Category : Sustainable renovation of public-access building

Case study : Offices of the CRIEPPAM

Project cofinanced by
European Regional Development Fund

Lead Partner
Provincia di Savona

Sustainable Construction in Rural and Fragile Areas for Energy efficiency

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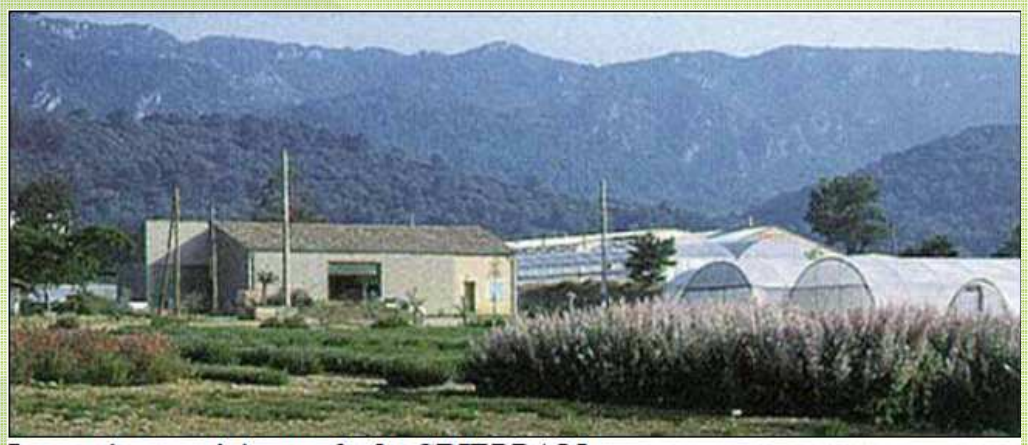
Sustainable Construction in Rural and Fragile Areas for Energy efficiency



La station expérimentale du CRIEPPAM

Project situation

The CRIEPPAM is a research centre for testing fragrant, aromatic and medicinal plants. Since 1998, the CRIEPPAM has had a testing station in Manosque where only 3 technicians were located. Given that the rest of the staff was located 5 km away, this situation did not make day to day management and teamwork very easy.

This project therefore emerged out of the need to pull the entire sector together at the testing station. At the same time, this project was designed as a showcase for producers: that's why the decision was taken to construct a building with a wooden framework insulated with lavender straw (by-products from local agriculture).

This building is therefore designed to:

be a pleasant place in which to work for its employees

fit in perfectly with the existing structure and surroundings

showcase its work for producers

incorporate natural and recyclable materials, providing perfect wall and roof insulation with as much natural light as possible and excellent sound insulation.

Project owner: CRIEPPAM

Project manager: SICA HR Alpes Méditerranée

Partners: The Luberon Nature Reserve as part of its "promoting organic resources" rural excellence centre

The project site:

Department: Alpes de Haute-Provence

Location: Manosque

Altitude: 350m

Climatic zone: H2d

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Superficie en hectares	lavandin	lavande
Alpes de haute Provence	9420	920
Hautes alpes	40	105
Drôme	3915	1245
Vaucluse	2560	1730
Autres (Ardèche, Gard, lot, bouches du Rhône)	1065	-
Total	**17000**	**4000**

Tableau 1- superficie des cultures de lavande et lavandin - source CEPPARM

Project situation

Given that there was already a 250m² hangar on the site, the new construction had to be incorporated harmoniously within the existing plot.

Construction principles:

Wood framework structure

Lavender straw insulation:

To the South: load-bearing wood frame walls with light concrete filled form panels made up of ground lavender straw mixed with air-slaked lime, building plaster and pumice

To the North: wood frame walls and box-sections filled with unsorted ground lavender straw at the factory

Lavender straw:

Lavender and lavandin growing forms an important part of the local economy of the Vaucluse, Alpes de Haute Provence, Drôme and Hautes Alpes departments. Indeed, 94% of France's production of lavender and lavandin is concentrated in these four departments of the South-East of France.

After the lavender harvest, the 21,000 tonnes of straw that are left over have interesting properties that can be used to make excellent heat insulation materials. Rich in silica, lavender straw is naturally resistant to micro-organisms. Even after distillation, it still contains 2 to 3% of essential oil that is an excellent insect repellent.

Today, this straw is considered a form of plant waste that is largely burnt in the open air and is consequently a very interesting by-product that can be recycled to make insulating materials.

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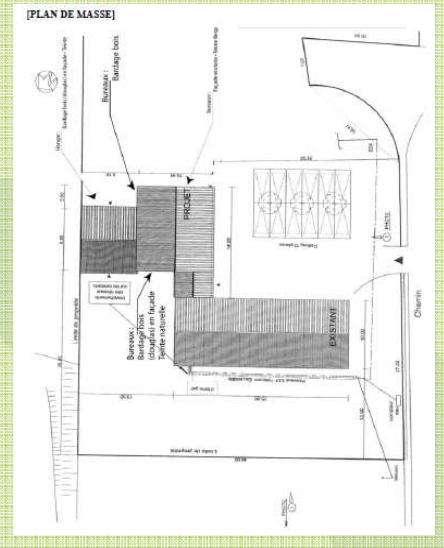

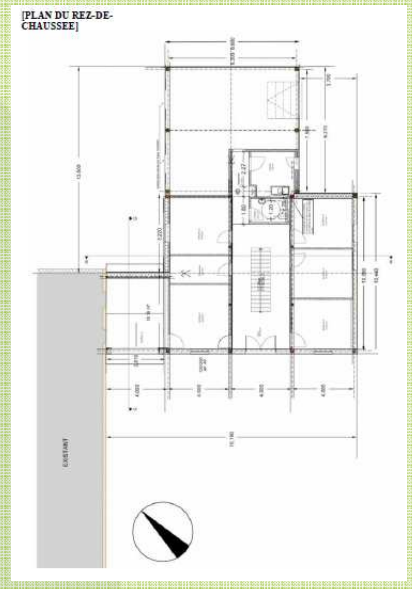

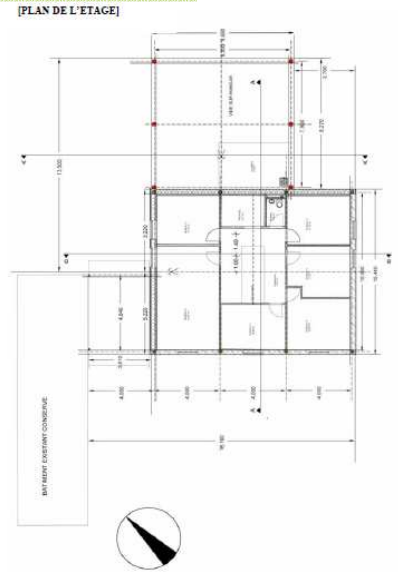

Detailed description

Constitution of the outer shell:
The building is made up of a load-bearing wood framework. The lavender straw is used as an insulating material, either in the form of lightweight concrete or unsorted in the prefabricated box sections depending on whether one wants inertia and insulation (South-facing walls) or simply insulation.
This first point, the importance of which is not in any doubt, shows that, depending on where it is located in the outer shell, a single material or several materials can be combined to provide the required properties (insulation, inertia, comfort in summer...). In the end, it is the sum of the intrinsic qualities of each material employed (or the single material used) that provides the building's overall performance.

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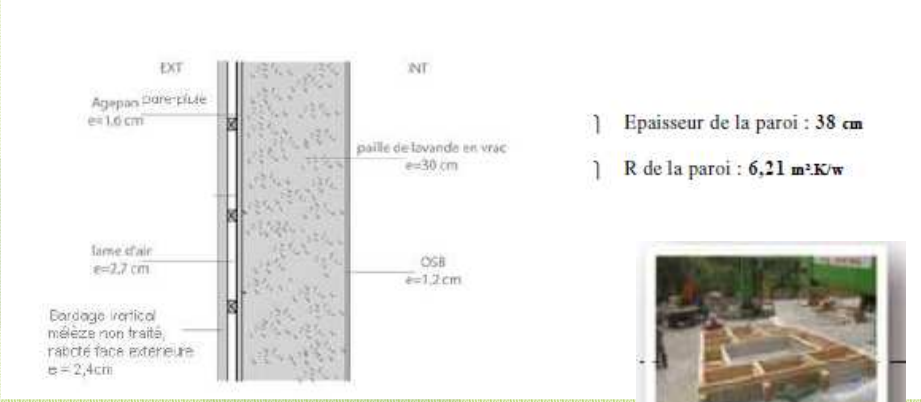

Detailed description

The walled-concrete wall panels:

To the South-East and South-West, the load-bearing wood frame is filled with a 30cm-thick lightweight lavender straw concrete layer. Adhering carefully to specified proportions (65% straw, 20% pumice, 10% lime, 5% building plaster), the straw is mixed with the air-slaked lime, the building plaster, pumice and water to form a paste that is poured and then manually compacted between the form panels. Once it has dried, the walls are rendered on both sides.

The interior partitions:

The interior partitions are made with 7cm-thick bricks, rendered with plaster. Efforts were undertaken to optimise the acoustic properties of the premises (installation of a flexible footing, partitions assembled prior to laying the screed floor...).

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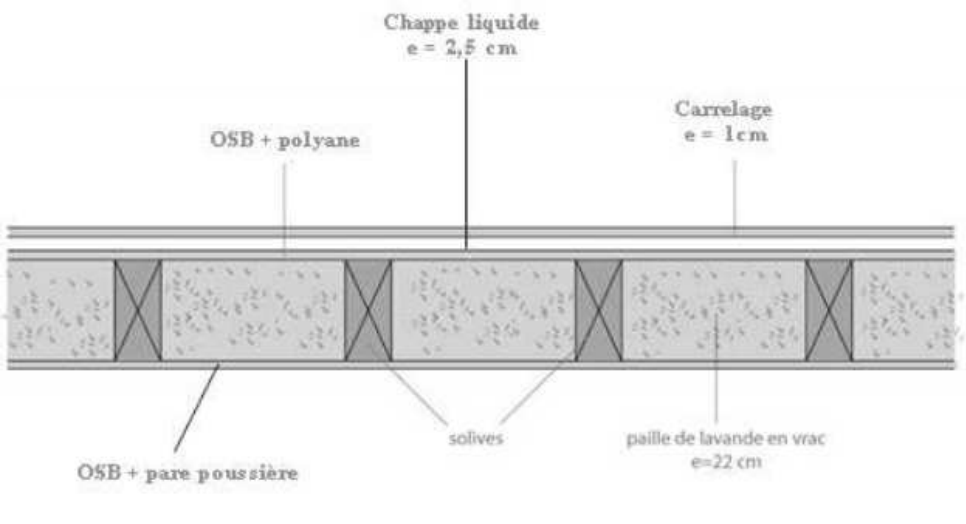

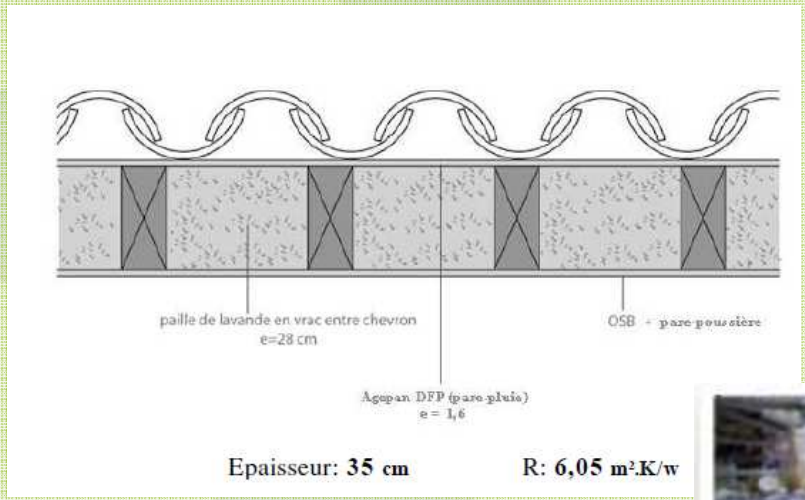

Detailed description

The upper floors:

The upper floors are made of wood laid on joists. Sound insulation is a key concern given that it divides the heated floors. The unsorted lavender straw is therefore used for its acoustic properties in this case. It is poured between the joists forming a 22cm-thick layer. A dust seal is laid on the underside of the floor.

The roof:

The insulation of the roof is also made with unsorted lavender straw, using the same process as that used for the wall panels (manufactured and filled at the factory). Once the framework is installed, the panels are ready to receive the roof covering.

The openings use argon-filled 4/16/4 wooden joinery with reinforced thermal insulation. The glass surfaces represent 40.8m², 80% of which are South-facing.

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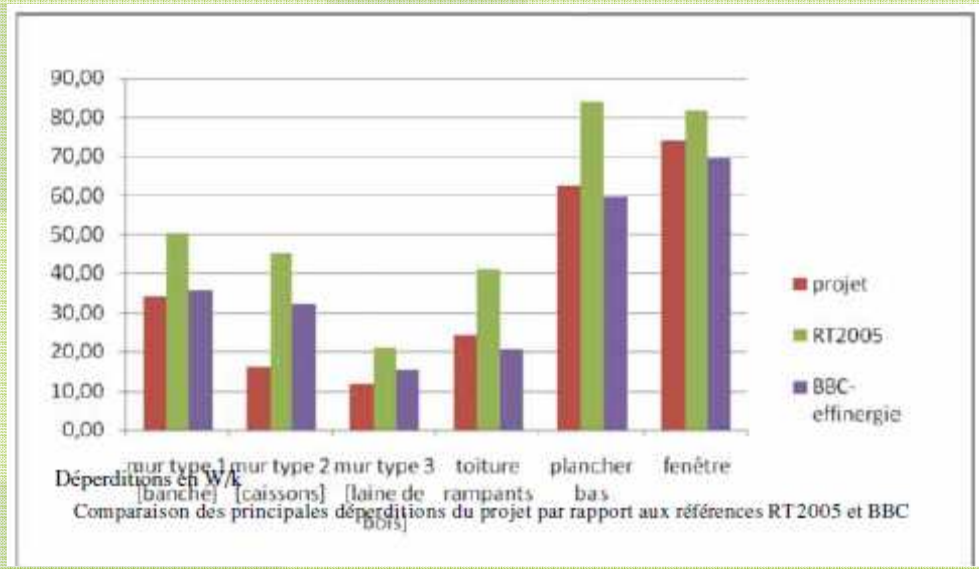
Detailed description

The **heating/cooling installations** are as shown in the table

Special attention has been paid to controlling the thermal bridges and the building's wind tightness.

Type de générateur		PAC eau/eau
Type d'émetteur	*Rez de chaussée*	*Plancher chauffant/rafraichissant*
	étage	*Ventilo-convecteur*
Type de régulation		*Thermostat central d'ambiance dans le hall d'entrée*



Comparaison des principales déperditions du projet par rapport aux références RT 2005 et BBC

Losses:

The result of the dynamic thermal simulation model (Pléiade+Comfie) showed that the heating and cooling requirements will be in the region of 40kwh/m²/year.
After using the building for a period of one year, the cooling was not needed in the end because of the protective measures implemented by the users and the statutory consumption levels (heating + sanitary hot water + non-specific lighting + ventilation) that amount to about 60kwh/m²/year.

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Conclusion / potential transferability

This project shows that it is possible to pass highly innovative technical solutions for buildings that are open to the public without technical advice, as long as the project owner and businesses of the sector are fully committed to these pioneering projects (technical inspection offices, insurers, construction businesses...).
In all the countries of the Mediterranean region where lavender is grown in large quantities, this type of construction can perform very well and have a very small impact on the environment. It is a method that can also use other materials coming from local agriculture or other sources that can be used for construction purposes thanks to local supply.

Project cofinanced by

European Regional Development Fund

Lead Partner

- Province of Savona (ITALY)

Project Partner

- Region of South Aegean (GREECE)
- Read S.A. (GREECE)
- Local Energy Agency Pomurje (SLOVENIE)
- Agência Regional de Energia do Centro e Baixo - Alentejo (PORTUGAL)
- Official Chamber of Commerce, Industry and Shipping of Seville (SPAIN)
- Rhône Chamber of Crafts (FRANCE)
- Development Company of Kefalonia & Ithaki S.A. - Kefalonia (GREECE)
- Chamber of Commerce and Industry Drôme (FRANCE)
- Cyprus Chamber Of Commerce and Industry (CYPRUS)
- Chamber of Commerce & Industry Marseille Provence (FRANCE)

SCORE

Sustainable Construction in Rural and Fragile Areas for Energy efficiency