Category Sustainable construction new building
Case Study Arbois Technical Platform

Project cofinanced by
European Regional Development Fund
Lead Partner
Provincia di savona
Sustainable Construction in Rural and Fragile Areas for Energy efficiency

Preamble

The building is a technical platform of 5132 m² clear surface area, designed to host young innovative companies including offices and laboratories.

This project confirms the environmental vocation of the technology park in a process of sustainable development*. It implements the principles of green building in such a way that the future building will be energy independent.

The project aims to be innovative, replicable and demonstrative. Careful planning has been carried out to respond in an efficient manner to the four themes developed in the Codebaque charter :

- Insertion into the area : for green architecture and sustainable urban planning,
- Materials, resources and construction pollution : limit emissions, maximise recycling,
- Energy, water and work waste : limit requirements, pollutant emissions, promote renewable energy,
- Sustainable comfort and health: maintaining health and improving comfort.

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Key points ...

COMMITTED BIOCLIMATIC DESIGN : compactness and sobriety of the building, north-south orientation, sun protection to enhance the natural light (deflectors). Insulated wooden facades, insulated panels of wood fibre and exterior wood cladding.

ORGANISATION OF BUILDING AROUND TWO COURTYARDS : allowing for increased natural light, they are part of temperature control, closed in winter and open in summer, they provide continuity between the offices and outside and are places of relaxation.

ENERGY SYSTEMS : efficient reversible heat pumps, double flow air processing units with high-performance heat exchanger modulated by CO2 detectors and sensors, a traditional well can limit powers in heating and cooling modes.

SOLAR : rooftop photovoltaic generators on a roofing surface area of 735 m2 with real-time performance display, solar production of hot water for the entire building (550 litres/day) with provision by thermodynamic balloon.

AND IN ADDITION : collection and use of rain water after treatment with phyto-purification, green walls, plants in the courtyards, filter gardens, clean site, monitoring and metering consumption, triple glazing to the north.

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Case Study Arbois Technical Platform

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Profile

Developer	Architect	Thermal Engineers	AMO QEB
SMA Europôle	CDD Architect	GARCIA Ingénierie	AB SUD Ingénierie

Typology	• Arbois Technology platform - New Tertiary
Area	• 5132 m² clear surface area
Climate	• Altitude: 175m • Climate Zone: H3
Classes: noise cooling	• BR1 • CE2

Primary energy consumption (excluding PV)	• 51.64 kWh_{ep} /m² clear surface area. Year • Gain of over 50% on primary energy consumption
Local electricity production	• 99 kWp • 67.99 kWh_{ep} /m² clear surface area. Year
Works schedule:	• Start: February 2010 • End: July 2011
Costs	• Works: € 2338 ex. tax /m² clear surface area • Total cost: €13m ex. tax

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Case Study Arbois Technical Platform

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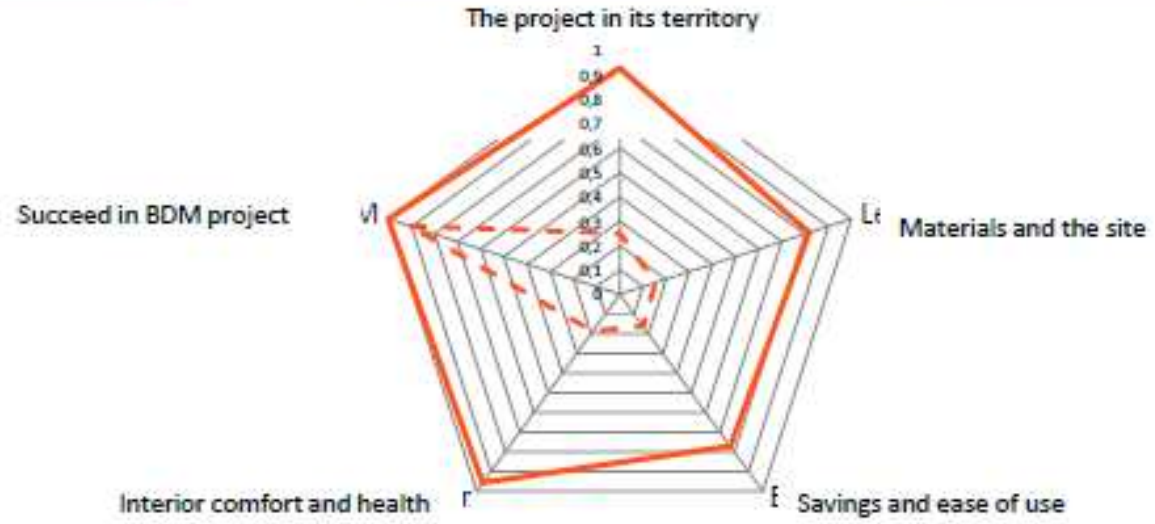
Evaluation according to BDM Process

Design
- 85 pts

Implementation
- Not evaluated

Operation
- Not evaluated



The project in its territory

The technological platform building lies at the heart of the Arbois Europôle.

The project in its territory

The technical platform project is located in the Arbois Europôle in the heart of protected natural sites, halfway between Marseille and Aix en Provence.

The site of the building is constrained by the existing alignment to the north, the south walkway, and a wing of the former sanatorium.

The project therefore makes best use of unused space in the Arbois industrial area.

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Case Study Arbois Technical Platform

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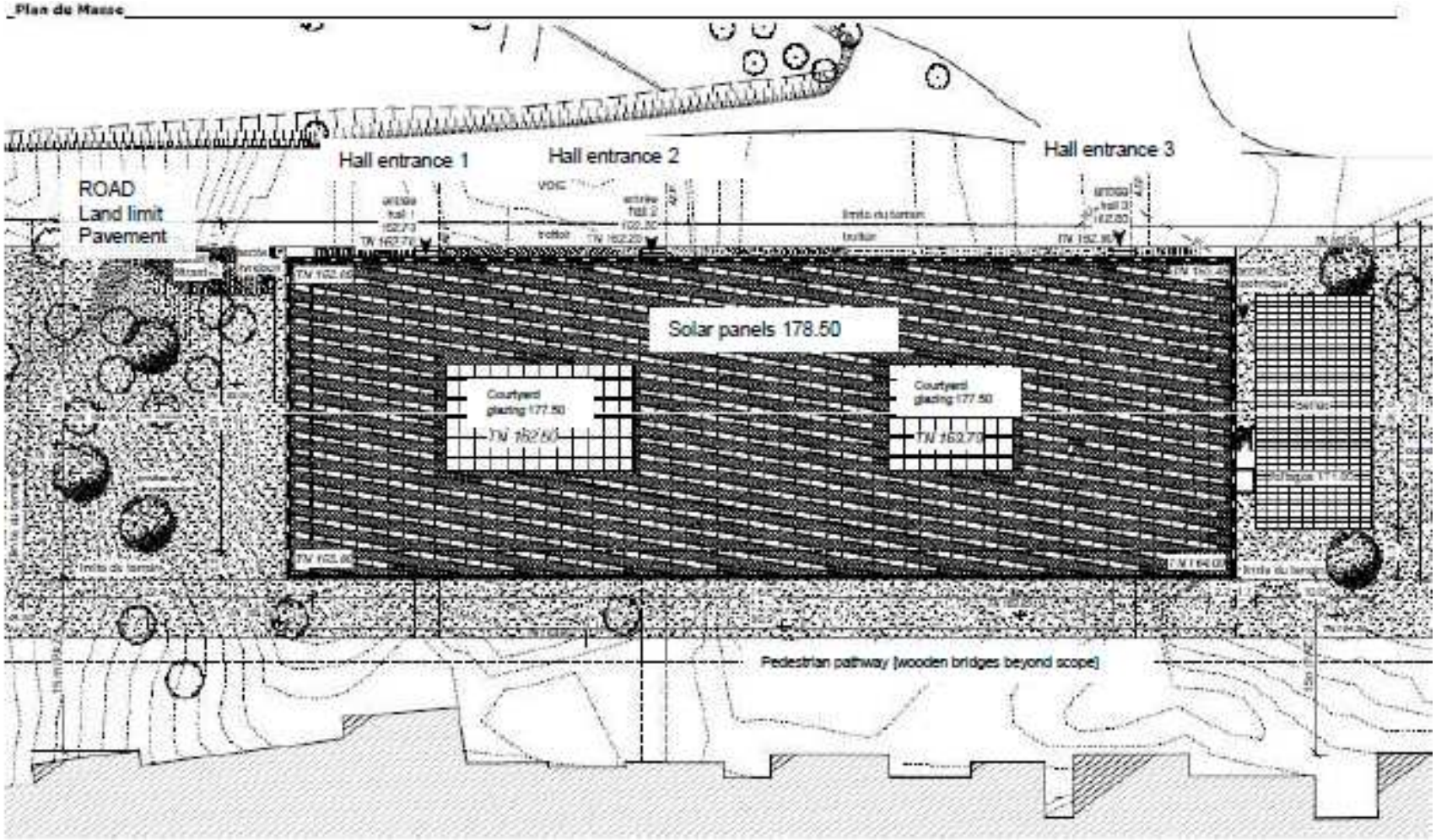
The project : ground plane



The project : multiple ambitions

The architectural project consists of an office building of 4 floors and a technologically equipped roof :

- Lobby and wooden terrace on the ground floor
- Two courtyards
- A technical terrace
- A filter pool on the ground floor
- Photovoltaic panels on the roof's steelwork

Constitution

An innovative and experimental project.
Clearly identifiable tenants within a unifying platform.
Partition of the building and identification of each company by a window effect.
Scalability of the building.
Taking into account all environmental targets
Exemplary energy efficiency.
Adaptation to the specific requirements of future tenants, ease of use and cost control.
Project set out for the long term

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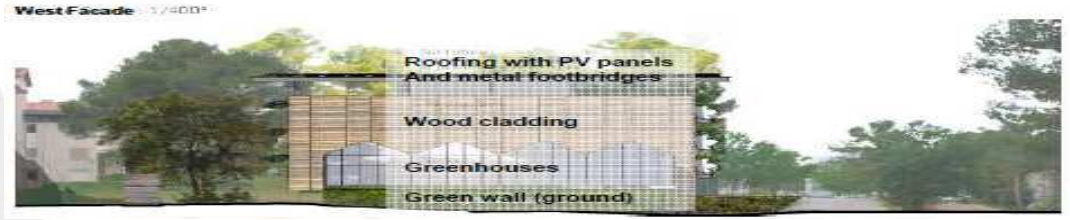
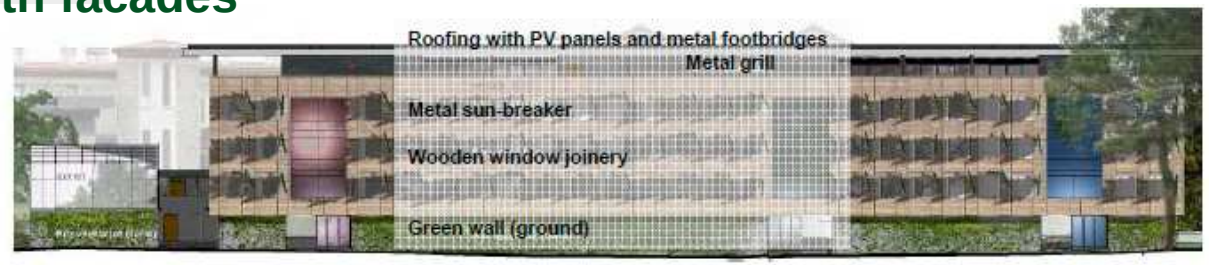
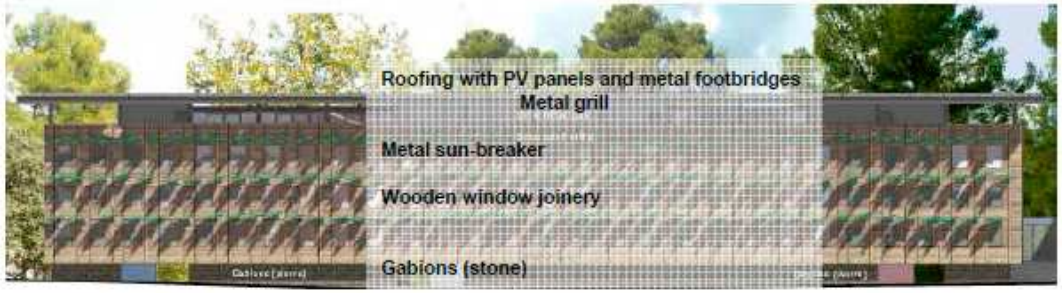
East + West facades



North + South facades





Insulation, comfort and health

Facades and exterior wood cladding.
Insulation by wood fibre panels.
Roof that can avoid overheating in summer.
Presence of vegetation, water and light in the heart of the building in the courtyards, heat and moisture control from adjacent spaces.
Sun protection, horizontal to the south and vertical to the north to protect from unwanted sunlight or to use a deflector to enhance the natural light within the premises.
Painting with European Ecolabel and a choice of products with a very low solvent content.

Technical systems

Combined technical systems (floor-based reversible air/water PAC, traditional Provencal well, VMC double flow).
Photovoltaic production over 735m2 of roofing.
Solar heated water production, provided by thermodynamic balloon.
Misters in the courtyards for summer comfort.
Energy metering and monitoring of heating, cooling, solar heating, ventilation, lighting, photovoltaic.

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Materials and insulation

Element	Composition
External wall thickness 30cm external insulation and wood cladding	Insulation panels in pavatherm wood fibre thickness 22 cm
Buried wall thickness 29 cm	Thick solid reinforced concrete 20 cm Complex insulation TH38 80+10 thickness 9cm
Partition thickness 10 cm	Carrobric brick thickness 10 cm
Interior wall on premises and on stairs thickness 29 cm	Thick solid reinforced concrete 20 cm Insulation thickness 80+10 9cm

Element	Composition
High-floor terrace thickness 30cm	Thick solid reinforced concrete 20 cm Styrodur terrace insulation 3035 CS thickness 10 cm
High-floor under technical room of thickness 30 cm	Thick solid reinforced concrete 20 cm Insulation FibraXtherm A thickness 10 cm
External low floor thickness 39.5 cm	Slabs Novacom 2.10 thickness 9.5 cm Thick solid reinforced concrete 20cm and Insulation FibraXtherm A thickness 10 cm
Low floor for archives/tank thickness 39.5 cm	Slabs Novacom 2.10 thickness 9.5 cm Thick solid reinforced concrete 20 cm Insulation FibraXtherm A thickness 10 cm

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Materials and insulation

Element	Composition
Unheated area low floor thickness 39.5 cm	Slabs Novacom 2.10 thickness 9.5 cm Thick solid reinforced concrete 20cm and insulation FibraXtherm A thickness 10 cm
Low floor on ground N1 thickness 35.5 cm	Slabs Novacom 2.10 thickness 9.5 cm Thick solid reinforced concrete 20 cm Insulation Unimat Sol Supra thickness 6cm
Low floor on ground N0 thickness 35.5 cm	Slabs Novacom 2.10 thickness 9.5 cm Thick solid reinforced concrete 20 cm Insulation Unimat Sol Supra thickness 6cm

Element	Composition
South windows in metal 6/16/6	Double glazing with reinforced insulation argon filling and thermal breaker
North windows metal 4/16/4/16/4	Triple glazing with reinforced insulation argon filling and thermal breaker
Glazing for hall, landing, patio	Metal windows with thermal bridge breaker double glazing with reinforced insulation and argon filling
Wooden door	Solid

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Savings and simplicity of use

Posts	Equipment
Heating	2 reversible air/water heat pump with COP = 3.86 on low temperature heated floor Regulation per room
Cooling	2 reversible air/water heat pump with EER = 3.86 on cooling floor Regulation per room
Ventilation	2 double-flow ventilation with heat exchanger in all rooms (1 per facade) Regulation by hourly programming in offices and by CO_2 sensors in meeting rooms Night ventilation as a function of temperature outdoor
Posts	**Equipment**
Photovoltaic	Photovoltaic station on roof area of 735m² giving good ventilation of panels and thus good system performance
Lighting	Working and common spaces are limited to 8w/m² Presence detection in all offices and corridors Automatic gradation dependent on natural light Natural lighting sought, darker rooms lit by optical fibres
Climatic well	Traditional Provencal well to limit power drawn in hot or cold installed under the building South

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Case Study Arbois Technical Platform

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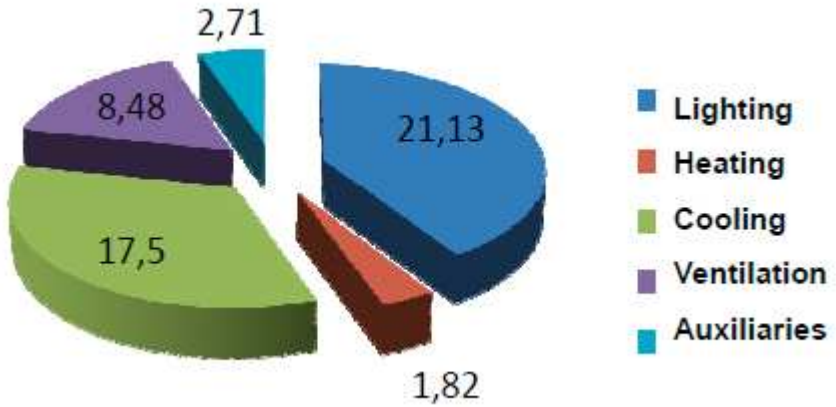
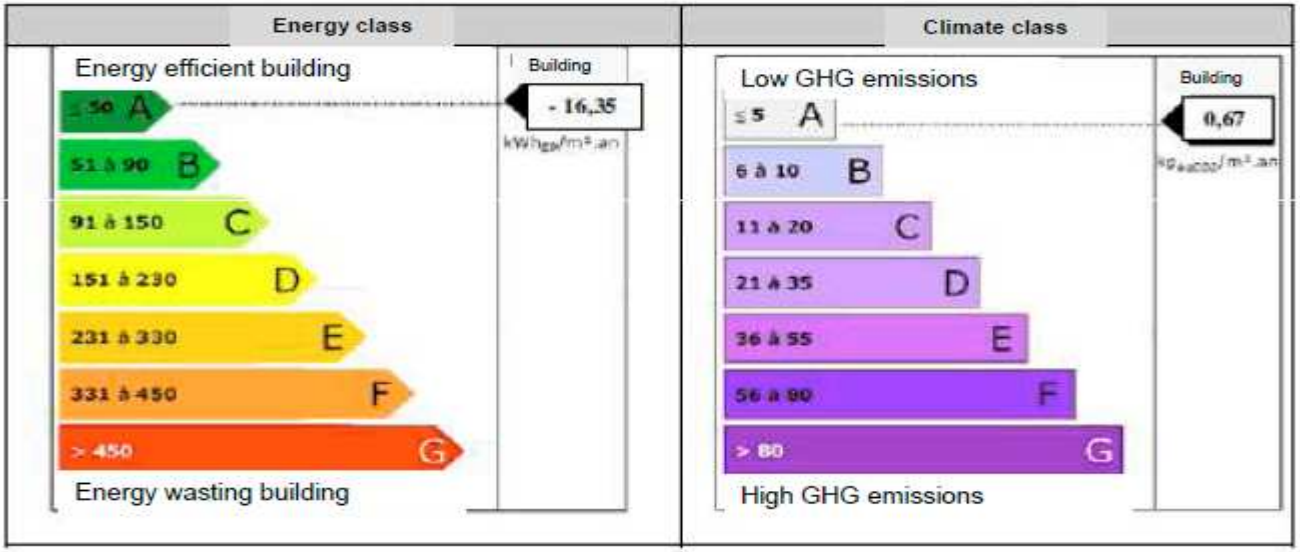
Primary energy consumption distribution in kWhep/m² clear surface area.year



Energy Labels and project climate (with PV)



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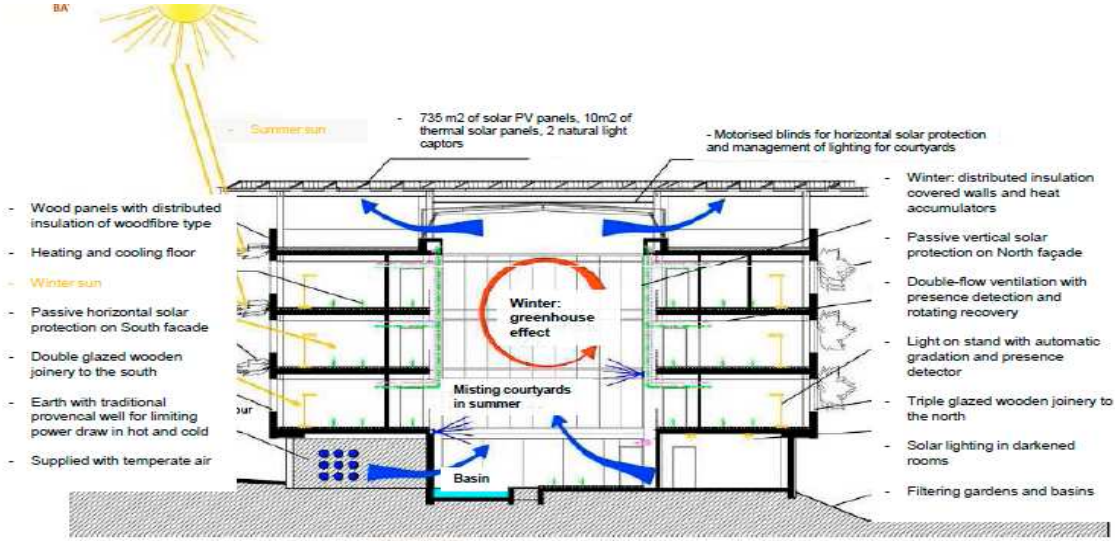
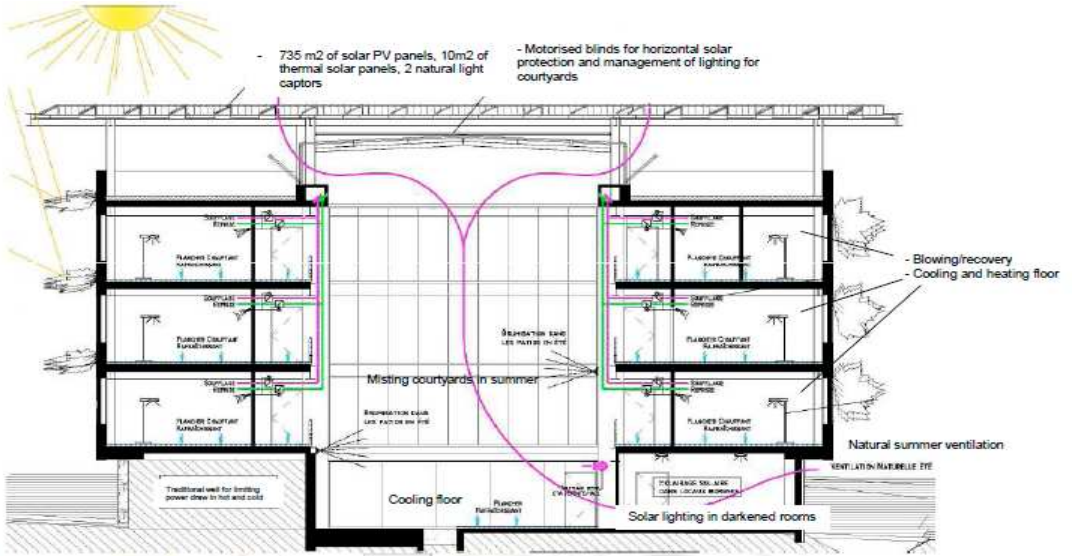
Development of the plaform



Summer treatment principle



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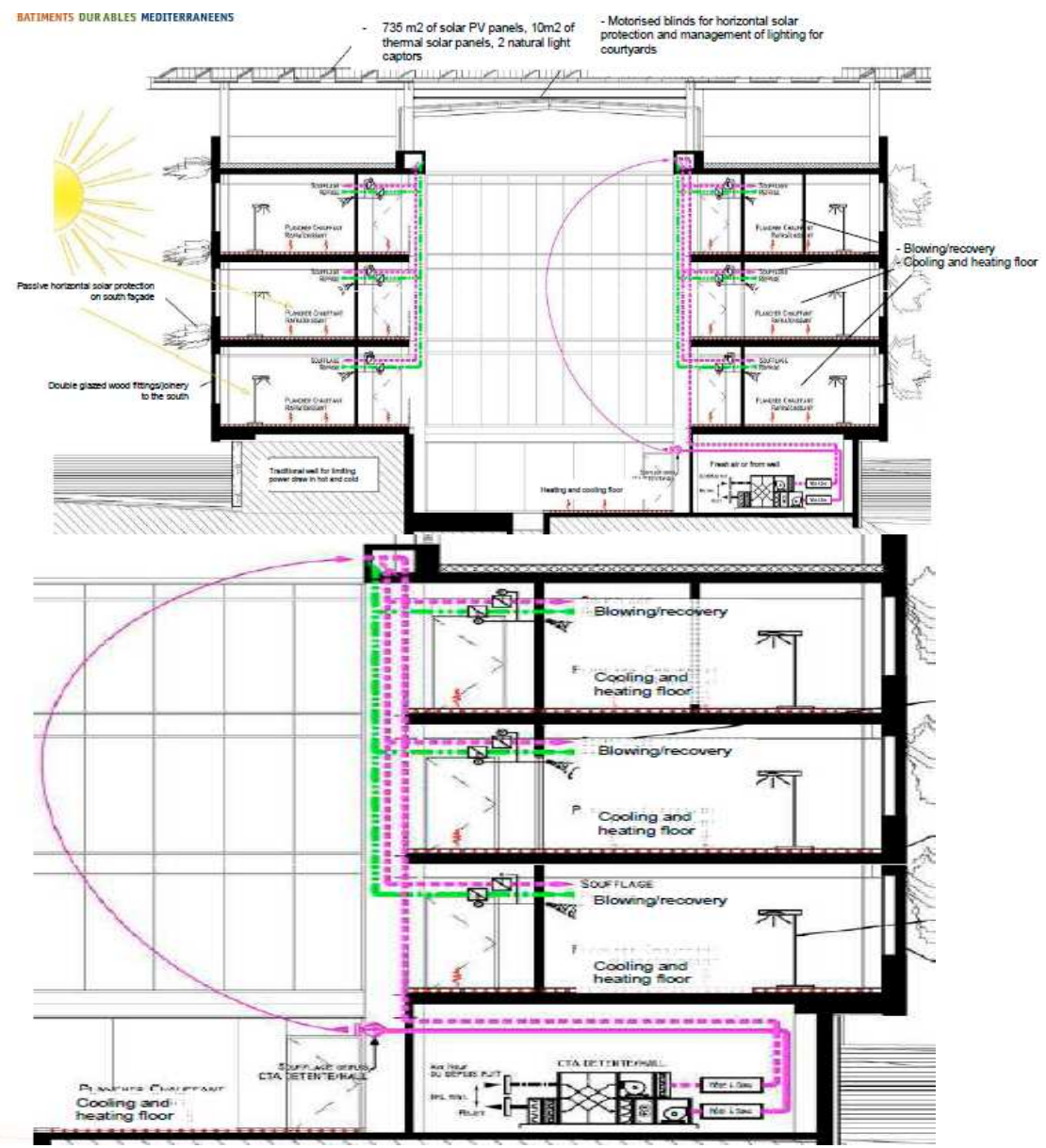
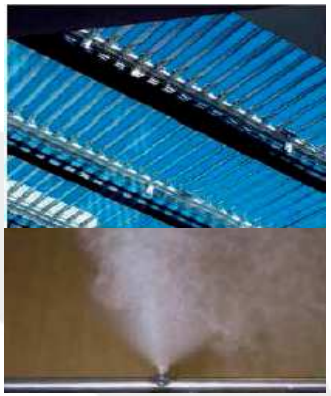
Winter treatment principle



Winter treatment principle

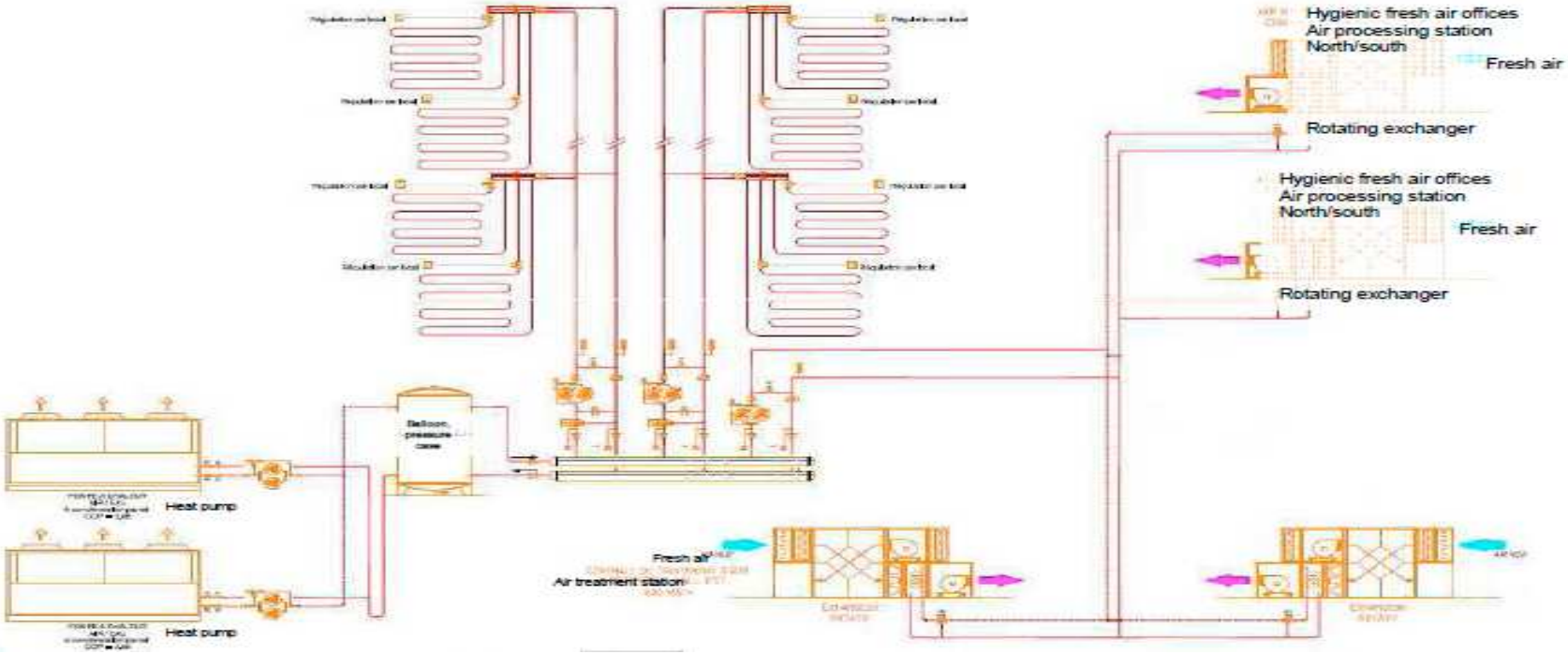
- Fresh air
- Returned air
- Blown air

Comfortable indoor temperature



In the summer, to ensure comfortable indoor temperatures at 28°C:
The courtyards are ventilated at the top and bottom (3m2 to the west and 2m2 to the east) by servo motor openings for the external temperature (>20°C) and indoor temperature (>24°C).
An external mechanised blackout system blocks direct solar rays.
Starting up the cooling floors.
A misting system will be started once the inside temperature exceeds 26°C.

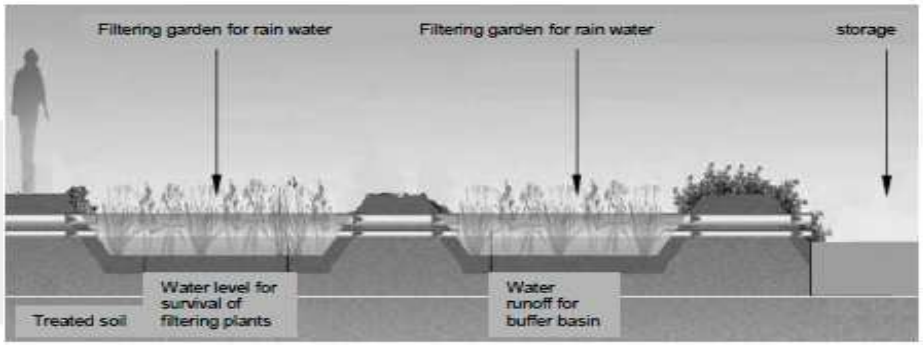
Diagram of hydraulic and air flow systems

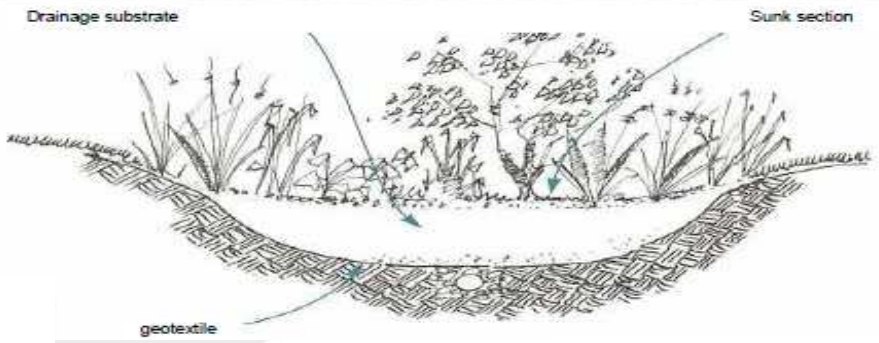


Air quality

In addition to traditional filtering, the heavily vegetated courtyards will help to significantly improve air quality in areas of movement and waiting within the building.
The plants clean the air :
Musa : formaldehyde
Hedera helix : benzene, TCE
Chlorophytum : Formaldehyde

Bio-retention system





Bio-retention systems consist of depressions that drain surface water and facilitate its infiltration into the soil during storms and when tanks are full.
The gardens filter and purify surface water from the site, before being stored in tanks under the building to be reused for irrigation, toilets.

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Case Study Arbois Technical Platform

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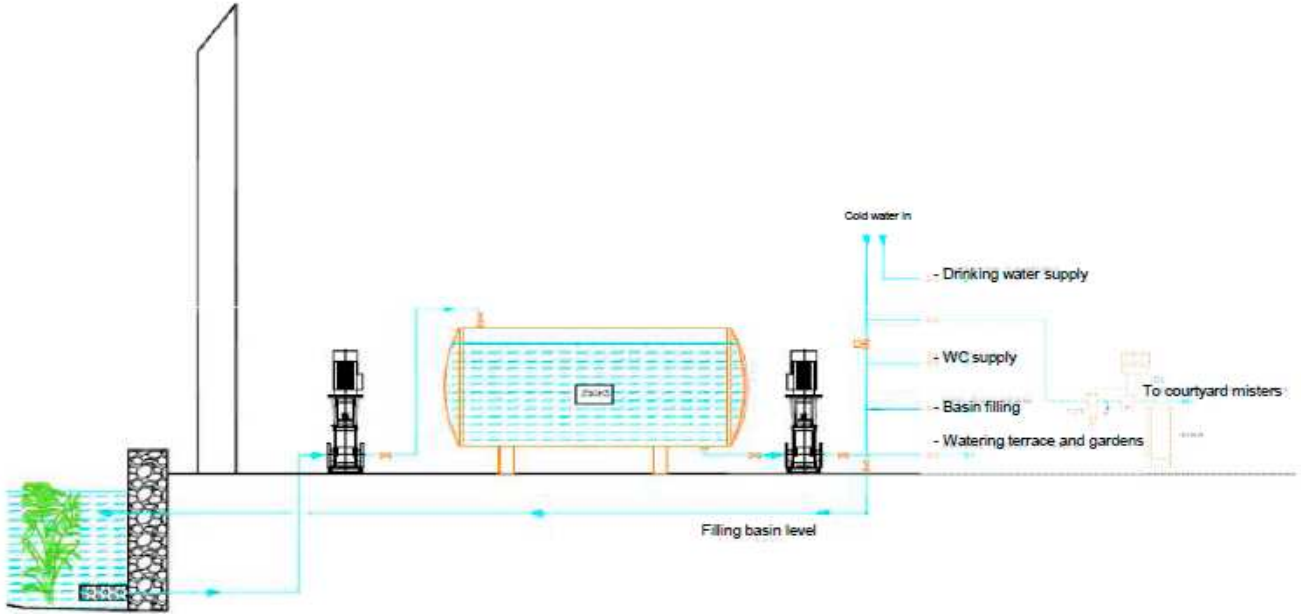
Rain Water Collection



Project stakeholders

Developer	Deputy developer	AMO QEB	End user
SMA Europôle	SQUARE	AB SUD Ingénierie	

Architect	Thermal Engineers
CDD Architect	GARCIA Ingénierie

Structural work	Facade cladding	Sealing	Joinery int/ext
Partitions/linings	**Floor coverings**	**Internal painting**	**Heating, Ventilation, Plumbing**
Renewable energy	**Electricity**	**Green spaces/landscaping**	**...**

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Technical appendices

- Thermal characteristics
- Plans and sections

Materials and insulation

Element	R (m^2K/W)	U (W/m^2K)
External wall thickness 30 cm external insulation and wood cladding Insulation panels in wood fibre 22 cm thickness pavatherm	4.614	0.217
29 cm thickness buried wall Solid reinforced concrete 20 cm thick and complex insulation TH38 80+10 thickness of 9 cm	2.41	0.415
10 cm thickness partition 10cm thick Carrobric brick	0.59	1.695
Interior wall on premises and on stairs thickness 29 cm Solid reinforced concrete 20 cm thick and 80+10 Calibel insulation thickness 9cm	2.747	0.364

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Materials and insulation

Element	R (m²K/W)	U (W/m²K)
High-floor terrace thickness 30cm Solid reinforced concrete 20 cm thick Styrodur terrace insulation 3035 CS thickness 10 cm	3.097	0.323
High-floor under technical room of thickness 30 cm Solid reinforced concrete 20 cm thick and FibraXtherm A insulation of thickness 10 cm	3.257	0.307
External low floor thickness 39.5 cm Slabs Novacom 2.10 of thickness 9.5 cm Solid reinforced concrete 20 cm thick and insulation FibraXtherm A thickness 10 cm	5.22	0.192
Low floor for archives/tank thickness 39.5 cm Slabs Novacom 2.10 of thickness 9.5 cm Solid reinforced concrete 20 cm thick and insulation FibraXtherm A thickness 10 cm	5.35	0.187

Element	R (m²K/W)	U (W/m²K)
Unheated area low floor thickness 39.5 cm Slabs Novacom 2.10 of thickness 9.5 cm Solid reinforced concrete 20 cm thick and insulation FibraXtherm A thickness 10 cm	5.35	0.187
Low floor on ground N1 thickness 35.5 cm Slabs Novacom 2.10 of thickness 9.5 cm Solid reinforced concrete 20 cm thick Insulation Unimat Sol Supra thickness 6cm	4.02	0.249
Low floor on ground N0 thickness 35.5 cm Slabs Novacom 2.10 of thickness 9.5 cm Solid reinforced concrete 20 cm thick Insulation Unimat Sol Supra thickness 6cm	4.02	0.249

Materials and insulation

Element	R (m^2K/W)	Uw (W/m^2K)
South windows in metal 6/16/6 Double glazing with reinforced insulation and argon filling and thermal breaker	-	1.8
North windows metal 4/16/4/16/4 Triple glazing with reinforced insulation and argon filling and thermal breaker	-	0.8
Glazing for hall, landing, patio Metal windows with thermal bridge breaker double glazing with reinforced insulation and argon filling	-	1.8
Solid wooden door	-	3.5

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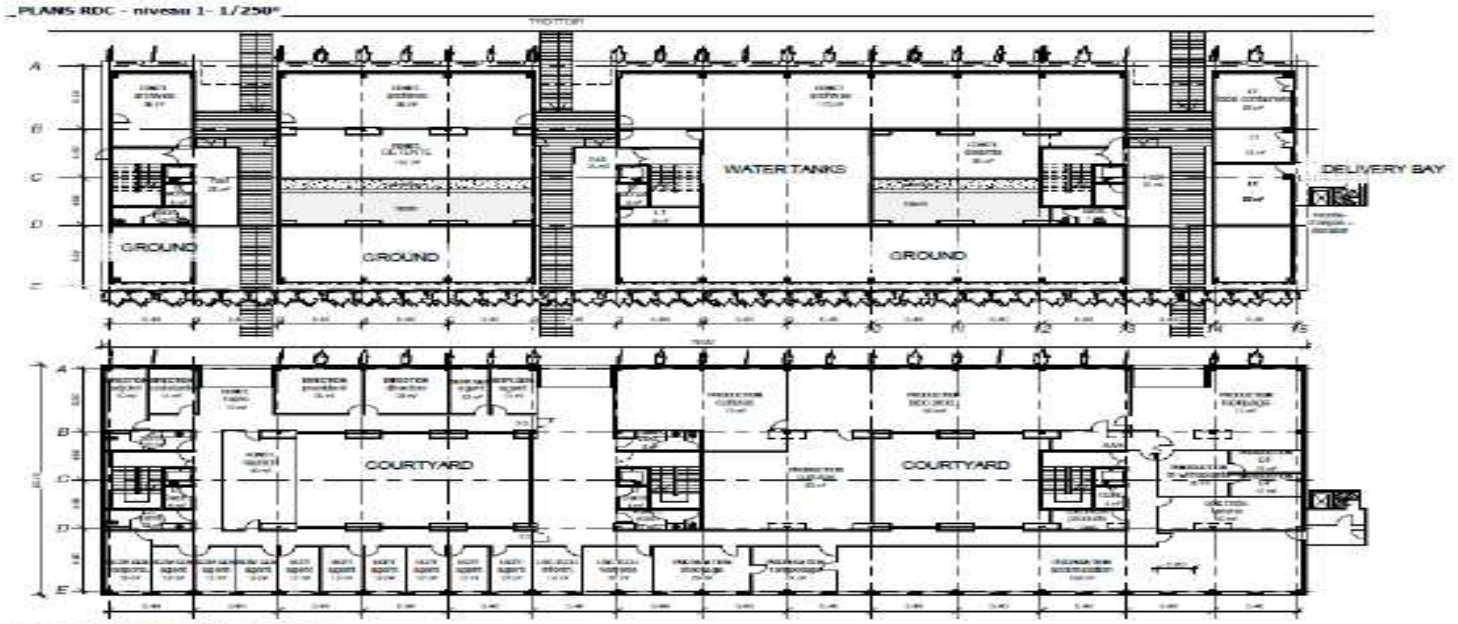
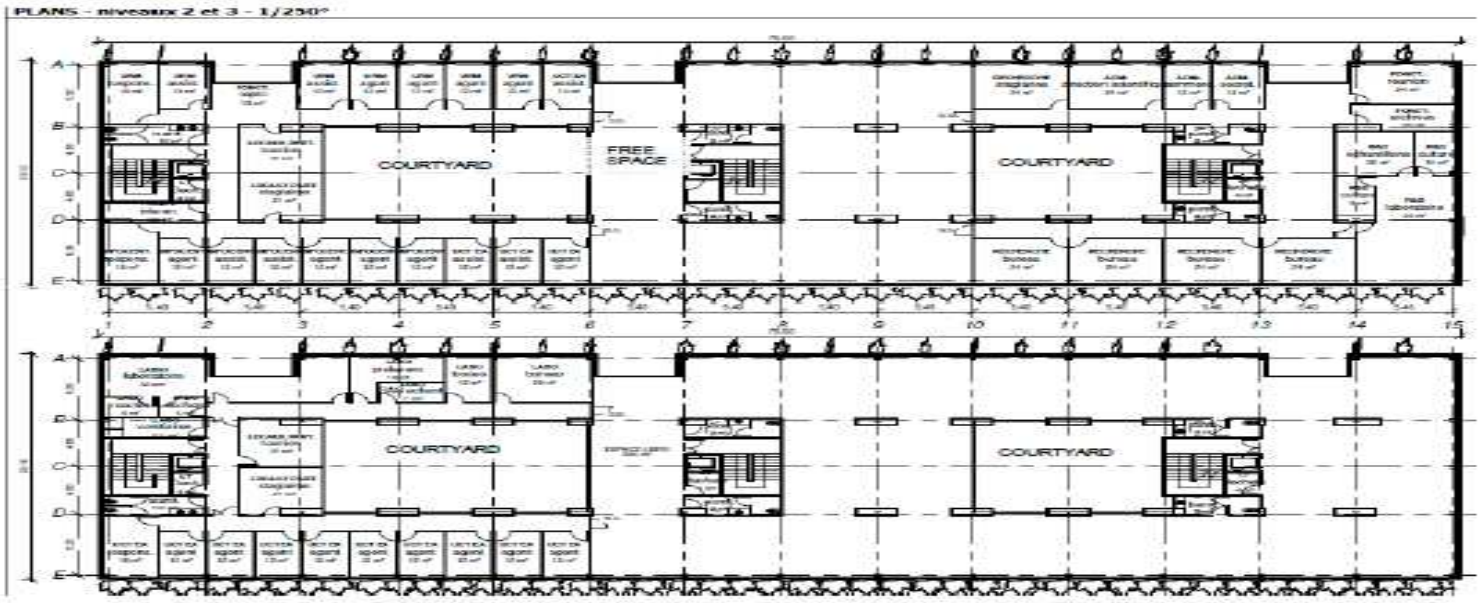
Plan

Ground floor
Level 1



Level 2 and 3



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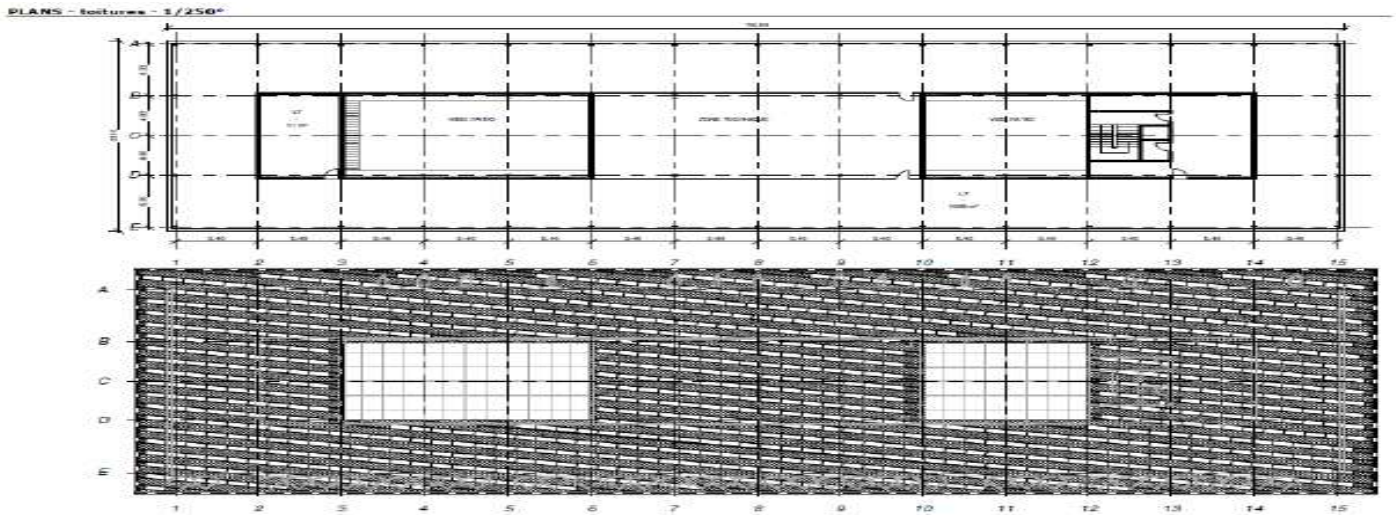
Roof Plan



Extraction / Fresh air

Fresh air Extraction

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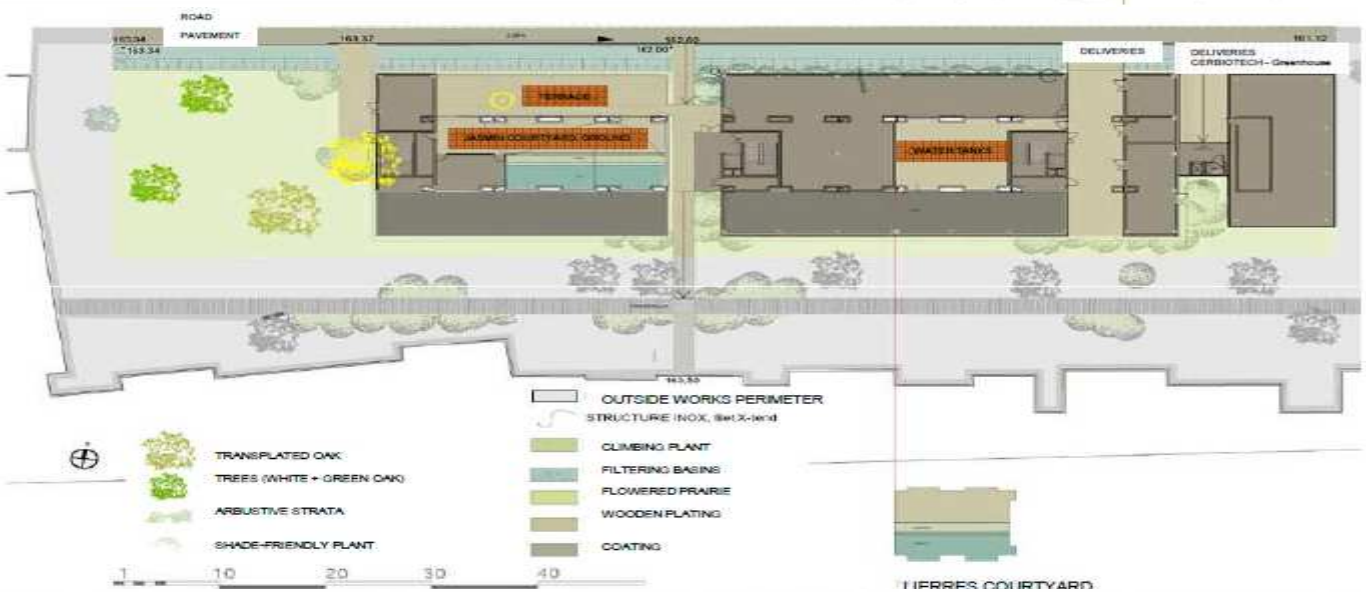
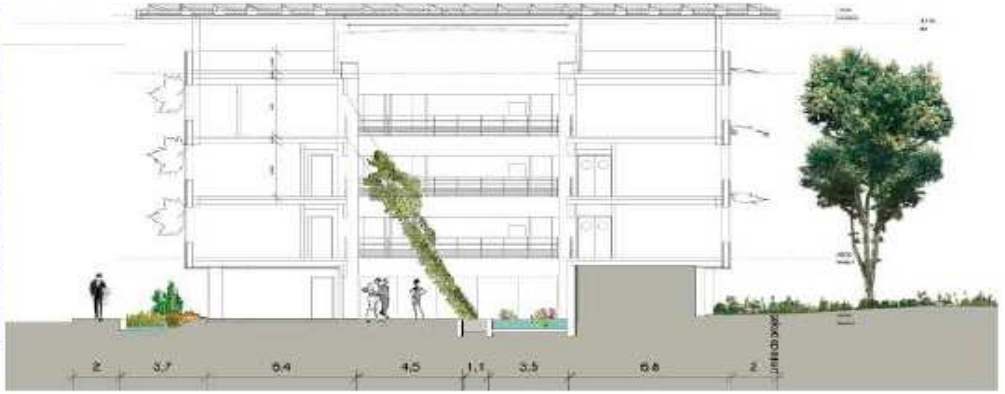
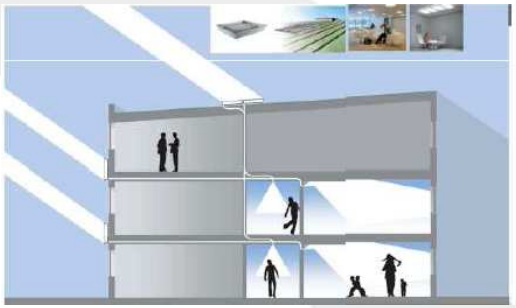
Green space lot



Climbing plants



Lighting



All offices will be equipped with intelligent presence detectors in order to refine lighting depending on the occupation of the premises.

The sun, with its beneficial effects on health and moral, is brought into the building as much as possible. To do this, we needed to install a very innovative system of sunlight conduction to use it as indoor lighting.

The concept is to capture the sun's rays on the roof, using micro-parabolas, and to transport them down fibre optic cables to the special light fittings. These hybrid fittings will integrate optical diffusers and dimmable fluorescent lights which will allow us to compensate for the absence of sun.

This system will mainly be used in corridors and walkways.

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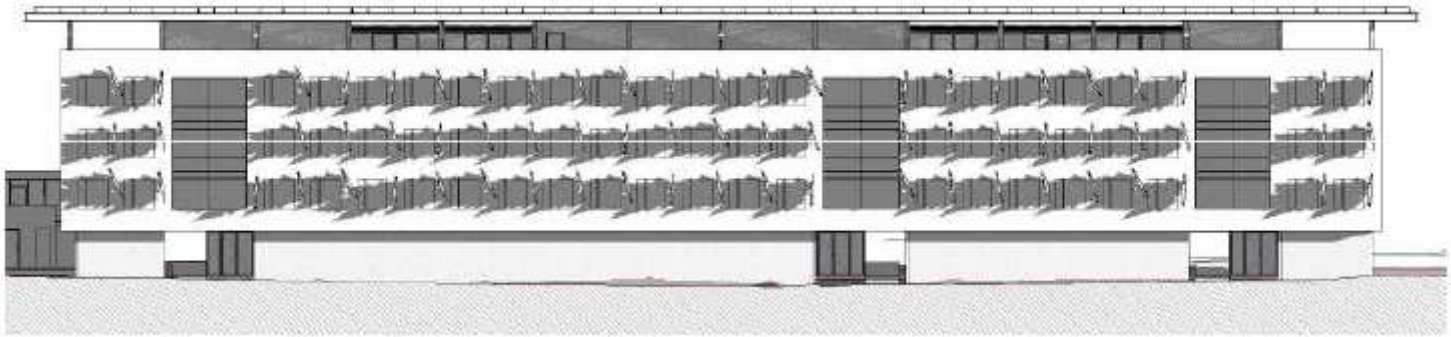
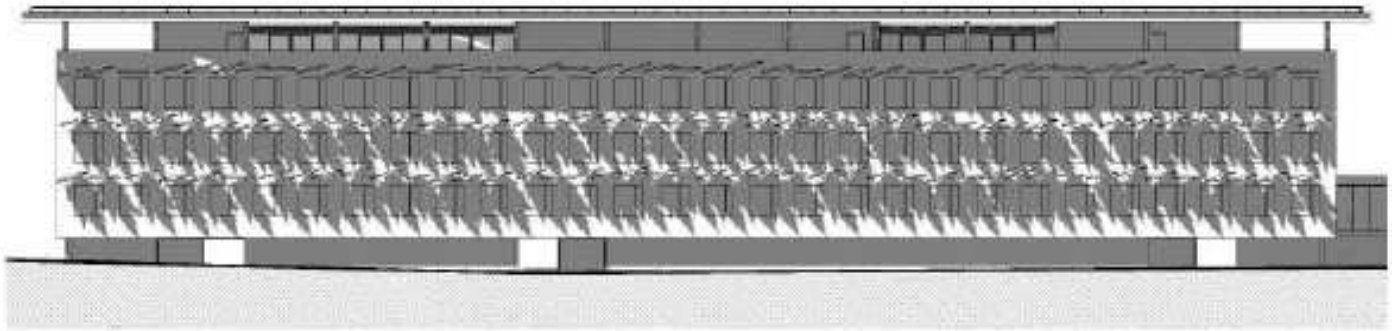
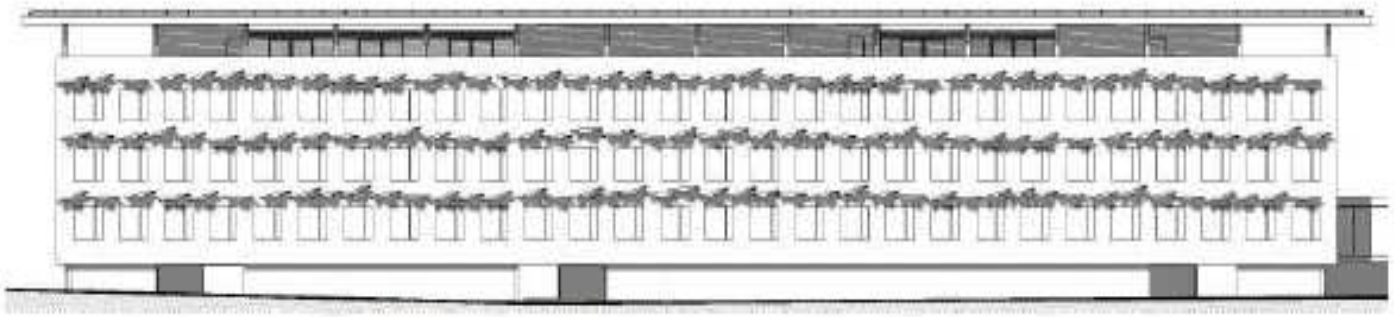
Solar protection

North facade
August 15th
at 6:30 p.m.



South facade





Project cofinanced by

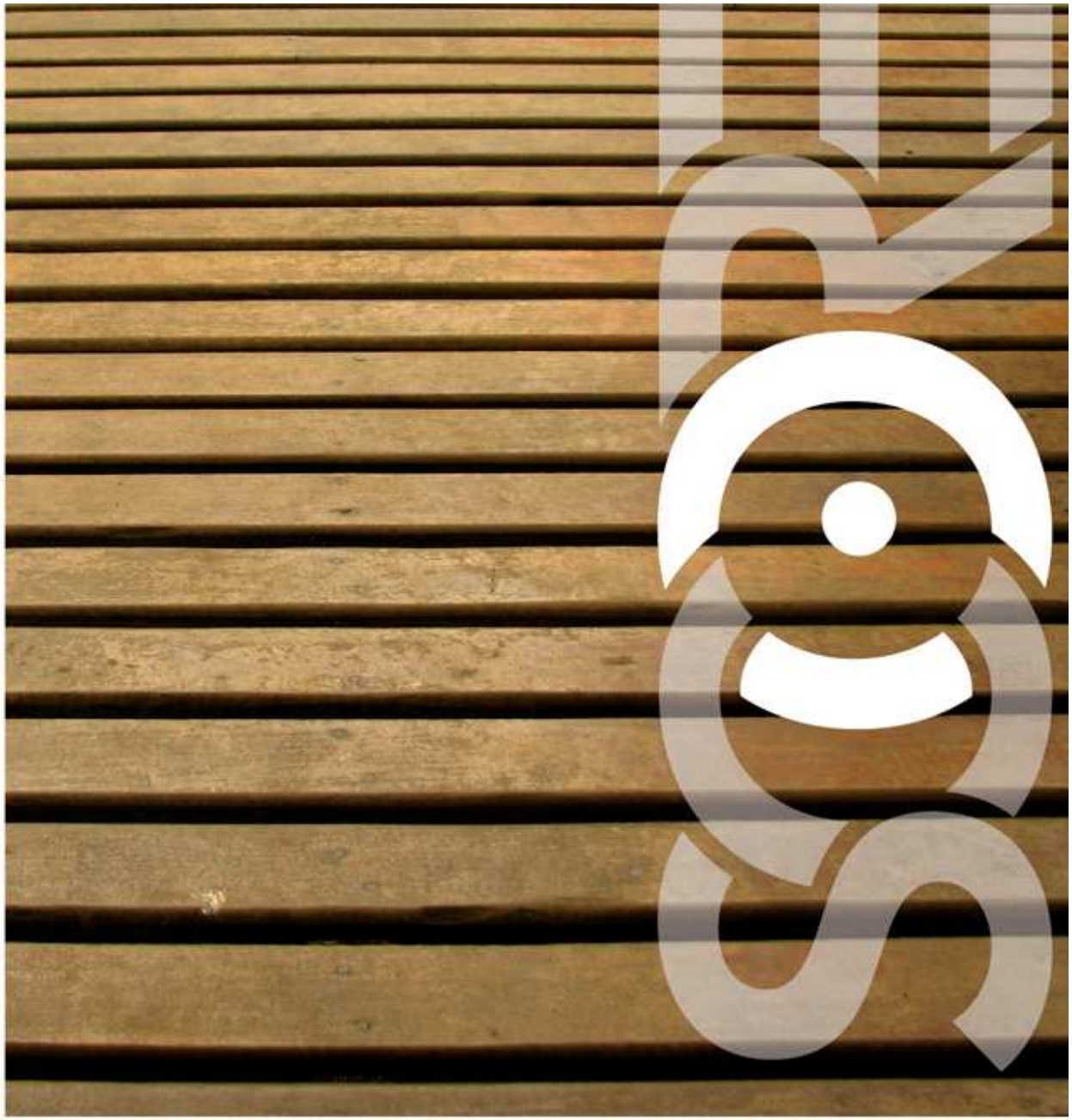
European Regional Development Fund

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

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