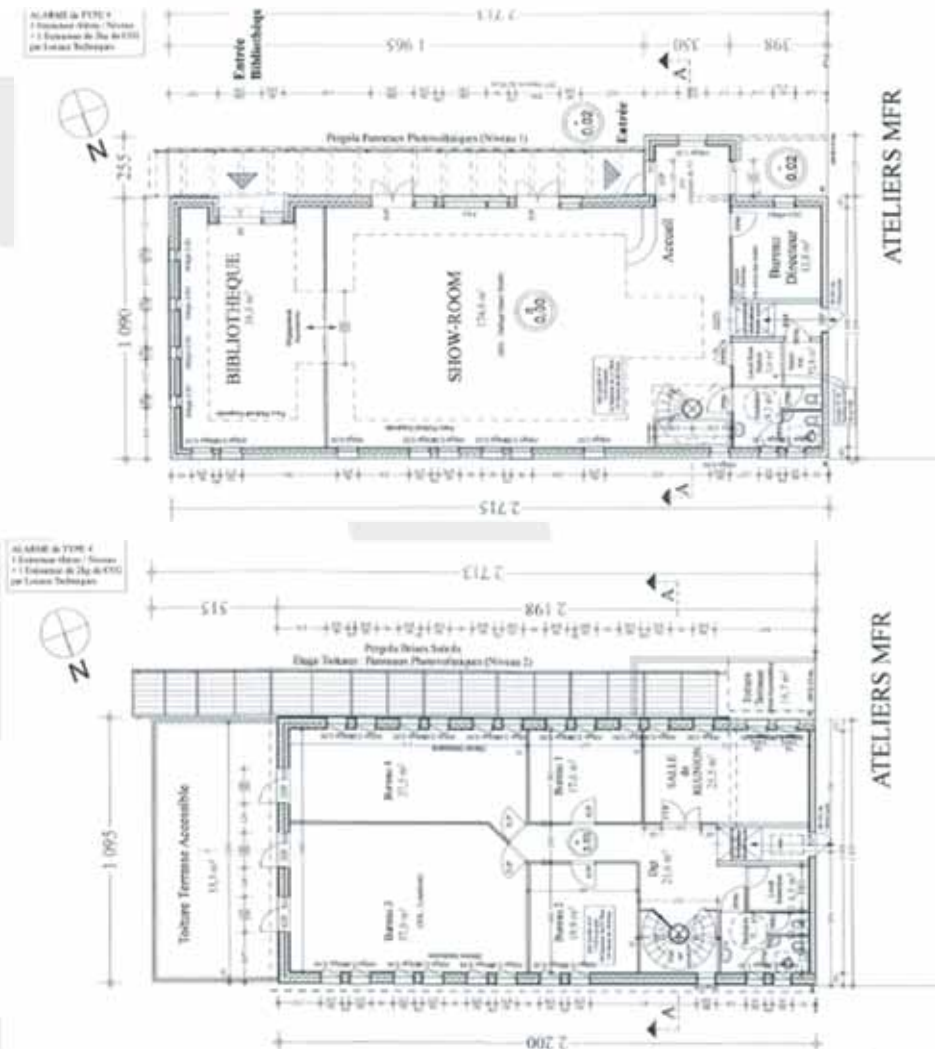
For this purpose, an advanced environmental strategy was developed to guarantee:

- Energy efficiency
- Visual comfort
- Thermal comfort
- Occupants health and indoor environmental quality
- Green construction site

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●●● Project Details



The project consists of an exhibition room on the ground floor and of office and meeting spaces on the second floor, spreading over 534m² (net gross floor area) or 448m² of gross leasable area.

The building is not cooled down and the interior insulation is reinforced (laureate of regional invitation to tender)

Estimated typical loads consumption: 39,9 kWh_{pe}/m².an (kWh of primary energy and m² of net gross floor area)

The energy performance of the project is:

Air infiltration: n50 = 0,6 vol/h,

Heating Consumption= 32 kWh_{pe}/m².an,

Typical loads consumptions (HVAC, lighting, and auxiliary loads) = 40 kWh_{pe}/m².an,

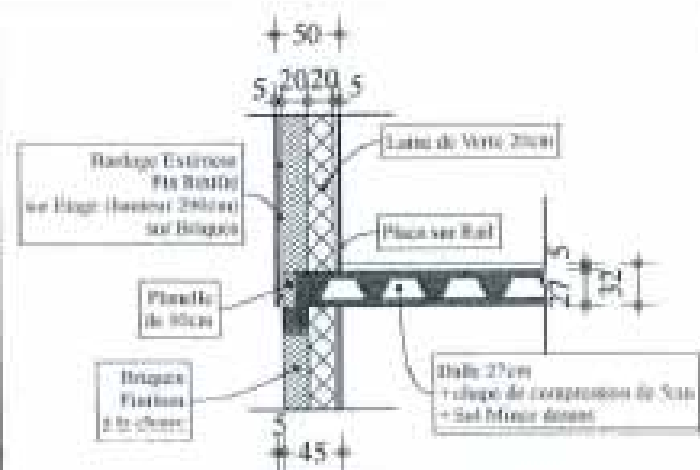
Photovoltaic production= 27 kWh_{pe}/m².an

A bioclimatic approach was taken in order to reduce the “glazed area to floor area” ratio to 18%.

50 % of the bay-windows face south.

The performance of the building envelope has been optimized to reach a U-value (U_{bat}) of 0,41 W/m².K

●●● Project Details



Structure

Concrete slab-on-grade on a 13cm pebble layer
 Concrete intermediary slab (20cm)
 Clay brick walls, 20cm wide
 Wood frame roof

Insulation

Exterior walls : $U=0,15$ ($W/m^2.K$), due to a 20 cm layer of glass wool,
 Adjoining walls: $U=0,36$, due to a 12 cm layer of glass wool,
 Floors : $U=0,24$, due to a 10 cm layer of polyurethane,
 Flat roof : $U=0,15$, due to a 14 cm layer of polyurethane,
 Attic: $U=0,11$, due to a 40 cm layer of glass wool,
 Tilted roofs: $U=0,18$, due to a 25 cm layer of glass wool,
 Prevention of thermal bridging by using thermal breakers at slab boundaries
 Windows: $U=1,4$, double glazing, wood/aluminum frame

Shading: exterior roller shutters on East/West sides, Fixed shading fins on South side and interior stores on North side

Interior insulation was chosen in order to prevent any deterioration that might occur with exterior insulation. In order to compensate the lack of thermal mass and to preserve a proper summer thermal comfort, quartz reinforced concrete was used for the floor slab.

●●● Project Details



Heating

A wood furnace will be used for the heating of the rural home and of the Parc Eco-habitat. The furnace has a 320 kW capacity.

The distribution system consists of hydronic radiators in each room

Hot water

Hot water consumption is very low in this type of buildings and can be neglected. It consists of sink usages for staff hand washing and space cleaning.

Ventilation

Heater Recovery ventilation with 75% efficient exchanger

Lighting

Corridor spaces use natural lighting and are equipped with efficient lighting fixtures as well as presence and twilight sensors.

Office spaces are equipped with 2 lighting circuits: one near windows and one in back end of rooms

Exterior lighting is also connected to as presence and twilight sensors.



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●●● Project details



Renewable Energies

40 m² polycrystalline panels are installed on the roof, capable of generating 5000kWhref with a 142 kW rated power per square meter of panel.

Raising awareness amongst users, tenants and owners

The townships cluster being both the owner and tenant/user, there was no need for a « hand-over » plan.

However, a tenant guidelines document was written for businesses that intend to move onto the site. The goal of this document is to entitle these businesses to meet the environmentally responsible values of the site and to encourage the implantation of green construction and energy efficiency related entities.



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Operation and Maintenance

The townships cluster is responsible for the maintenance and consumption monitoring of the building. A display screen enables the user to witness the energy savings generated by the solar photovoltaic (PV) system.

Sub-meters are monitoring heating, electricity and water consumptions as well as the amount of electricity generated by the PV system.

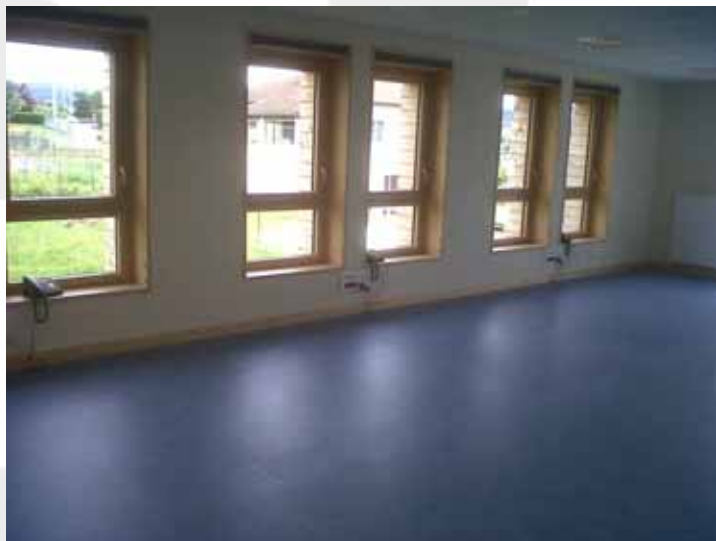
After going through one heating season, the building demonstrates promising comfort levels. Even during the coldest periods of time, passive solar gains allow for proper working conditions.

Because of improperly connected meters, consumption monitoring was not possible during this period of time.

Once more clement temperatures arise during spring time, natural ventilation enables optimal temperature and humidity conditions without air conditioning.

Because the 2nd floor is currently unoccupied, it was not possible to compare real and estimated consumptions.

●●● Project financing



The construction costs represent 1 028 600€ or 1 758 000€ ATI and comprise the following :

The impact of energy efficiency measures is estimated to be:

- Building insulation : 25 696 € excl. tax,
- Air sealing : 10 335 € excl. tax,
- Solar shading devices : 27 606 € excl. tax,
- Photovoltaic system : 46 645 € excl. tax,
- Wood furnace : 77 850 € excl. tax,

This project was financed thanks to :

Département du Rhône : 348 870 €,

FNADT : 160 000 €,

Federal Government : 27 500 €,

Regional invitation to tender PREBAT : 13 750 €,

Complement ADEME PREBAT : 29 975 €.

=> Subventions represent 56 % of the project total costs

The rest of the financing was provided by the townships cluster "Les communes des Hauts du Lyonnais ":

Cash: 66 148 € ATI ,

Lease : 223 108 € ATI ,

FC : 159 248 € ATI .

●●● Project transferability

Example by leadership is one of the key objectives of this building design: it points out simple, robust and cost-effective solutions and illustrates that a very efficient and comfortable building can be reproducible and affordable.

Providing leasable office space to local businesses on the first floor enables the project to meet the requirements of the rural excellence service that imposes a balance between public and private activities. Leasing space is today's main priority of the townships cluster.

Specific training on air sealing was provided to contractors before the first stages of construction. The training led to a different building method: the brick + coating was replaced by a B13 type lining behind a 6cm gap.

This approach to air sealing issues enabled productive exchanges between the contractors, the construction manager and the owner. The plaster contractor particularly benefited from this experience to become a local specialist on air infiltration.

Developed with the help of incentives and subventions, this project will position itself to PROLONGER the training goals of the rural home center and will particularly focus on social, environmental and economic aspects.

Numerous exhibitions offered within the Parc largely contributed to educate local businesses and the public. This will enable the townships cluster to compensate this project ecological footprint thanks to the development of more environmentally friendly projects in this region.

Project cofinanced by



European Regional Development Fund



Lead Partner

- Province of Savona (ITALY)



Project Partner

- Region of South Aegean (GREECE)
 - Reas S.A. (GREECE)
- Local Energy Agency Pomurje (SLOVENE)
 - LEA Pomurje - Lokalna Energija Pomurja
- Agência Regional de Energia do Centro e Baixo - Alientejo (PORTUGAL)
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