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ARQUITECTOS & ASSOCIADOS

GREEN DOT AWARDS 2013
AWARD CATEGORY: CONCEPT | SANTA MARIA DA FEIRA SCHOOL

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PHILOSOPHY & SUSTAINABILITY

P3P ARQUITECTOS & ASSOCIADOS

is an architecture office based in Coimbra, Portugal. With a multidisciplinary team, our projects cover a wide range of programs and scales, from architecture, urban and landscape design to interior design.

Excellence of design reflecting sustainability and its successful materialization are crucial in our philosophy.

In **P3P** we are deeply conscious the important role that architects plays, working together with the construction industry, facing the challenge of creating new cities and buildings, consuming less natural resources, using less energy and water.

Think global but act local. More than a fashionable or empty word, sustainability is crucial for our global survival, and we strongly believe that our practice can make the difference on this global challenge.

Since our first projects, the **P3P** team has incorporated in a consistent basis, bioclimatic strategies into its concept design process. As a wide contextual

framework for our proposals, our design process regards carefully site topography, climate and solar orientation of the place, local materials and construction systems.

Our sustainable architectural vision let us evolve, develop and strengthen systematic innovative approaches to buildings. Nowadays, sustainability demands for holistic approach. In our design process, we integrated local climate data analysis, bioclimatic strategies, bio materials, sustainable construction techniques, efficient services design, renewable energy source equipments, as well as rainwater recovery and promoting biodiversity.

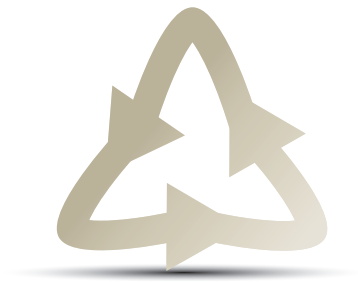
With our clients and partners, **P3P** will continue our strong commitment to build a more sustainable future for our community and our planet.



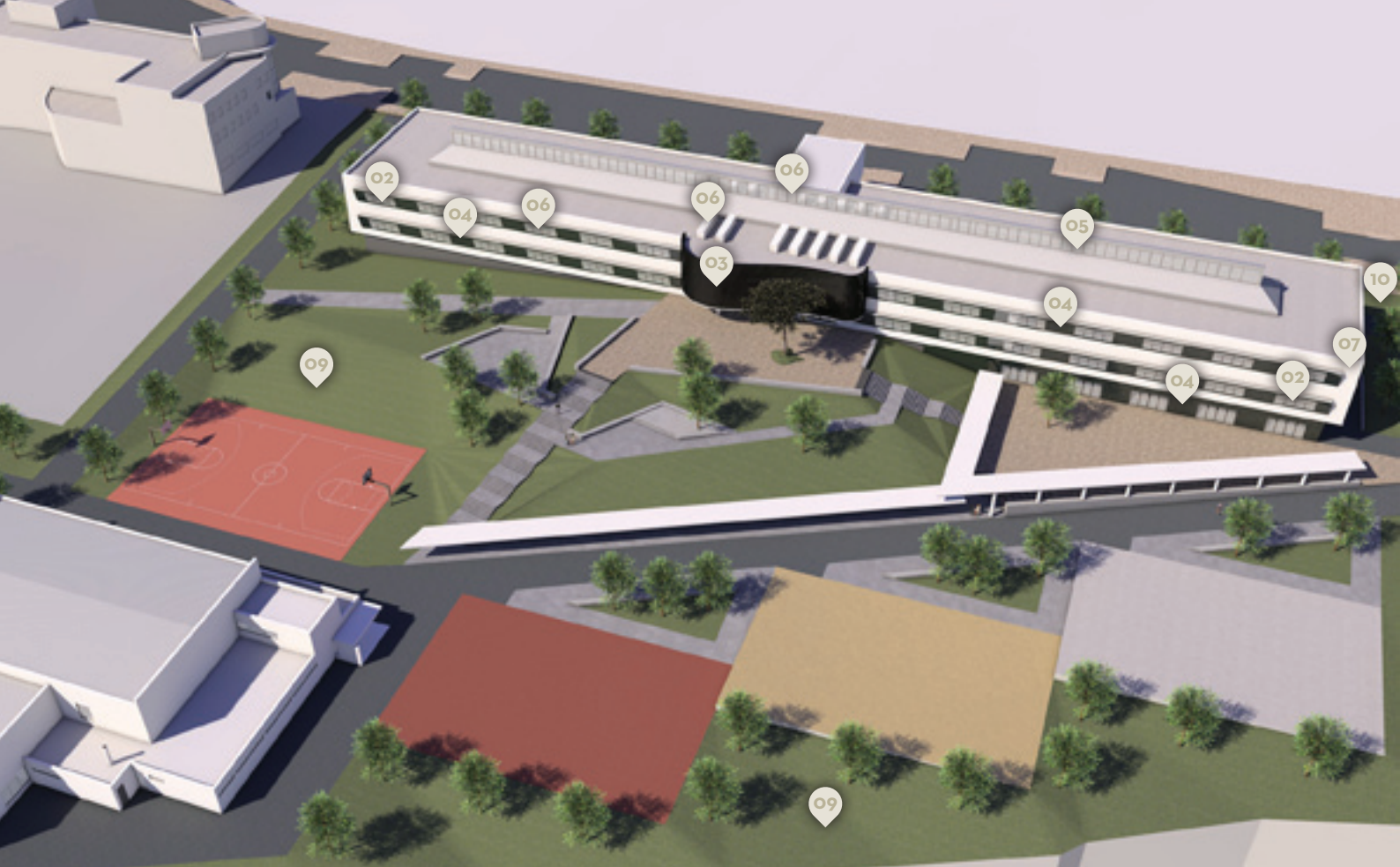


SANTA MARIA DA FEIRA SCHOOL





The building was conceived exploring with detail the potential of bioclimatic design. Therefore, the new school equipment should achieve the guidelines and goals of the Council of Santa Maria da Feira. Students, professors and other school staff can enjoy a high quality of life, inside a building that can also have the lowest environmental footprint.



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01
Land Setting.
Shape.
Orientation.



02
Shading Design



03
Solar Wall



04
Trombe Wall



05
Natural Ventilation



06
Daylighting



07
Thermal Insulation
Materials



08
Thermal Mass Solutions



09
Sustainable Landscape

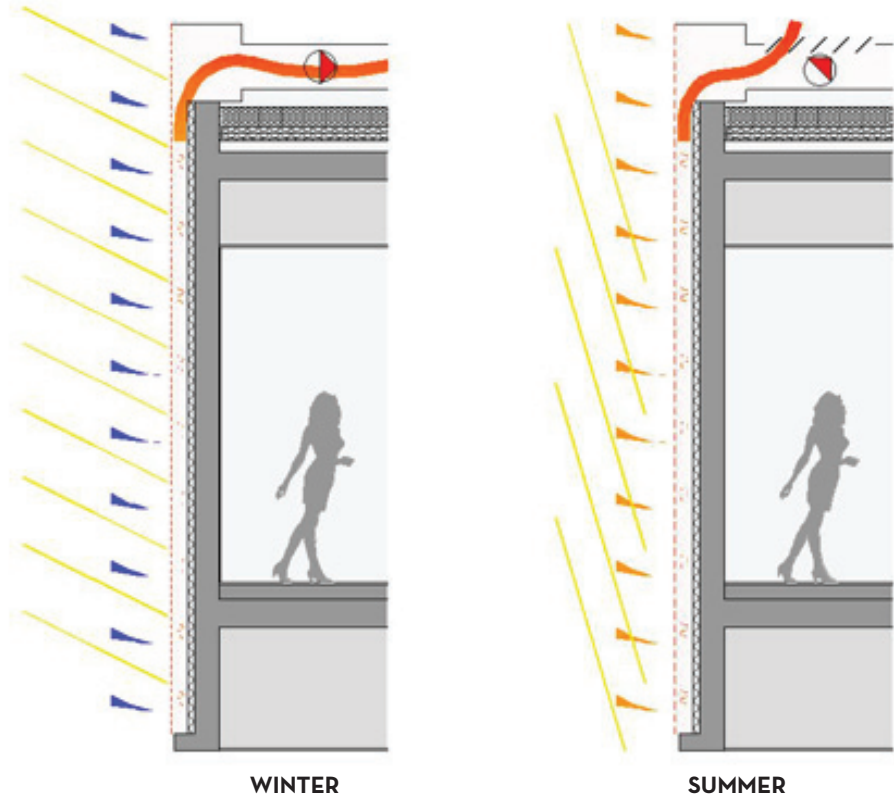


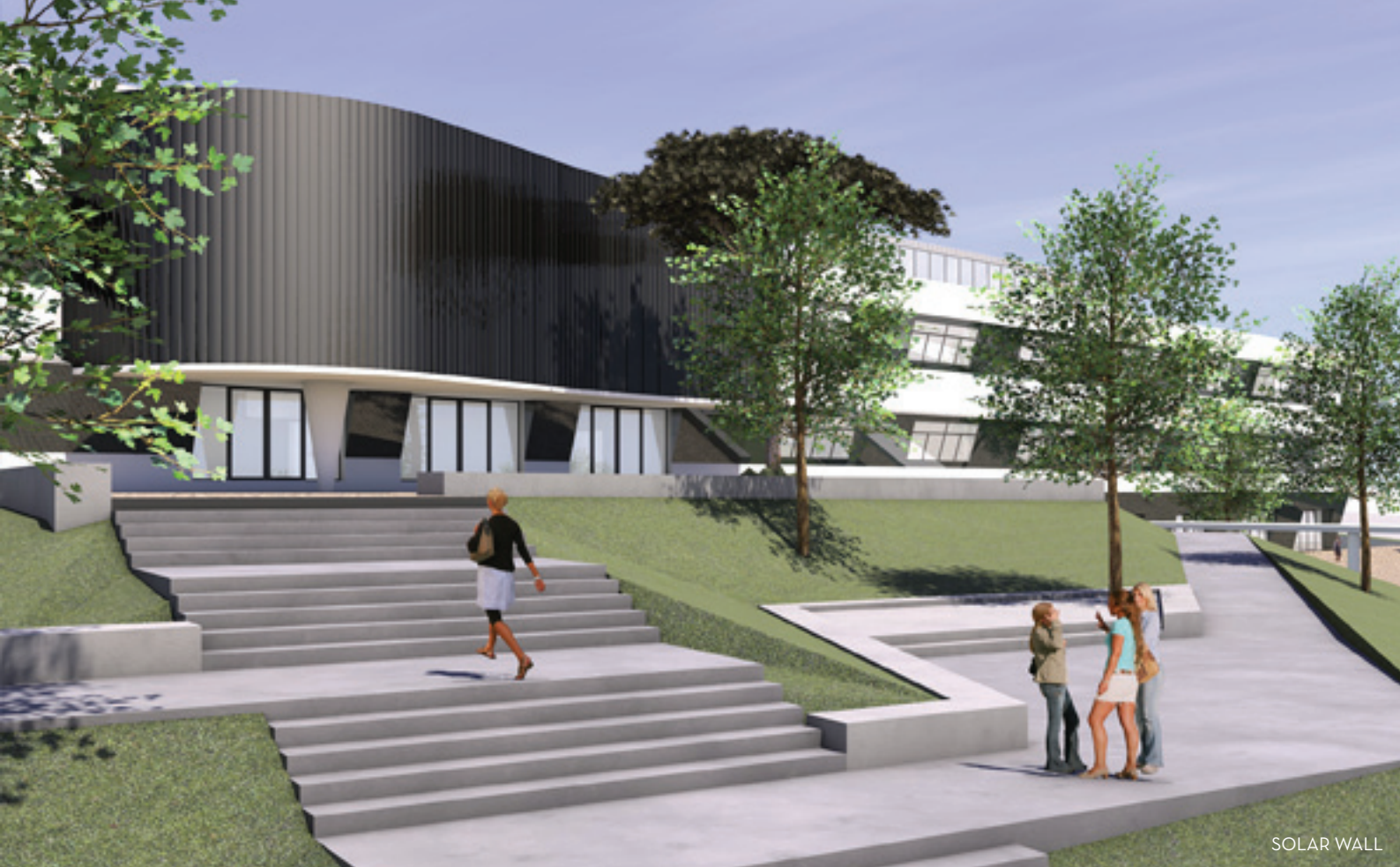
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Permeable Parking

The building was conceived into a main volume of two elevated floors, by focusing on it the 5.744 square meters of the functional program. The long-lined compact shape well aligned in the east-west axis allows excellent insulation conditions on the whole building.

Specific activities of the school program take into consideration the dimensions, time of occupation, layout and spatial organization of its different spaces. So, theory/ practice classes were displayed on the south façade, thematic classes and laboratories were placed at the east and west end, and equipment rooms and short terms occupation rooms (professors offices, staff, storage, sanitary facilities, vertical communications) were placed along the north facade.

SOLAR WALL

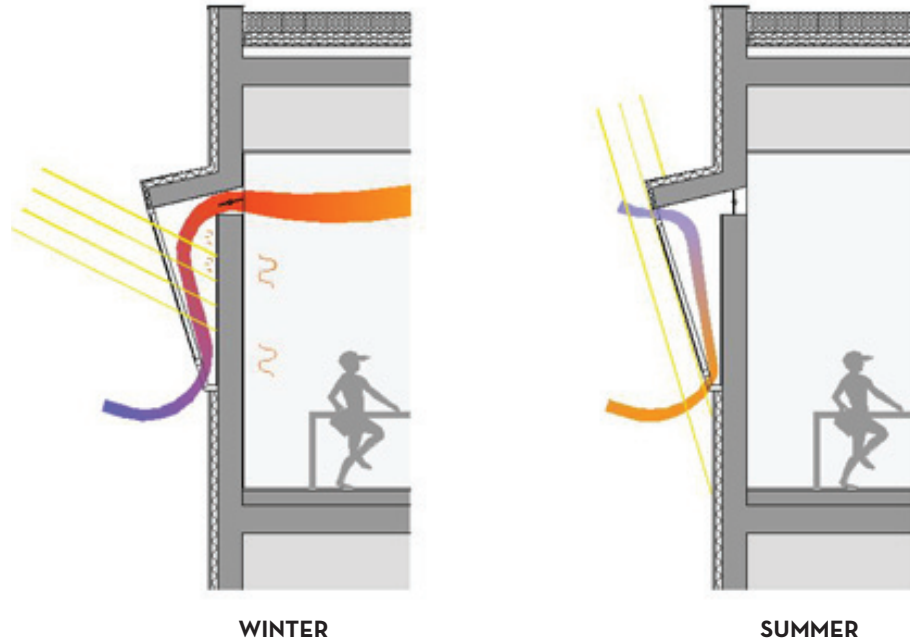






TROMBE WALL

TROMBE WALL



Mostly opaque, the building envelope and its construction system produce an optimized thermal mass, completely mobilized by its interior. The walls are completely covered on the outside by thermal insulation 80 mm thick (ETICS). Windows and shading systems were carefully dimensioned and placed.

On South, each class room has a wide window centered on level and section, and if on the inside is protected by a strip curtain type, on the exterior it's protected by a brise-soleil panel. At east and west, windows are centralized by an element of design with dimensions adjusted to the room's areas, assuring direct solar gains controlled by an internal shading system.

The roof is crossed over by a longitudinal central skylight through which zenithal light penetrates and

covers the internal lobby as well all horizontal circulation spaces of the building. This will assure great natural lightning conditions not only these spaces, but also in classrooms and confined spaces through top wall mounted windows.

The use of artificial lightning will also be eliminated during the day-time when the building is in full use.

Facing south, the skylight becomes fundamental on developing a good thermal and energetic building performance. Its internal overheating will be crucial to induce the thermosiphon air circulation, and trigger the natural ventilation building system.

Trombe Wall and Solar Wall (passive solar systems), as part of the design optimization process, simultaneously

promote heating, cooling and ventilation of all rooms and workspaces assuring indoor air quality.

Concluding, these strategies combined and jointed allow a significant reduction of all the building energy needs. Inside a building with an exclusively daytime occupation the use of these systems will be sufficient to assure the interior comfort needs of its users.

Our approach covered also the outdoor spaces, bearing in mind the concept of sustainable landscape design. Besides a shadow area with trees, the solution includes an area of natural meadow which contributes to the propagation of endemic plants and biodiversity.

This improves soil structure, and less water consumption to its maintenance.

On a daily basis, these outdoor spaces could work as a new ground to promote actions on environmental education inside school activities.



COLD SEASON FUNCTIONING

On the south façade, heating is assured by solar direct gains that the wide central window provide. Interior solar penetration is maximized by placing the glass windows on a sloping position aligned with the upper brise-soleil.

Solar gains using this passive solar system do not suffer any shading effect by the upper brise-soleil. Inside the rooms, windows are protected by a strip curtain system. Hence, the system assures the control of natural lighting without overriding direct solar gains.

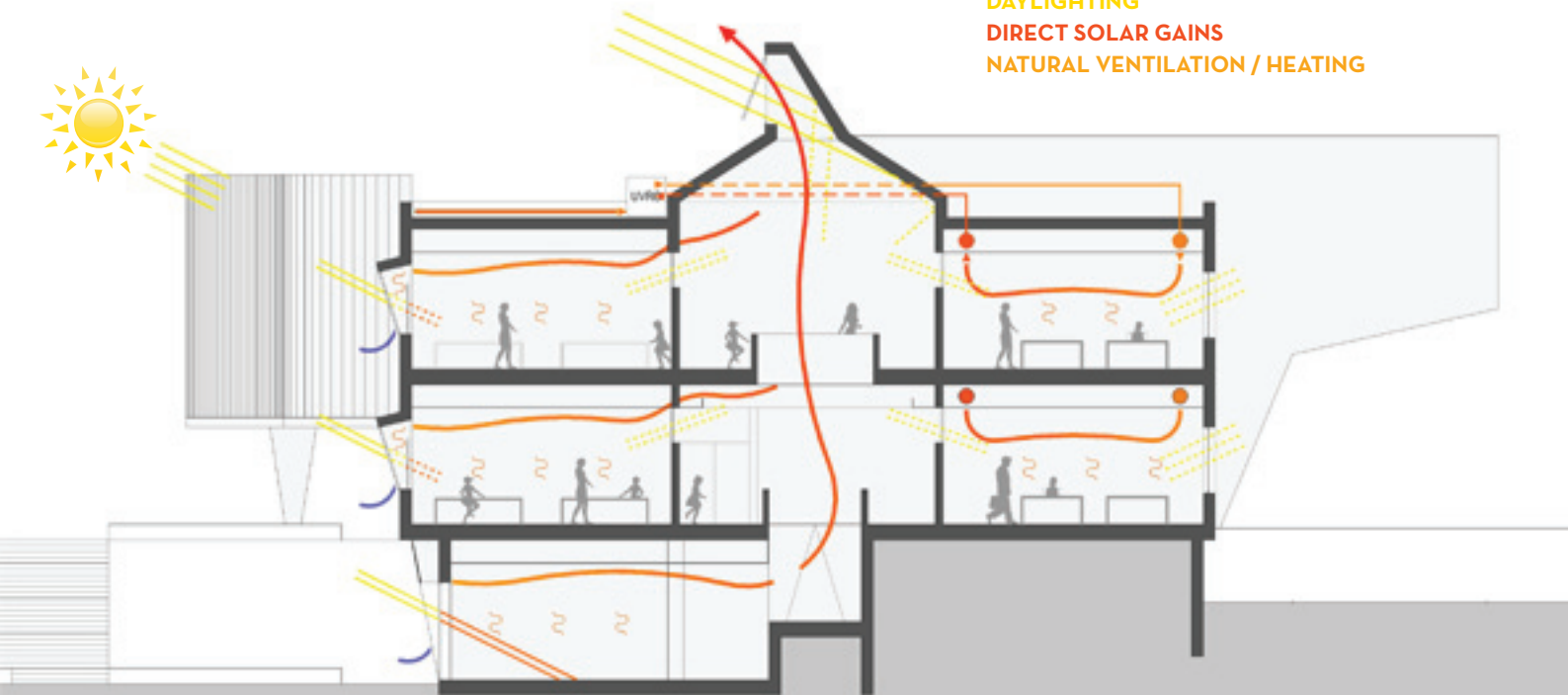
Natural ventilation will simultaneously assure classroom heating through Trombe Wall system. The cold air coming from the outside is naturally pre-heated before entering straight in each classroom.

The wide longitudinal lobby will be heated and naturally lighted in the daytime through the direct solar penetration by the upper skylight. Northern rooms and other circulation areas will also benefit from natural light by the skylight and top wall mounted windows.

With the Solar Wall system placed at the south façade, cold air will be pre-heated naturally by the perforated solar panel, collected on the roof top and distributed to the northern building areas. In some of these rooms, with a high stocking density (such as the auditorium, administration area), it will be used a special air renewal system, inasmuch they have significant internal thermal gains. With a heating recovery process, this air renewal system will be attached to the admission of outside Solar Wall system.

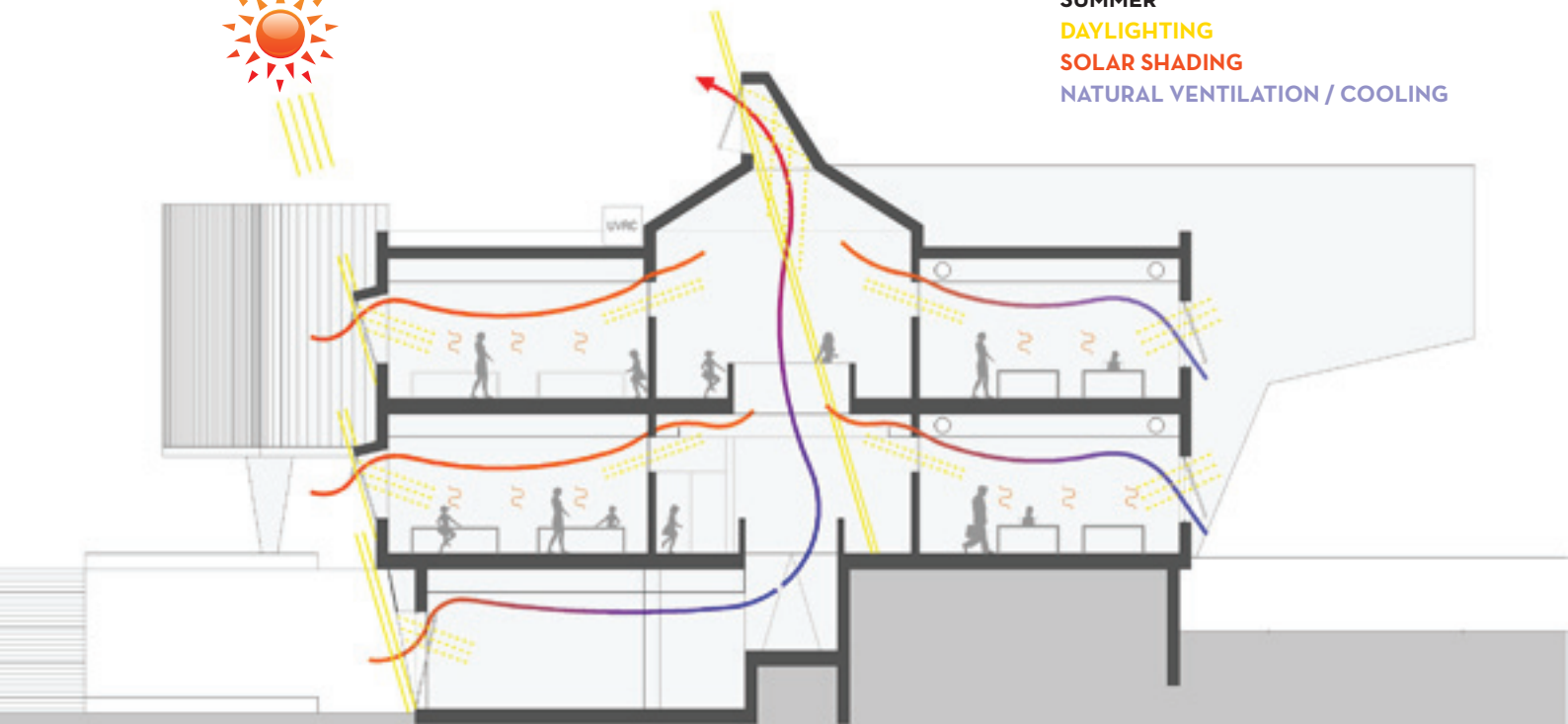


WINTER
DAYLIGHTING
DIRECT SOLAR GAINS
NATURAL VENTILATION / HEATING





SUMMER
DAYLIGHTING
SOLAR SHADING
NATURAL VENTILATION / COOLING



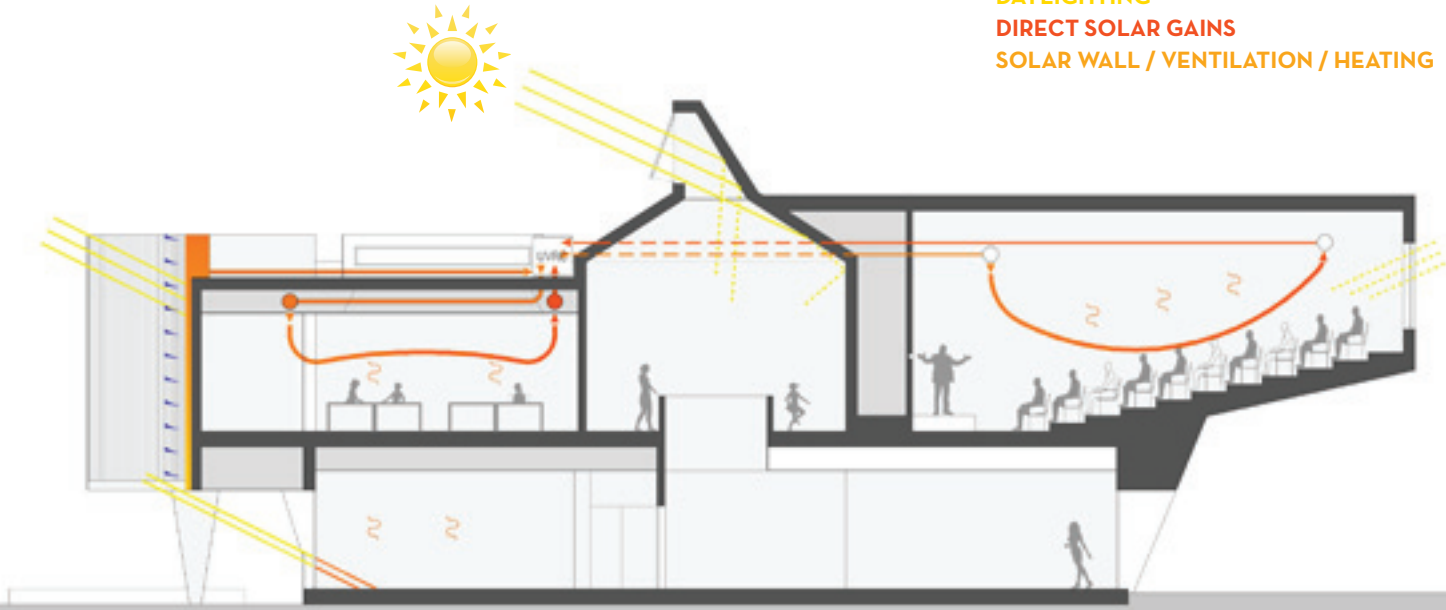
WARM SEASON FUNCTIONING

The south façade will be shaded by the longitudinal sloped brise-soleils. By this way excessive solar gains can be controlled.

Occasionally, inside the rooms the strip curtain system complements shading and the excess of natural light. South rooms will have the Trombe Wall system closed (air chamber open and switching device closed).

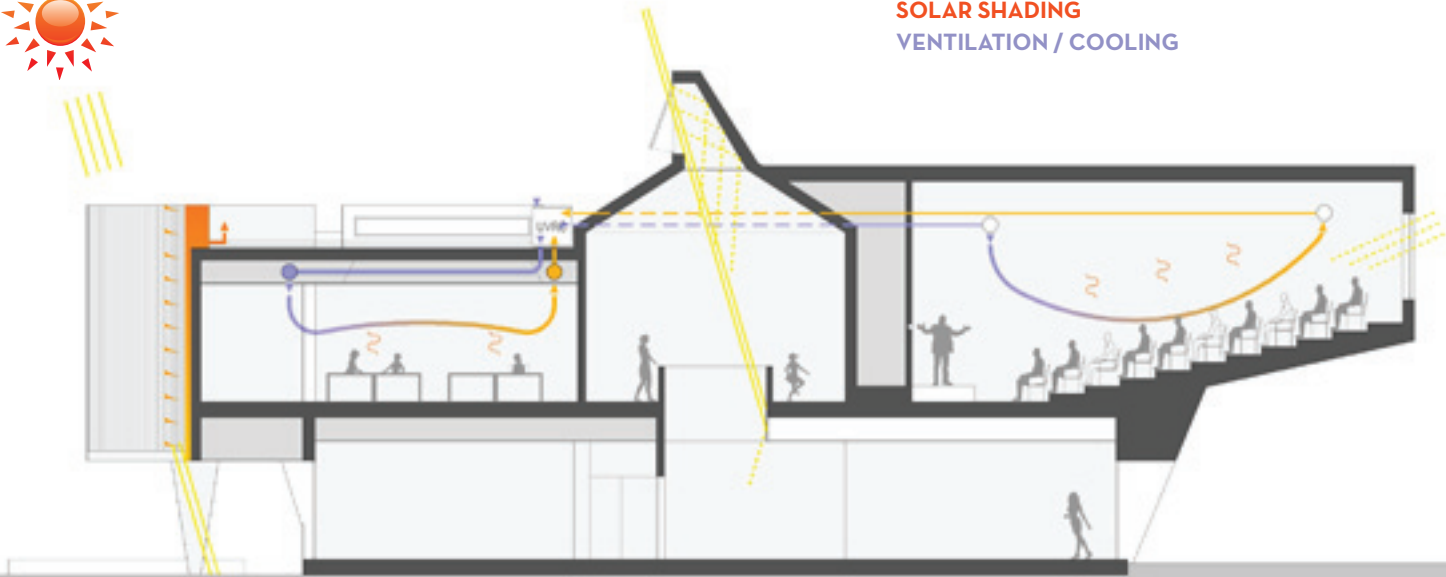
All over the building, cooling will be assured by cross ventilation with natural air admission and natural air extraction induced by thermosiphon effect through the upper central skylight.

WINTER
DAYLIGHTING
DIRECT SOLAR GAINS
SOLAR WALL / VENTILATION / HEATING





SUMMER
DAYLIGHTING
SOLAR SHADING
VENTILATION / COOLING







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