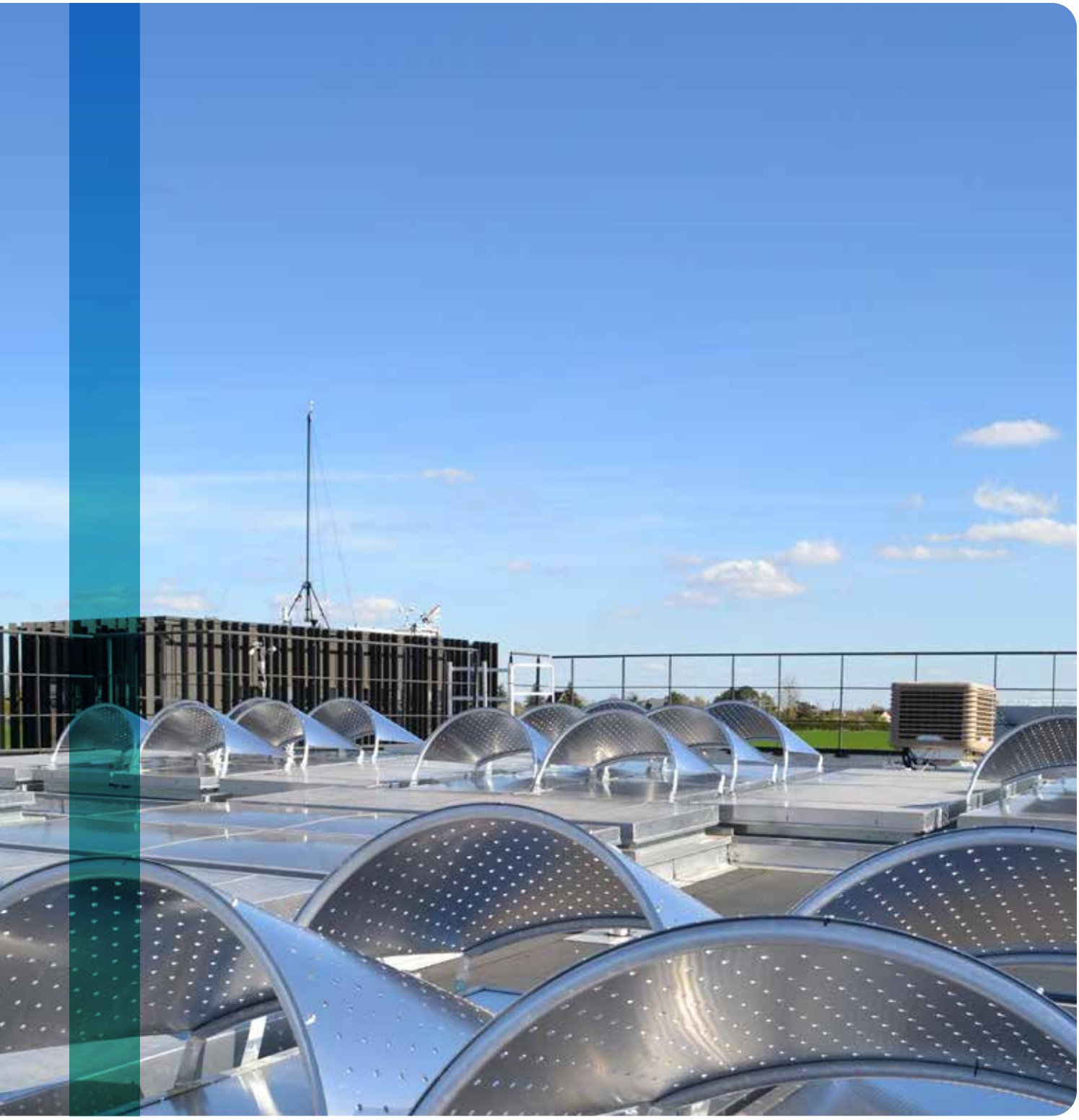

Energy Management Solutions for **Buildings**

genatis

Gestion des Energies Naturelles //

Editorial

In 2019, we created the **Genatis** brand, shared by Bluetek, Souchier-Boullet, and Tellier-Brise-Soleil (all subsidiaries of Adexsi within the Soprema group), to pool the solutions developed for the controlled use of natural energies and ensure the comfort of building occupants. The Labo by Genatis was launched in May 2023 with the aim of optimizing our range of products and services (which we regularly enrich) and testing new materials and components on a demo building scale to continuously improve our solutions' efficiency.

There is a time lag between CO_2 emissions and their actual impact on the climate. Moreover, climate change is intensifying, as we are experiencing today what was predicted for 2030-2040 a decade ago.

The industrial revolution is often cited as the starting point of climate change. What is it about? It was a period of flourishing inventions that profoundly transformed our daily lives through the development of mobility solutions (trains, trams, subways, cars, planes, transport ships), and the gradual emergence of electrical networks for domestic needs and urban lighting. In short, we moved from local communities to a global outlook due to all these inventions that transformed our lives.

Should we go back? It's complicated, even impossible, in an interconnected and interdependent World. We can't change the past, but we are responsible for deciding our future. Today, 1.9 billion air conditioners are installed worldwide, accounting for 10% of global electricity consumption, which is expected to triple by 2050 and represent 1.5 billion tons of CO_2 per year (source: International Energy Agency). This leads to an exponential increase in urban heat islands. No future without frugality.

It's not about rejecting all the progress we've enjoyed over the last 200 years, but about moderating our excesses with a return to common sense. Does it make sense to cool offices to 21°C when it's 35°C outside, and as the medical community agrees that thermal shock risks start at a 7°C difference? What if polo shirts became a summer standard, just as body warmers were a hit last winter?

There is urgency. Every delay in progress will undeniably worsen the situation. We cannot rely on magic to rewind a part of our history, nor do we want to. The eco-responsible revolution will be a broad spectrum of personal initiatives adopted collectively, just as the industrial revolution only brought benefits through the widespread application of individual inventions.

It is for this reason that we develop solutions and systems based on the increased use of natural energies to ensure the comfort of building occupants. Our ambition is to replace or, at the very least, minimize the use of high-performance but less environmentally friendly equipment that has created this urgent situation.

I invite you to (re)discover in this documentation our thematic solutions, which do not yet include other developments in progress. We hope that reading these summaries will fuel your thoughts, and our teams are at your disposal to answer your questions.

Philippe FRITZINGER,
General Manager - Adexsi

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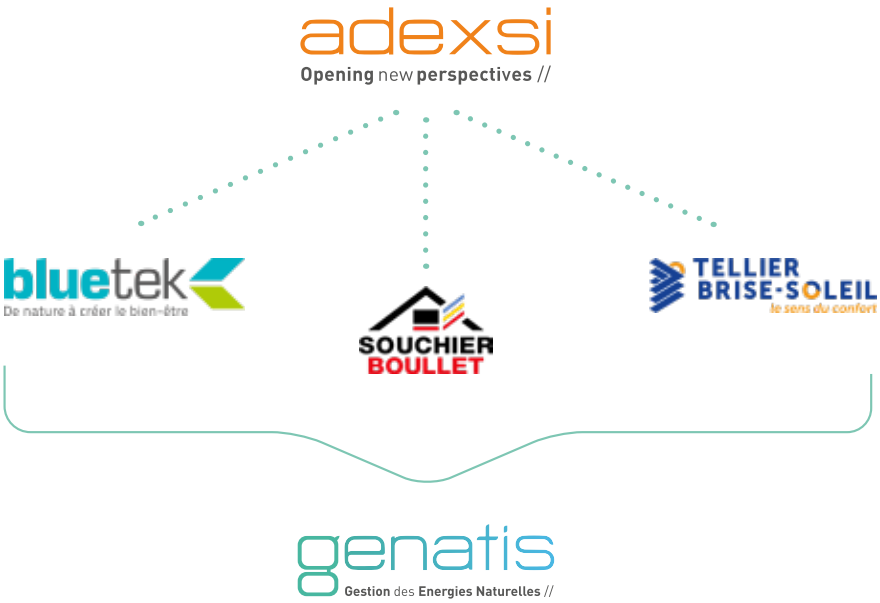
Discover our website
www.genatis.com
- News
- Use cases
- Our solutions

What is genatis

Gestion des Energies Naturelles //

The entire Adexsi group has come together under the **Genatis** brand to combine each company's strengths and offer a comprehensive and complementary solution for the **natural energy management of your buildings.** By combining our expertise and products, you will maximize your **comfort.**

Genatis brings together the key players in fire safety and building energy optimization: **Bluetek**, **Souchier-Boullet,** and **Tellier Brise-Soleil.**

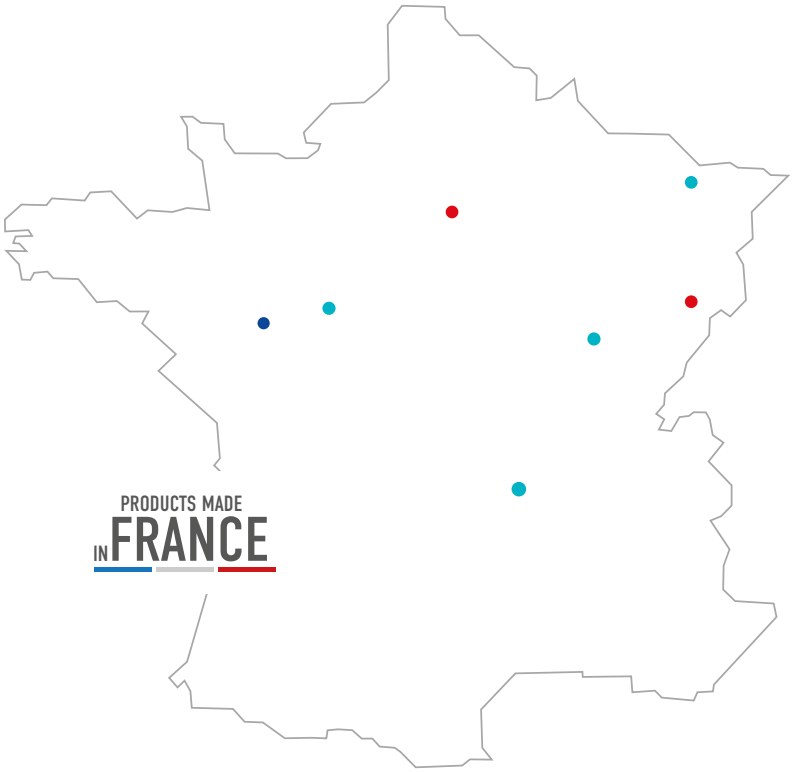


Production sites

- **Bluetek**
  Ambert (63), Luynes (37),
  Gevrey-Chambertin (21), Sarralbe (57)

- **Souchier-Boullet**
  Creil (60), Héricourt (70)

- **Tellier Brise-Soleil**
  Chemillé-en-Anjou (49)





bluetek
De nature à créer le bien-être

BLUETEK is a major player in **natural smoke extraction** and **skylight lighting** for rooftops, offering a unique vision of **natural well-being** and safety for all types of buildings.

With four production sites across France and a strong focus on innovation, **BLUETEK** centers its development on comprehensive solutions that meet the most stringent **standards** and **certifications** (RE2020, BREEAM, HQE, etc.).

SOUCHIER BOULLET

Founded in 1930, **SOUCHIER-BOULLET** is a manufacturer and historic leader in **architectural smoke extraction** and custom designs.

SOUCHIER-BOULLET offers a wide range of solutions, including **intelligent natural ventilation** (VNI), **adiabatic cooling**, and **building management and supervision systems.**





TELLIER BRISE-SOLEIL
le sens du confort

TELLIER BRISE-SOLEIL specializes in the design and manufacture of **fixed** or **adjustable sunshades, facade cladding slats, louvered siding, ventilation grids,** and **sliding shutters.**

With 19 years of experience and **over 1,000 projects** completed each year, **TELLIER BRISE-SOLEIL** has strengthened its expertise and is positioned among the leading players in its field.

Climate *change* is a SCIENTIFIC FACT *not an opinion...*

Warnings and scientific publications alerting to global climate warming are multiplying. It is no longer up for debate: climate change is a global issue affecting all regions of the World.

Several indicators characterize climate change, with the **constant rising temperatures** being one of the first signs of this phenomenon.

2011 to 2020 was the hottest decade on record, with a global average temperature reaching 1.1°C above pre-industrial levels.

Polar regions are experiencing **accelerated ice cap melting,** leading to rising sea levels and an increased risk of coastal flooding. In other regions, extreme weather events such as **storms, floods,** and **droughts** are becoming more common and intense.

And more locally, in France?

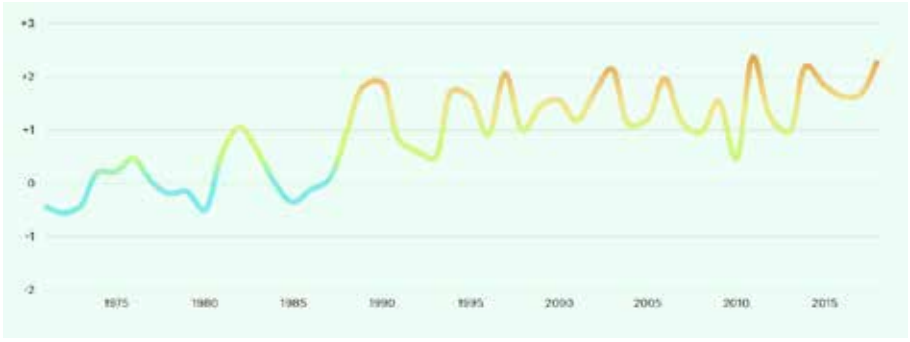
In France, new temperature records and drought periods are being set every year, **increasingly early.**

Since 1900, average temperatures have risen by **1,7°C**[1].

A study analyzing temperature data from over 100,000 European cities compares average temperature values between two decades: 1961-1970 and 2009-2018. For example, in the city of Bordeaux, the estimated annual average temperature has increased from **+12.6°C** to **+14.2°C,** representing a rise of **+1.6°C.**

IN BORDEAUX
+1,6°C
(1960-2018)

*the data is sourced from Copernicus and the European Centre for Medium-Range Weather Forecasts (ECMWF).



Evolution of the annual average temperatures in Bordeaux from 1961 to 2018.

[1]Source : Météo France

Here is the temperature difference recorded for a few French cities:

	T°C 1960-1970	T°C 2009-2018	T°C Gap
Paris	+11,1	+12,6	+1,5
Lille	+9,6	11,4	+1,8
Strasbourg	+9,5	11,6	+2,0
Nantes	+11,5	+12,6	+1,1
Marseille	+15	+16,2	+1,2

Published in 2022, recent studies[2] forecast an average warming of **over 3.8°C** in France by 2100 if greenhouse gas (GHG) emissions remain at current levels.

It is crucial to take action to minimize GHG emissions as much as possible. Each ton of CO_2 emitted contributes to global warming, while reductions in emissions help to slow it down.

Average warming of
3,8°C
by 2100

According to an «intermediate» scenario, similar to current trends in greenhouse gas (GHG) emissions.

Increasing energy consumption

While energy consumption accounts for over three-quarters of greenhouse gas emissions, global energy consumption continues to rise. According to the International Energy Agency (IEA), global energy demand will increase by **21%** by **2040.**

At the same time, energy costs are continually rising. Therefore, it is essential to direct our innovations towards solutions that are **less energy-intensive** and **emit less CO_2.**

However, each year we are all confronted to the discomfort present in existing buildings, especially during summer or periods of excessive heat when building-related issues become most noticeable to occupants. This **summer discomfort** typically manifests as a feeling of heat or even suffocation when there is little or no air circulation.

While widely used and popular solutions exist to temporarily alleviate this discomfort, they often perpetuate a vicious cycle. These systems cool indoor air but expel hot air outside, sometimes creating urban heat islands and contributing to the warming of ambient air. Nevertheless, solutions do exist to delay or even replace their use...

[2] Source : https://climate.ec.europa.eu/climate-change/causes-climate-change_en
Source : https://esd.copernicus.org/articles/13/1397/2022/esd-13-1397-2022.html

Les solutions genatis

Gestion des Energies Naturelles //

1 ZENITHAL LIGHTING

2 FIXED SUNSHADE

3 NATURAL VENTILATION

4 BIOCLIMATIC FACADE


5
ADIABATIC COOLING
6
AIR TREATMENT SYSTEM
7
AIR DESTRATIFICATION
2b
ADJUSTABLE SUNSHADE
1
6
7
1
3
2
2b
3
AUTOMATION & MANAGEMENT

LE labo

GENATIS GROUPE SOPREMA

Inaugurated in 2023 at the Luynes site (37), **Le Labo** is an **exceptional tool** dedicated to the **management of natural energies,** designed to test the solutions from the subsidiaries **Bluetek**, **Souchier-Boullet** and **Tellier Brise-Soleil** under real conditions.

A *unique* building in EUROPE

A Custom Tool, Adapted for All Tests

Spanning **500m²** and equipped with **state-of-the-art scientific instrumentation,** Le Labo has sufficient volume and height to be representative of activity spaces. The building's design has been developed to facilitate the daily execution of tests. The two interior spaces are separated by a movable partition to accommodate larger-scale measurements as needed. The facades and roofing are also modular, providing great flexibility.

The goal is to test various solutions and combinations of solutions from the group related to **natural ventilation,** facade and/or roof **shading, natural light, control systems,** and **adiabatic cooling,** and to assess their impact on visual and thermal comfort as well as energy savings. The tests also help identify and analyze improvement opportunities to develop future products.

A Dedicated Team

In addition to having **powerful digital tools,** Le Labo is led by a technical team of specialized engineers, supported by the presence of doctoral students, responsible for **programming, implementing,** and **collecting** the results of conducted experiments. As true specialists in energy management, they annually carry out **over 200 climate studies** and recommend Genatis solutions aimed at ensuring **occupants' comfort while reducing energy consumption.**

The technical team is also capable of **recalibrating simulations** by comparing them with measurements taken within the laboratory.

Furthermore, Le Labo participates in several **research programs** in collaboration with recognized organizations such as Ademe, CSTB, and CEA.

Come **visit** Le Labo!

If you wish to learn more about this unique building, feel free to contact your Genatis representative.

RÉPUBLIQUE FRANÇAISE
Liberté Égalité Fraternité

FRANCE 2030

ADEME
AGENCE DE LA TRANSITION ÉCOLOGIQUE

lave


Natural
LIGHT

natural LIGHT

In a few words

Because artificial lighting represents an increasing share of our energy consumption, we have made **natural light** a cornerstone of our approach. The skylight (considering the light transmission of the glazing) thus becomes a **key asset** in the **distribution** of **natural light.**

When discussing natural lighting, the requirement for illumination is expressed in terms of **«Daylight Factor»** (DF). This is also the most commonly used indicator in environmental quality assessments. The daylight factor is a value that allows for a precise quantification of **natural light** entering buildings.

300 lux 50% of the time over 95% of the area is the minimum threshold recommended by the European standard EN17037 «Natural Light in Buildings».

300 lux,
50% of the time,
over **95%** of the area

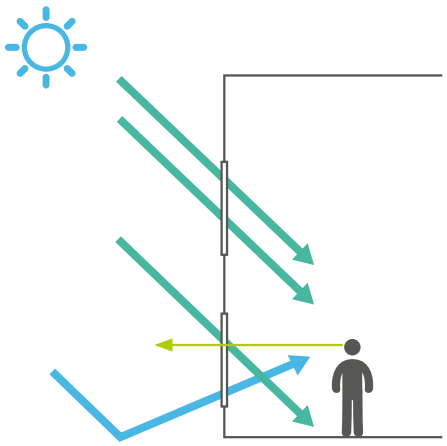
It is the minimum threshold recommended by the European standard EN17037 «Natural Light in Buildings.»

Would you like to **know more?**

The **GIF lumière,** the Association of Manufacturers and Installers of Fire Protection and Smoke Extraction Equipment (GIF), details all the **standards** and **guidelines** applicable to natural light in buildings.

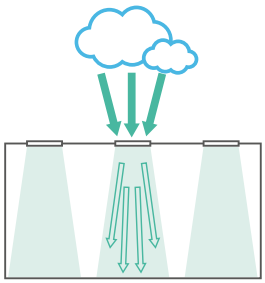
NATURAL LIGHT
IN IMAGES

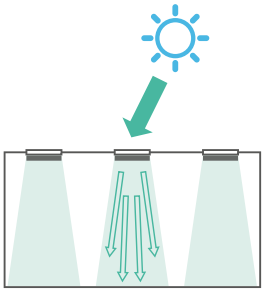
On the facade



On the roof

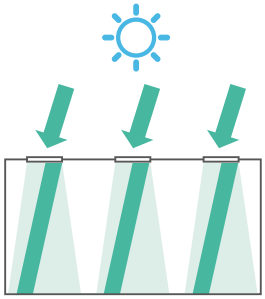
Lighting under overcast sky with skylight featuring diffusing or transparent glazing.





Sunlight with skylight featuring diffusing glazing.

Sunlight with skylight featuring transparent glazing.



Benefits & advantages OF **NATURAL LIGHT**

HEALTH

Natural light stimulates the production of hormones that affect **concentration, mood, learning, attention**, and **sleep.**
A lack or deficiency of light negatively impacts the internal clock and biological cycle, potentially leading to health issues such as depression, insomnia, digestive problems, mood swings, and stress.
Natural light = well-being and good health.

SAVINGS

More natural light, less energy consumption — it's simple! For example, installing skylights can **reduce the need for artificial lighting by 30 to 50%.**

ENVIRONMENT

The addition of natural light means a reduction in artificial lighting.
This optimized lighting management leads to a **decrease in a building's energy costs.**

SAFETY

Good natural lighting enhances concentration and improves the performance of sometimes difficult tasks. **It reduces fatigue,** one of the primary causes of workplace accidents. Increasing lighting from 500 lux to 2,000 lux at a workstation can result in a **50% reduction in workplace accidents** (according to a German study).

AESTHETICS

It's nothing new, **natural light highlights the volumes of a building,** its design, and architecture.
Natural lighting is an element of decor that provides visual and physiological well-being to occupants.

PRODUCTIVITY

Several studies have proven that natural light enhances learning and productivity. In both educational and professional environments, learning and task execution are more efficient with natural light... and it also **reduces absenteeism.**

We observe a **3 to 6% increase in efficiency** with the addition of natural light.
In retail spaces, the increase in sales is significant, with a +28% rise compared to environments without natural light.

RE 2020

The installation of our products on the roof or facade optimizes natural light autonomy within the building and reduces its primary energy consumption (Cep) (see Th-U and Th-L regulations).

Our CASE **STUDY** *natural light*

CONTEXT

Our case study on **natural light** focuses on the renovation project of a technical building. Located in the Moselle department, it houses the mechanical workshop and the vehicle repair and maintenance store for the departmental technical services.

The project involves a **complete renovation of the roof,** aiming to improve thermal insulation and **staff comfort.** Additionally, the **inclusion of natural light** through the roof was specifically requested by the project owner.

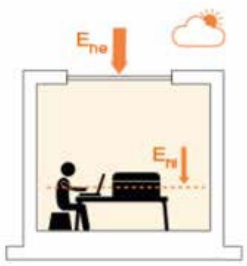
overview of the building before renovation

The **goal** for natural lighting in this study is set at **500 lux** for **50% of the time,** which is the average level recommended by the European standard **EN17037.**

PRINCIPLE

The most important indicator of a building's ability to admit natural light is the **Daylight Factor** (DF). It represents the ratio of natural light entering the building compared to the amount available outside.

The DF depends solely on the building's **orientation** and its openings, making it independent of location. Using meteorological data from a site, the DF allows for **estimating natural light autonomy** relative to a lighting target. It represents the percentage of time during which the lighting target will be achieved within the building.



$$FLJ = \frac{\text{E intérieur } (E_{hi})}{\text{E extérieur } (E_{he})} \times 100\%$$

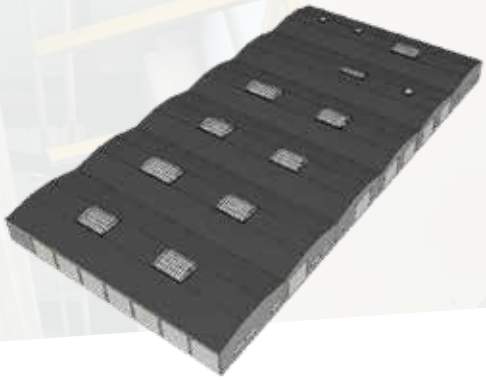
The typical Daylight Factor (DF) values to aim for to achieve natural light autonomy are between 1.5 and 2.5.

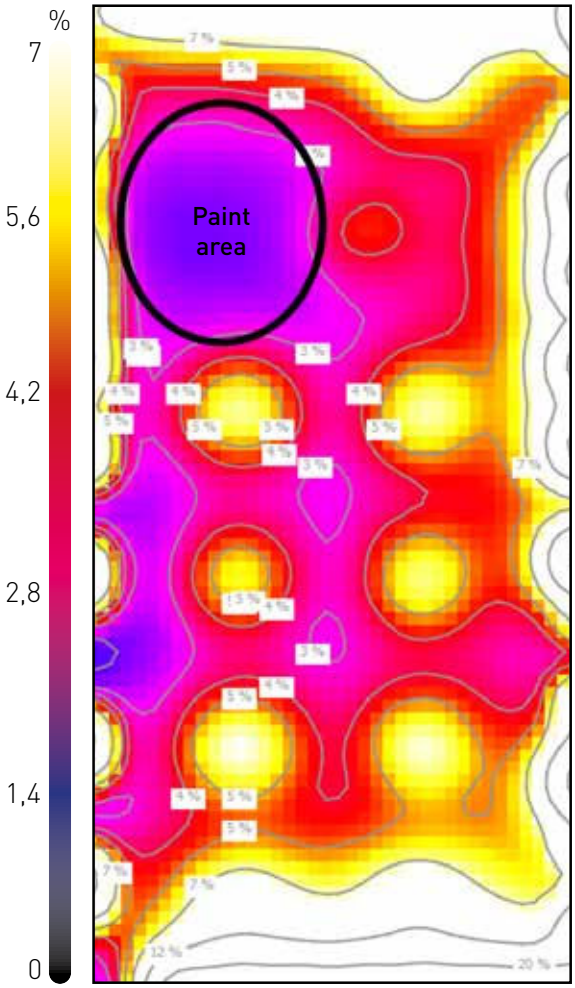
STUDY

To achieve the natural lighting goal inside the building, our experts recommend the installation of:

- **8 Bluevoûtes Therm**, each measuring 3x6 m
- **1 Bluevoûte Therm** measuring 2x5 m
- **3 Bluesteel Therm** , each measuring 1,3x1,3 m

The light transmission of the skylights is 52%.
The glazed elements on the facade have a light transmission of 70%.





Daylight Factor Distribution (%)

Simulation

LOCATION	
Longitude	0,6°
Latitude	44,2°
SOLAR POSITION	
Elevation	37°
Azimuth	13,6°
NATURAL LIGHT	
Sky Type	CIE type 16
Available Direct Illumination	34 059 lux
Available Diffuse Illumination	25 175 lux
Minimum Received Illumination	747 lux
Average Received Illumination	3061 lux
Maximum Received Illumination	22 824 lux
Minimum Daylight Factor	1,8%
Average Daylight Factor	6,0%
Maximum Daylight Factor	27,2%
Ratio of Surface Meeting the Requirement	100%

According to the recommendations and **simulation results,** the natural light provided by the facades and roof covers the entire space.
In this configuration, the natural lighting **goal** of **500 lux** for **50% of the time** will be **achieved** across **more than 95% of the surface area.**

80% average natural light autonomy achieved!

at 500 lux, during the 8am-6pm period, users will only need to rely on artificial lighting 20% of the time! This results in significant energy savings and substantial improvements in working conditions.

RESULTS
after renovation

Several months after the completion of the renovation, feedback has been very positive.

The recommendations from our lighting study were followed, allowing for minimal use of artificial light for the majority of the day. Additionally, an extra Bluevoûte was installed in the darker area to achieve better distribution of natural light there.

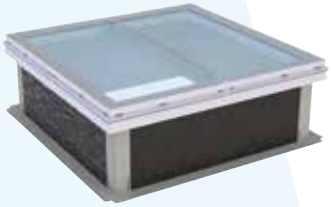
Finally, the complete refurbishment of the roof combined with the thermal performance of the installed vaults has significantly improved the building's thermal comfort.

How to BRING NATURAL LIGHT into buildings?

SKYLIGHTS

Bluetek skylights, available in the Therm (thermal improvement) and RPT (thermally broken) ranges, are ideal solutions for bringing natural light into buildings. Paired with our high-performance filling solutions, they provide optimal luminous, thermal, and acoustic comfort for occupants.

Available in a wide range of sizes and suitable for all types of roofs (sealed, dry, or renovation).



Bluesteel, Bluecoif, Bluebac range

VAULTS & SKYLIGHTS

Bluetek vaults and skylights offer the best alternative for combining luminous and thermal comfort inside buildings. Their various widths and unlimited lengths can be tailored to your needs, providing unparalleled natural light.

Bluevoûte, Bluelight range

VENTED AND LOUVERED DEVICES

Equipped with glass or polycarbonate filling, **Souchier-Boullet** hinged or louvered devices provide skylight illumination and natural light within the building.

Their custom manufacturing allows them to adapt to all configurations.

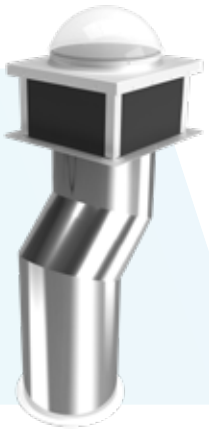
Certilux T, Certilight, Ventilight range

LIGHT TUBES

The Lightube natural light conduit by **Bluetek** brings natural light into dark or windowless rooms by channeling sunlight through a reflective tube.

Its ease of installation and various versions allow it to be used in all types of buildings (public buildings, warehouses, residences, etc.).

Lightube range



GLASS SKYLIGHTS

ERP (public buildings), commercial buildings, residences, industries, workplaces and living spaces...

The Inside range provides a solution for all types of projects where glass is used (comfort or smoke ventilation). This product line features an elegant design, offering occupants thermal, visual, and acoustic comfort.

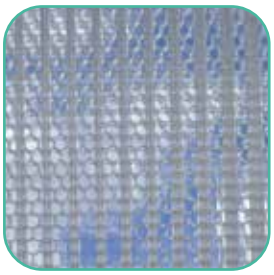
Inside range

PIVOTING LOUVER SYSTEM

Glass louver system used for **natural smoke ventilation** and **natural ventilation**. Discreet, aesthetic, and efficient, it integrates seamlessly into fully glazed surfaces while maintaining the flow of **natural light.**

Luxlame F Vision

HIGH-PERFORMANCE FILLINGS

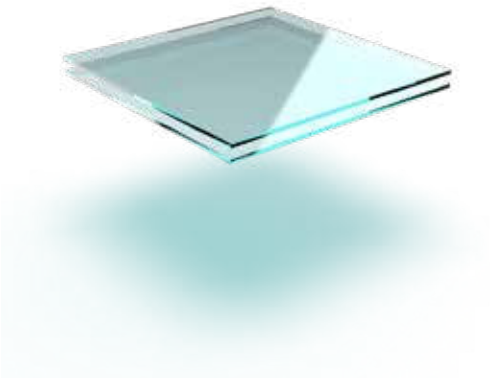


Brise Soleil Lumineux (BSL) - Luminescent Sun Shading

The **BSL** (Brise Soleil Lumineux - Luminescent Sun Shading) solution is a composite that includes cellular polycarbonate and a polycarbonate panel known as honeycomb. Its unique design provides **diffuse and even lighting** inside the building, eliminating light spots and glare. It also features **excellent thermal insulation performance.**

Pearl Inside

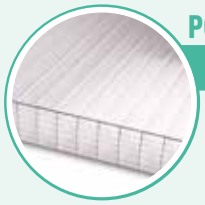
The Pearl Inside technology is an innovative filling that incorporates micro-glass beads. It enhances the acoustic performance and aesthetics of the building. Each bead diffracts light rays to achieve more uniform lighting and address glare issues.



Glass filling

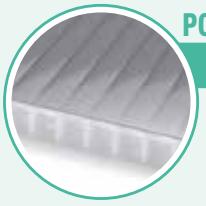
Tempered double or triple glazing, available in large formats. Valued for its light transmission and acoustic qualities, it also provides visibility to the outside, allowing you to enjoy the natural color of the sky.

STANDARD FILLINGS



PCA
Transparent

PCA
Opalescent



PCA
Calor Control

Which filling is right **for your building?**

Transparent, diffusing, or tinted, from 16 to 32 mm, the choice of filling varies depending on the building's nature and its activity.

Our experts are available to recommend the ideal filling for your project!

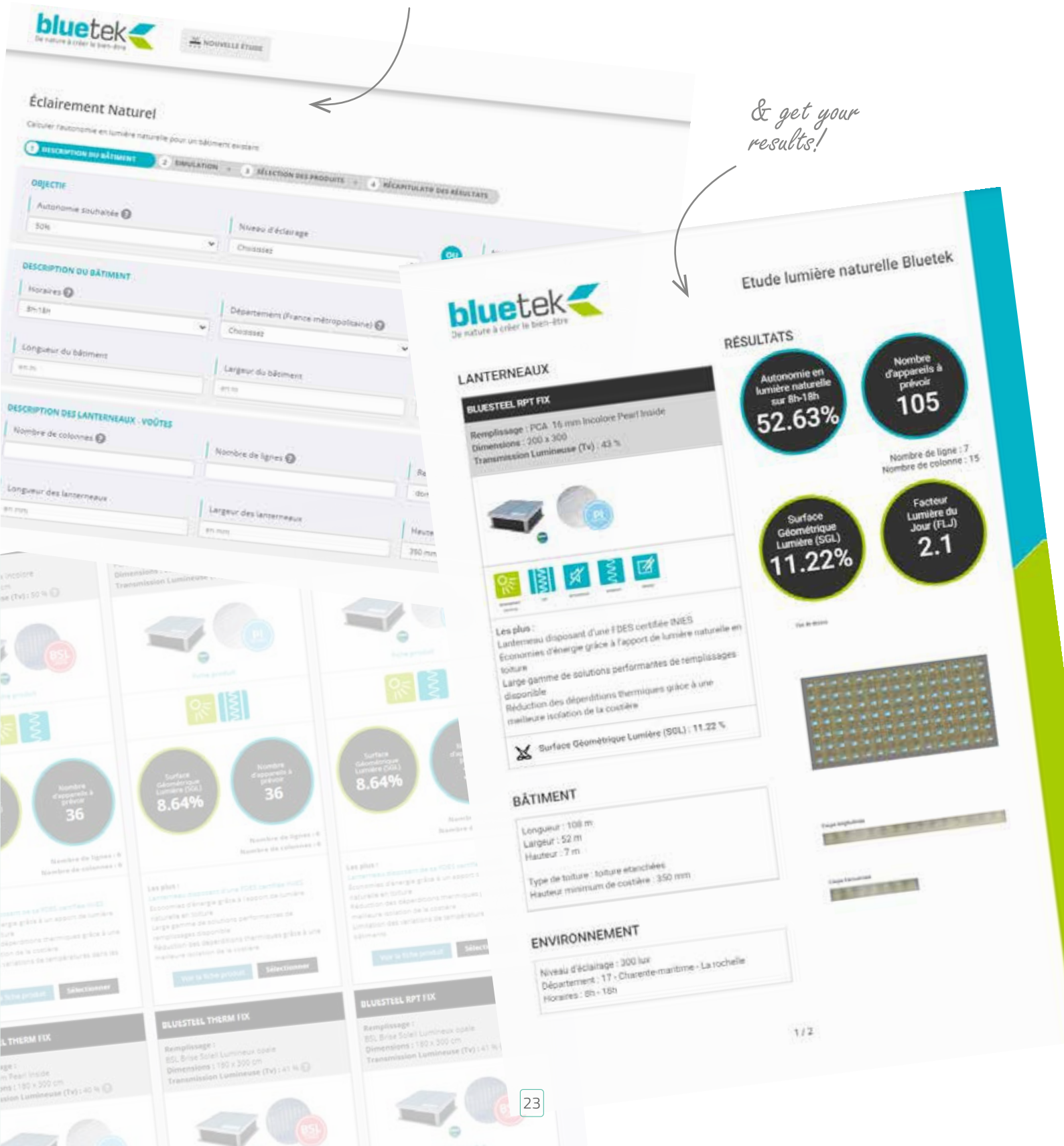
DISCOVER OUR LIGHT TOOL

Discover our **light tool!**

Quickly calculate the number of skylights you need to achieve **natural light autonomy** in your building.

Enter your building information, select your solution...

& get your results!



SUN
Shading

SUN-SHADING
fixed or mobile

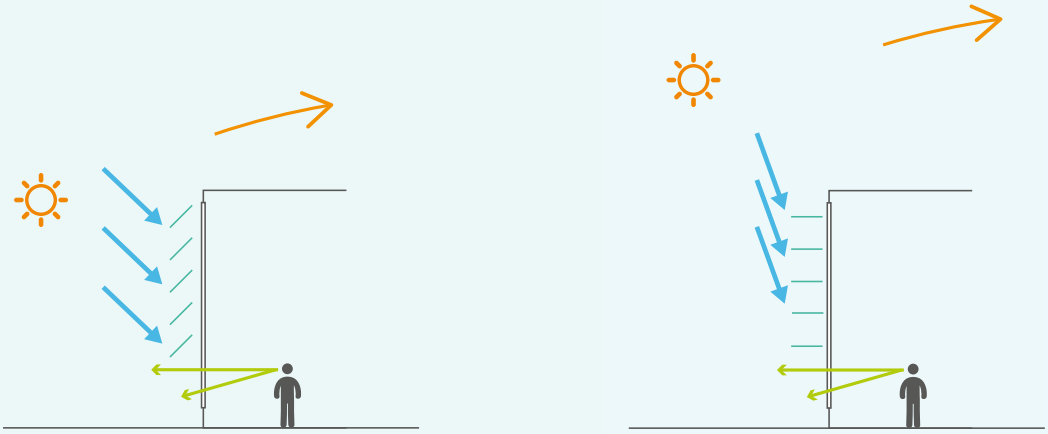
In a few words

Summer solar radiation can become a source of discomfort if not properly managed. **Solar shading** solutions play a crucial role in intercepting sunlight before it penetrates through glass surfaces and overheats the interior. Installing shading solutions **on roofs and/or facades** protects the building from excessive heat. This approach is effective, environmentally friendly, aesthetically pleasing, and cost-efficient.

SUN-SHADING
IN IMAGES

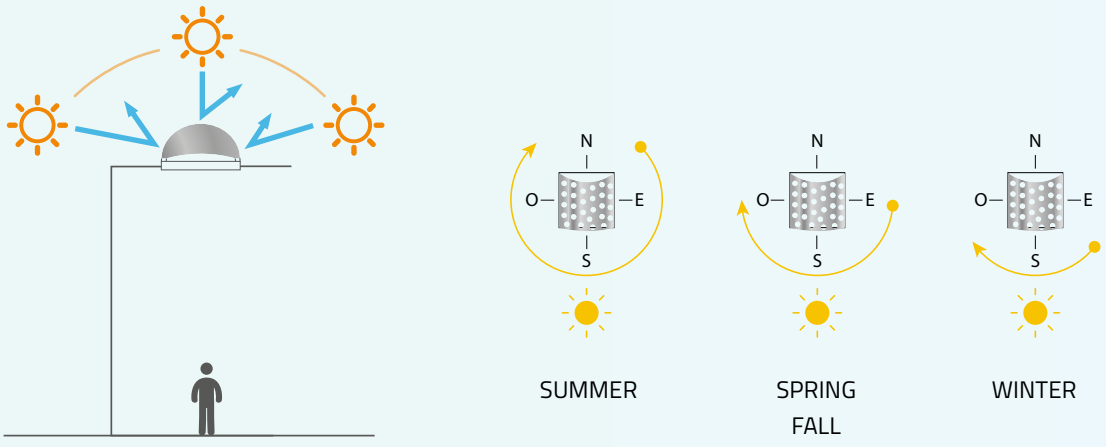
ORIENTATION OF MOBILE SHADING SOLUTIONS RELATIVE TO THE SUN'S PATH

On the facade



ORIENTATION OF FIXED SHADING SOLUTIONS RELATIVE TO THE SUN'S PATH

On the roof



Benefits & advantages OF **SUN-SHADING**

AESTHETICS

These solutions enhance the **value of buildings** and adapt to various architectural styles, whether they are installed on new or renovated facades.

ENVIRONMENT

Solar shading systems prevent overheating inside buildings and **reduce the need for air conditioning.** This lowers energy consumption and minimizes the negative environmental impact.

SAVINGS

Shading provides additional solar protection to the building and **delays the need for cooling systems** in spaces exposed to high temperatures. This solution results in **significant cost savings** for building managers.

COMFORT

Shading in buildings helps to **limit heat entry during the summer** and reduce discomfort. Additionally, our fixed or mobile solutions **prevent glare** in the spaces to optimize occupants' visual comfort.

PRODUCTIVITY

Excessive heat in buildings can cause discomfort and lead to a significant **decrease in productivity.** Effective shading helps to **significantly reduce heat gain** in the building, thereby maintaining occupant comfort.

RE 2020

To meet the goals set by RE2020 regarding summer comfort and energy consumption, it is essential to implement solar protection systems such as our fixed or mobile shading solutions (see Th-S rules).

Our CASE **STUDY** *sun-shading*

CONTEXT

Our **sun-shading** case study focuses on the renovation of an old youth workers' residence (FJT) located near Angers (49). The site, which is spread across two buildings, was completely redesigned to include a library, a playroom, an educational center, and office space.

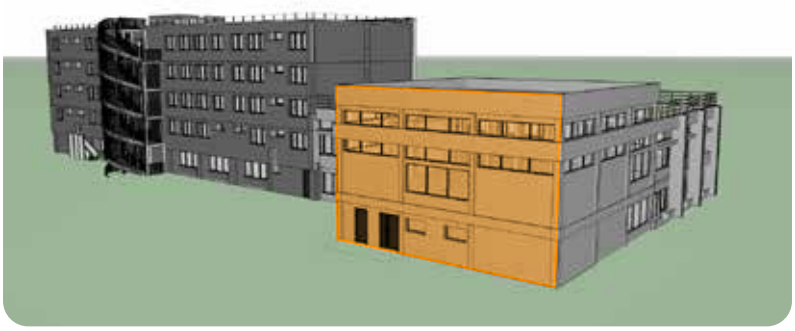
Major **renovations**, thermal upgrades, compliance adjustments, and accessibility improvements were carried out. To optimize **indoor comfort** and occupant **well-being, sun-shading devices** were installed on the fully renovated facades.

overview of buildings before renovation

The **goal** of this sun-shading study is to find the optimal balance between **solar protection performance** to enhance **thermal comfort during the summer** and the preservation of **light and solar inputs** during the winter.

STUDY

For this building, the goal is to integrate sunshades on the East, West, and South facades. Although the different geographic orientations of the three facades require separate studies, the methodology remains the same.

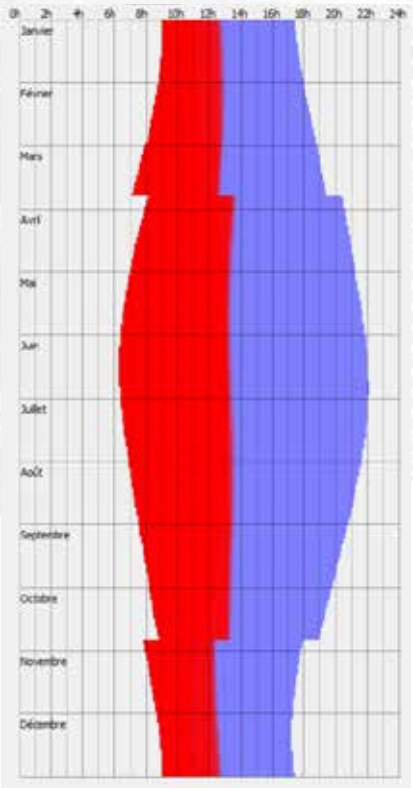


3D ArchiWizard view of the building - Eastern Facades

Initially, it is essential to assess the solar reception of the building without sunshades. This involves studying the average monthly values of solar radiation and light entering the building through the facade openings.

Let's use the Eastern facade of the building, identified in orange on the attached 3D visual, as an example.

Without sun-shading



Mapping of direct radiation reception by hour and month without sunshades

Thanks to our simulation tools and the provided mapping, we can observe that the east-facing facade is exposed to direct sunlight throughout the morning, both in summer and winter. This result must be taken into account to ensure the right balance between the two seasons.

Hours	Direct radiation (kWh/m²)											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	1	0	0	0	0	0	0
9	0	0	0	1	3	3	3	2	0	0	0	0
10	1	1	1	3	6	5	5	5	2	2	1	0
11	2	2	1	4	7	6	7	7	4	4	2	1
12	2	2	2	4	5	4	5	6	4	3	2	1
13	1	1	1	3	4	3	3	4	3	2	1	1
14	0	0	0	1	1	1	2	2	1	1	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0

Direct reception

No direct reception

With sun-shading

We then study the impact of the blade tilt on the solar reception of the facade. The table below presents, for the studied tilts, the monthly ratio of remaining radiation and illumination compared to the configuration without sunshades.

The tilt of -30° appears to be the optimal compromise between reducing direct solar gains in summer and preserving light and solar gains in winter.

		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
-45	Global radiation	0,69	0,67	0,62	0,56	0,53	0,53	0,53	0,54	0,60	0,64	0,70	0,71
	Direct radiation	0,71	0,67	0,63	0,43	0,35	0,30	0,32	0,39	0,54	0,61	0,72	0,73
	Global illumination	0,67	0,65	0,60	0,55	0,54	0,54	0,54	0,54	0,59	0,62	0,67	0,68
	Direct illumination	0,73	0,67	0,63	0,44	0,36	0,31	0,33	0,41	0,55	0,62	0,73	0,74
-30	Global radiation	0,75	0,75	0,69	0,63	0,60	0,60	0,60	0,61	0,68	0,72	0,76	0,75
	Direct radiation	0,78	0,76	0,73	0,53	0,41	0,35	0,37	0,47	0,65	0,72	0,78	0,77
	Global illumination	0,73	0,73	0,68	0,63	0,61	0,61	0,61	0,62	0,67	0,70	0,74	0,73
	Direct illumination	0,78	0,77	0,74	0,54	0,43	0,36	0,39	0,48	0,66	0,73	0,78	0,77
-15	Global radiation	0,74	0,76	0,73	0,70	0,67	0,66	0,66	0,68	0,74	0,76	0,75	0,72
	Direct radiation	0,74	0,78	0,79	0,65	0,52	0,42	0,46	0,58	0,75	0,78	0,75	0,70
	Global illumination	0,73	0,75	0,72	0,70	0,67	0,66	0,67	0,68	0,73	0,75	0,74	0,71
	Direct illumination	0,73	0,78	0,79	0,66	0,53	0,44	0,48	0,59	0,76	0,78	0,74	0,68
0	Global radiation	0,67	0,72	0,72	0,74	0,71	0,69	0,70	0,73	0,75	0,74	0,68	0,64
	Direct radiation	0,62	0,71	0,76	0,75	0,64	0,54	0,58	0,70	0,80	0,76	0,63	0,57
	Global illumination	0,67	0,72	0,73	0,73	0,71	0,70	0,70	0,72	0,75	0,74	0,68	0,65
	Direct illumination	0,60	0,70	0,76	0,76	0,65	0,55	0,59	0,71	0,80	0,75	0,62	0,55

RESULTS
after renovation

The installation of **AZUR** fixed sunshades has reduced direct radiation by an average of **60%** over the summer, while preserving **over 70%** of natural light and solar gains in winter. Combined with an adiabatic cooling system (see page 48), these solutions have ensured a comfortable indoor summer climate without air conditioning.

The primary goal of the project's lead contractor was to achieve **energy performance** equivalent to that of a new building. While we currently lack sufficient data to confirm this objective, we can assert that occupant **comfort** has been **significantly enhanced** compared to the original building. The **facade sunshades** actively contribute to preserving indoor **thermal and visual comfort,** creating **comfortable and inviting spaces** for staff and occupants.

Architect Lionel Vié & Associés - **Engineering Firm** AB Ingénierie - **Installation** Adrion sunshades

Discover our **3D sun-shading configurator!**

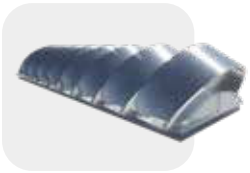
This new tool for assisting in the design of construction and renovation projects prominently demonstrates the **performance of our sunshades** from both interior and exterior perspectives. It allows you to model our solutions in 3D and download a PDF report detailing the annual **energy performance** with and without sunshades.

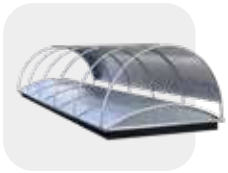
How to INTEGRATE SUN-SHADING into buildings?

FIXED SUN-SHADING
Dome-veil

The Dome Veil by **Bluetek** is a **fixed shading solution** for skylights, DENFC, or vaults. Thanks to its optimized orientation, it effectively **reduces direct radiation** in summer, thereby preventing overheating. In winter, its design allows natural light and warmth to enter the building.

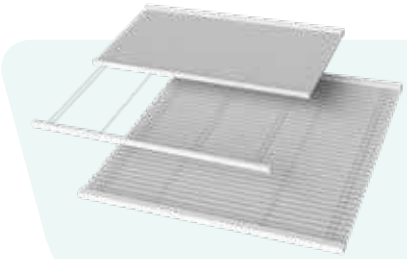
On the Bluevaults, the Dome Veil is available in **two versions:** longitudinal or lateral.





The concept in video

INDOOR BLINDS



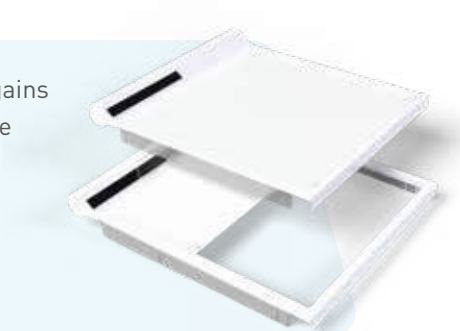
The electric interior blind is a mobile solar protection solution compatible with **Bluetek** skylights. Whether translucent or blackout, it helps to limit room heating and eliminate glare when closed.

Inside, Bluesteel RPT & Therm range

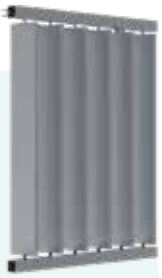
EXTERIOR SHUTTERS

Autonomous thanks to its photovoltaic receiver, the exterior shutter reduces solar gains by 90%. In winter, when closed, it helps retain heat inside the building during the night. Available for Steel Inside **Bluetek** skylights.

Inside range



SUNSHADE



Installed on building facades, **Tellier Brise-Soleil** represent an effective architectural solution against solar radiation. Fixed or adjustable, they help limit direct solar gains and thereby preserve the thermal and visual comfort of occupants.

Adjustable sunshades allow for customization of shading based on needs, ensuring a constant **balance between light and shade.**

Azur and Recti'ligne range

Beyond their functional aspects, sunshades are also architectural elements integrated into the facade. With their careful design, they aesthetically complement all types of buildings regardless of architectural style.

Various installation methods are available: vertical with upright slats, vertical with horizontal slats, and horizontal installation.

EXTERNAL VENETIAN BLIND (BSO)

Ideal for meeting **solar protection** requirements, the range of adjustable blade blinds preserves the building from solar radiation. Mounted on the facade within a niche or under lintel, they **shield** occupants from summer overheating.

Thanks to the easy tilt adjustment of the blades, it's possible to control the amount of natural light entering. This shading modulation achieves **optimal lighting** inside the building. Closing the blades allows for nearly complete blackout if desired.

Mobil'ligne range

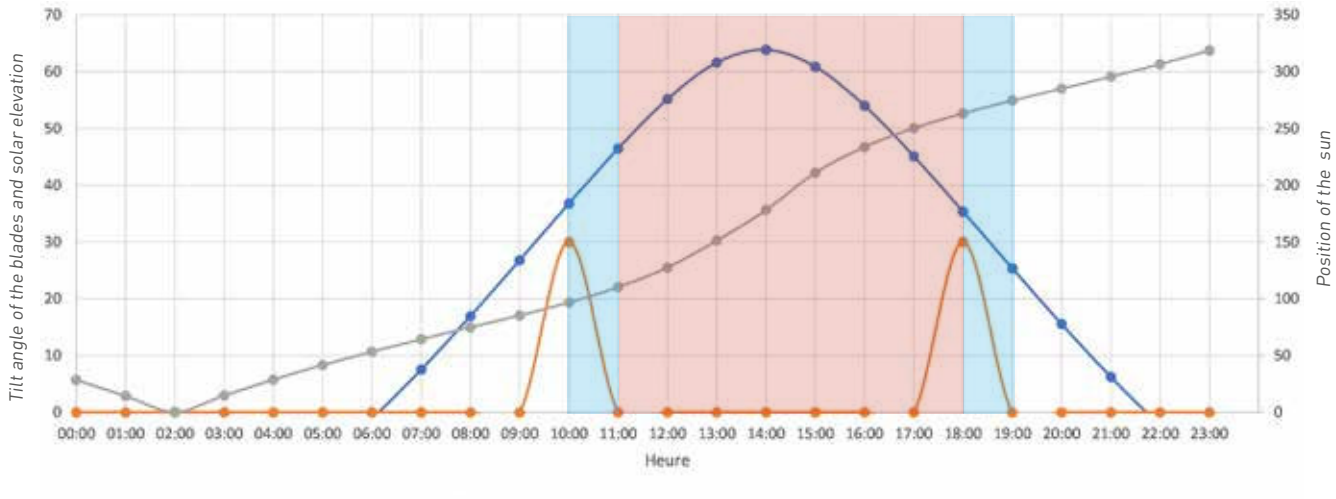
Architect Thierry Van de Wyngaert Architectes Associés - **Installation** Briotet Semecourt

CONTROLS & mobile shading solutions

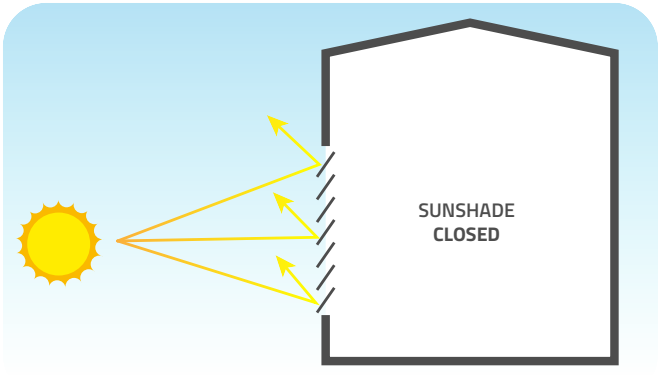
Controlling adjustable sunshades ensures the **optimal tilt angle** of the blades **to counter direct sunlight** and maintain **maximum brightness.**
Several parameters must be considered to achieve the optimal control solution: the building's location, facade orientation, weather conditions, and sunshade configuration.

Summer scenario

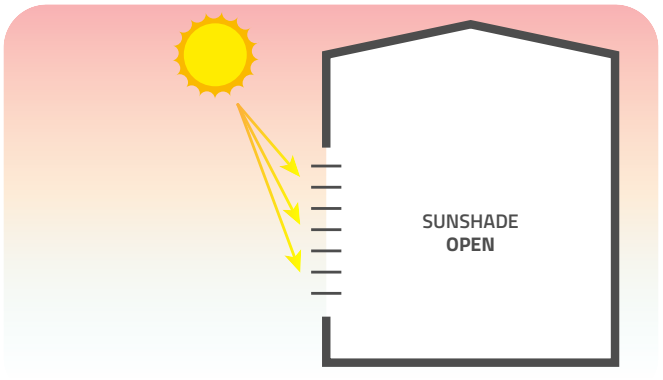
Automated control for a clear-sky day with direct sunlight (city of Paris - southern facade):



The two blue zones, from **10:00 am to 11:00 am** and from **6:00 pm to 7:00 pm,** represent the times when the sun is at its lowest on the exposed facade. During these times, the control system adjusts the tilt angle of the sunshade blades to limit direct sunlight inside the building. The red zone represents the part of the day when the sun is high enough that the sunshade blades no longer need to be tilted.



Sun position and sunshade tilt during the time slots 10:00-11:00 am and 5:00-6:00 pm

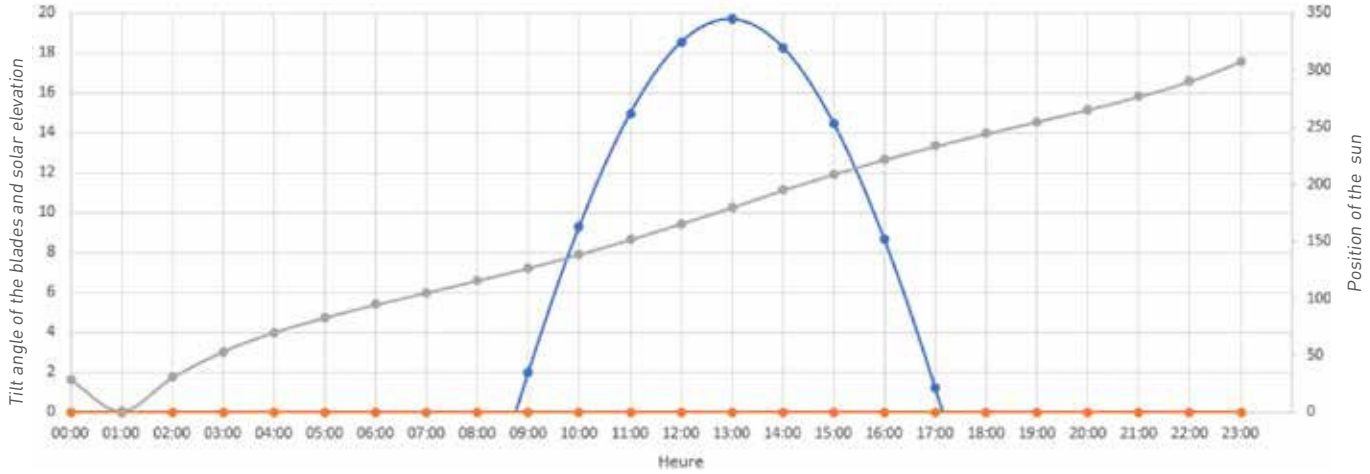


Sun position and sunshade tilt from 11:00 am to 5:00 pm

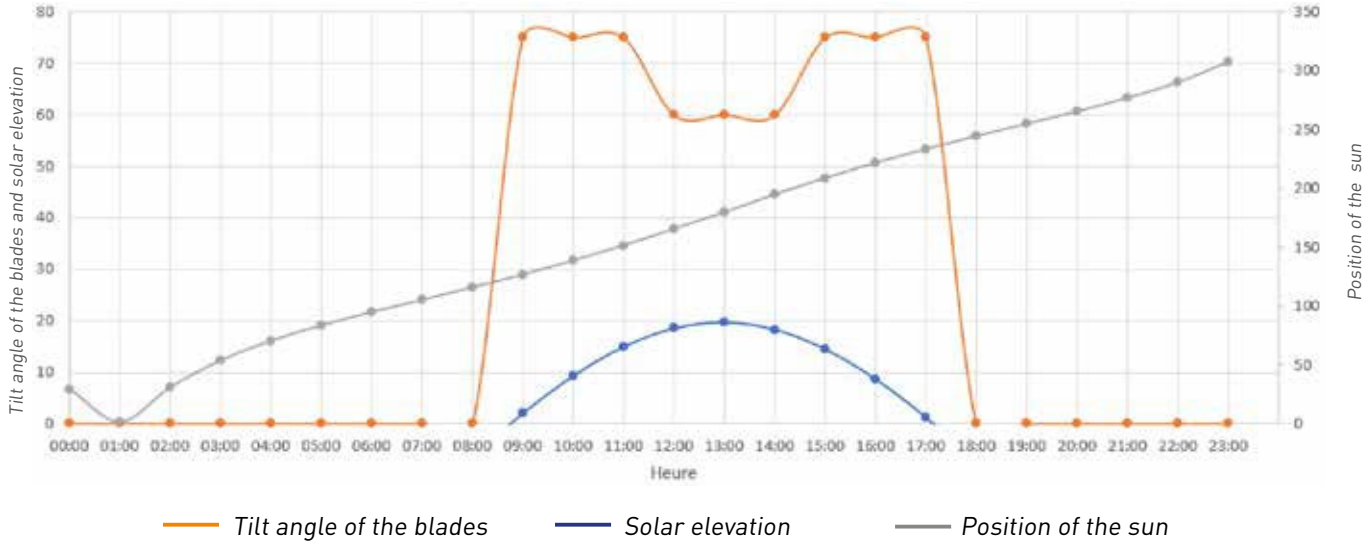
Winter scenario

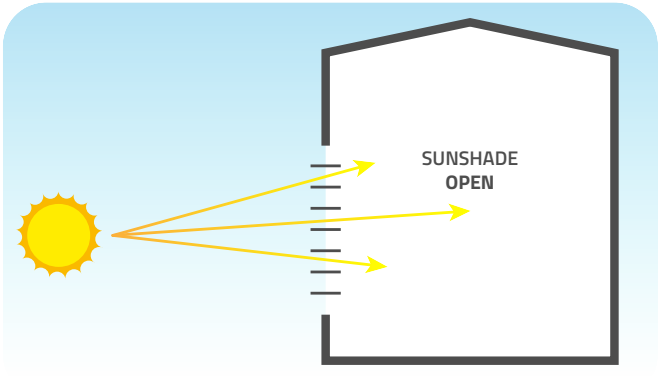
Automated control for a clear-sky day with direct sunlight (city of Paris - southern facade):

Scénario 1 : Maximizing solar gains inside the building. The sunshades remain constantly at 0° to facilitate the penetration of direct sunlight into the building.

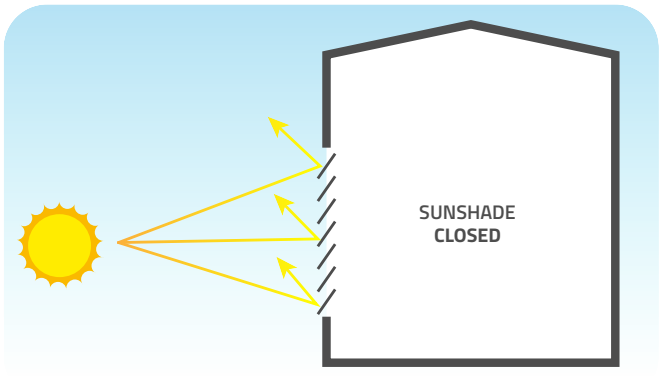


Scénario 2 : Minimization of glare inside the building. The tilt angle of the blades varies based on solar exposure.



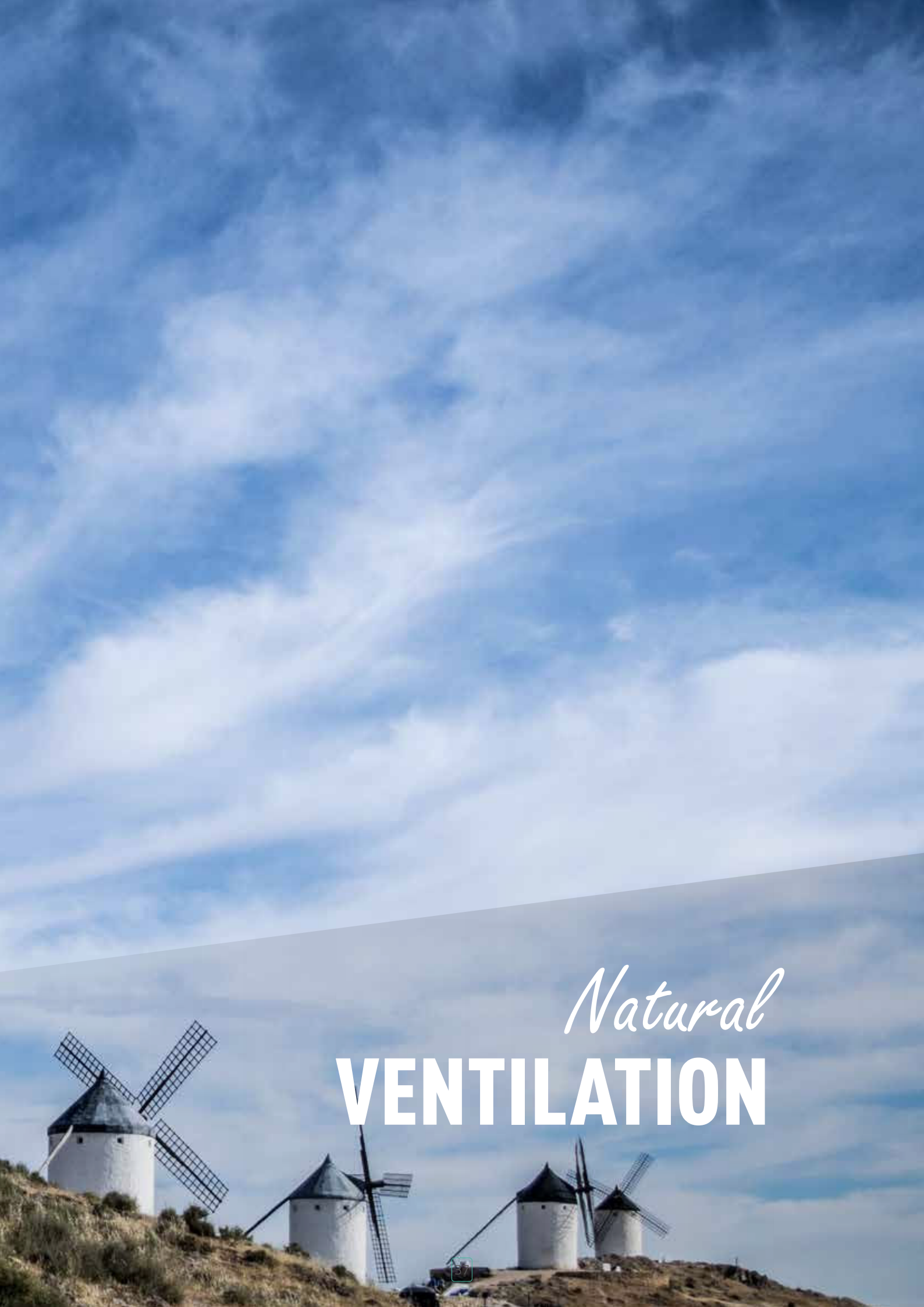


SCENARIO 1 : Maximizing solar gains



SCENARIO 2 : Reduction of glare

Tilt angle of sunshades based on the sun's position in winter



Natural

VENTILATION

natural VENTILATION

In a few words

Genatis offers a solution for **natural ventilation** in buildings, which is now essential. In addition to **renewing the air,** it is crucial to understand its benefits for occupants and facility managers. By providing **fresh and healthy air,** this solution aims to ensure **good indoor air quality, reduce thermal load,** and contribute to summer **comfort.** Proper use significantly limits environmental impact and reduces energy costs.

Indoor air can be up to **8 times** more polluted than outdoor air.

The cause is a high concentration of chemical, biological, and physical pollutants.

Natural ventilation is governed by two physical principles:

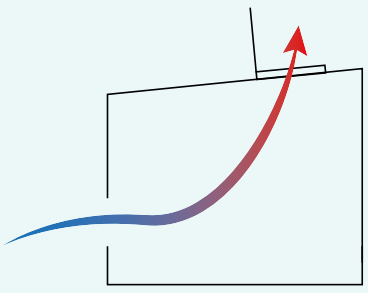
- Thermal buoyancy (or thermal draft)
- Aerodynamic pump

To learn more, discover **«The Guide to Natural Ventilation»**.

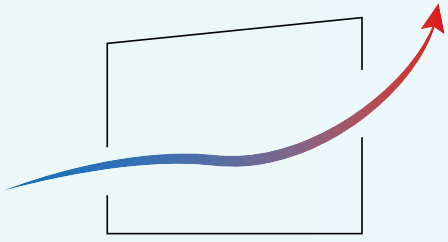
This «natural ventilation» guide serves as a precise tool for **optimized ventilation management.** Beyond being part of the health and environmental framework that fully complies with RE2020 regulations, quality ventilation is inseparable from the well-being of building occupants. Ventilation also aligns with the development of sustainable constructions, in line with a successful energy transition initiative.

NATURAL VENTILATION
IN IMAGES

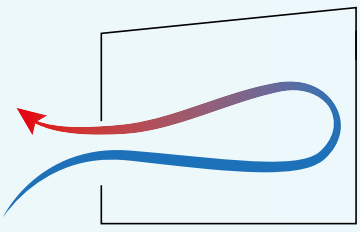
HOT AIR, LESS DENSE THAN COOL AIR, TENDS TO RISE AND EXHAUST ITSELF AT THE UPPER PART OF THE SPACE.



NATURAL VENTILATION THROUGH CHIMNEY EFFECT



CROSS-VENTILATION NATURAL VENTILATION



SINGLE-SIDED NATURAL VENTILATION

Benefits & advantages OF **NATURAL VENTILATION**

HEALTH

On average, we spend 80% of our time indoors. It's important to note that **indoor air can be up to 8 times more polluted than outdoor air (CO_2/ VOCs).**
From a health perspective, it's crucial to understand that ventilation helps **prevent, or at least limit, the spread or emergence of viruses and allergens,** which can lead to respiratory diseases.

SAVINGS

The use of natural ventilation not only purifies indoor air but also creates a gentle breeze that enhances comfort for occupants. This reduces or even eliminates the need for fans or other devices, **resulting in real cost savings.**

ENVIRONMENT

It is possible to simultaneously address ecological footprint concerns while achieving significant savings. By reducing or eliminating the use of energy-intensive devices, such as limiting greenhouse gas emissions, responsible behavior leads to a **decrease in energy expenses.**

SAFETY

The introduction of fresh and healthy air helps **combat indoor humidity,** thereby **preventing premature deterioration** of the building structure. Consequently, it optimizes indoor comfort and well-being.

COMFORT

Natural ventilation is quiet compared to certain devices like fans. This feature provides real comfort for occupants, as they are not subjected to constant noise disturbances.

Our CASE **STUDY** *natural ventilation*

Tellier Brise-Soleil (49)

CONTEXT

Our case study on **natural ventilation** focuses on the construction project for **Tellier Brise-Soleil**' manufacturing site in Chemillé-en-Anjou (49). In the case of a new building, the study of natural ventilation typically occurs early in the planning stages of construction.

To properly size a project and provide **recommendations**, it is essential to study various elements related to the building in question. These studies are **crucial** as they determine the performance of **natural ventilation** systems.

GPS coordinates, orientation and **external architecture, dominant winds** on the site, surrounding **built environment,** building **activity and human occupancy zones, internal architectural obstacles** and **aerodynamic factors** are all points studied for the successful completion of the study.

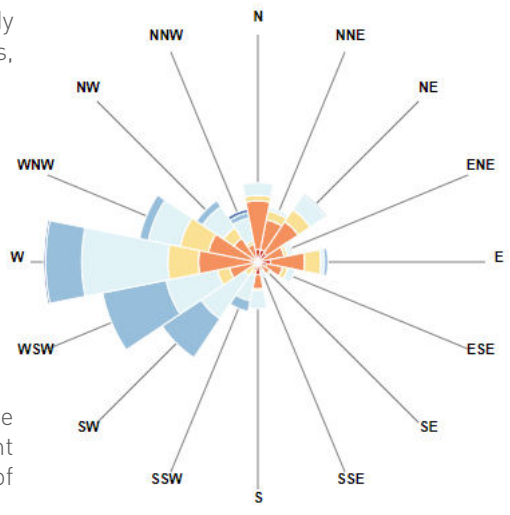
STUDY

To assess the aerodynamic potential of the future building, it is crucial to study its **environment,** including geographical location, obstacles or masking effects, neighboring aerodynamics, dominant winds, and topographical effects.

In our case, the construction is planned in the municipality of **Chemillé-en-Anjou,** Maine-et-Loire, with prevailing winds typically from the **West or West-Southwest** during summer.

Topographical effects of the site must also be considered. Due to the proximity of another building, it is recommended that the new construction be located at least 5 times the height of the neighboring obstacle away to minimize its **masking effect.**

Wind is a **variable phenomenon** in both **speed** and **direction,** which can change rapidly. Initially, the site's aerodynamic potential is assessed. This assessment helps quantify the effectiveness of natural ventilation based on the percentage of facade and/or roof openings.



Wind rose

Masking effect of the neighboring building

Office space

Each volume of the building is then studied, taking into account the **main wind directions** and **possible air inlets/outlets.** It is important to note that for effective natural ventilation, achieving a sufficient **air exchange rate** is essential to ensure indoor comfort (minimum of 8-10 air changes per hour).

As a result, three levels of natural ventilation can be identified:
Green indicates volumes where natural ventilation is potentially **effective.** These volumes are suitable for cross-ventilation (air intake and exhaust on opposite facades) or natural ventilation with chimney effect (air intake on facade and exhaust through the roof).
Yellow represents volumes where there are air inlets, but the air exchange rate may be potentially insufficient because the configuration is not easily compatible with cross-ventilation.
Red indicates spaces where the air exchange rate is considered insufficient (limited or no air inlets/outlets, internal configuration issues, etc.).

Main floor, office space

Second floor, office space

Unlike the ground floor, the offices on the first floor have the advantage of using **skylights as exhaust vents.** This allows placing the exhaust vents opposite the air intakes to achieve complete air circulation within the volume.

However, for spaces where the facade is not exposed to wind, an air intake on the roof and an exhaust vent on the facade can be considered. This configuration is not ideal as it goes against the natural thermal draft, but wind can still create appreciable airflow.

Workshop area

Only a portion of the workshop area can be partially ventilated naturally. Installing **facade openings like Certilam F** will create air intake in this zone. However, roof exhaust vents must also be installed to ensure natural ventilation.

The quantity and configuration of these ventilation openings should be determined based on smoke extraction studies and in coherence with the adiabatic cooling study.

Considering these factors, it is suggested to opt for the installation of **Exuplus Elec vault openings,** which serve both natural smoke extraction and natural ventilation purposes.

Conclusion

The effectiveness of natural ventilation is **directly related to the presence of wind and its variations** over time in **speed** and **direction.** Facade openings positioned on the Northwest and Southwest facades allow **fresh air to enter** the premises, especially in the offices. When feasible, extraction points on opposite facades and **roof openings** serve as **air outlets.**

The circulation of fresh air **significantly enhances** working conditions for employees, who appreciate the **comfort** of the new building. Compared to the company's previous facilities, **natural ventilation maintains a pleasant working environment** without the discomfort of stifling heat, even on hotter days.

Adiabatic cooling could further improve **summer comfort,** especially in areas where the effectiveness of natural ventilation is more limited.

How to BRING NATURAL VENTILATION into buildings?

FACADE LOUVERS

Glass, polycarbonate, or aluminum louvers with **pivot systems** used for natural **smoke extraction and ventilation.** They are discreet, aesthetic, and efficient, seamlessly integrating with various architectural styles and building configurations.

Luxlame F, Certilam F, Certilux F

FACADE WINDOWS

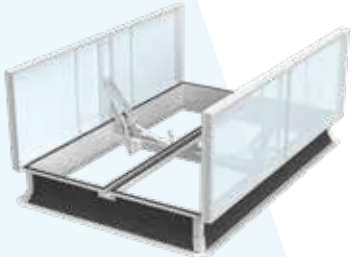
Facade windows combine **natural smoke extraction** and **natural ventilation solutions.** They feature a sleek RPT frame design with a wide range of operating mechanisms to accommodate various applications. Some models have **concealed** electrical or copper cables within the profile for enhanced functionality.

OTF, OTF Vision, Exubaie V2

SKYLIGHTS

Equipped with **improved thermal performance** or **thermally broken profiles,** roof skylights serve the functions of **natural smoke extraction, natural ventilation,** and **zenithal lighting** of the building. Available with single or double openings, their **large opening surfaces** contribute effectively to the proper **natural ventilation** of the premises.

Bluesteel RPT Air, Bluesteel Therm DV, Ventilight



WINDOW AUTOMATION

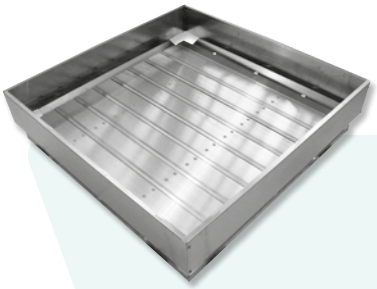
The **chain actuator** or **electric chain actuator** allows for the automation of projecting windows, sheds, skylights, or casement windows. Its installation enables **natural ventilation** inside the premises.

Chain actuator, electric actuator

ROOF OPENINGS

Electric or pneumatic, roof openings are adaptable to all types of Bluevoûte structures. In addition to providing natural light, they offer a **natural ventilation** solution for buildings equipped with Bluevoûtes.

Exaplus RPT



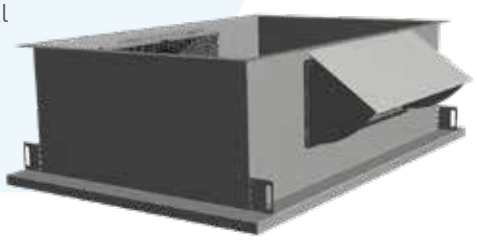
LOUVERS WITH BLADES

Equipped with pivotable blades, **louvers** combine **natural ventilation** and **natural smoke extraction** solutions. Models with transparent blades also provide zenithal lighting. The various frame profiles allow them to adapt to all types of configurations.

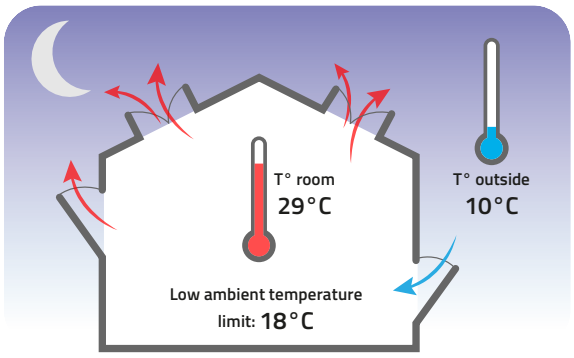
Certilam T, Certilux T

VENTILATION UPSTAND

An upstand equipped with motorized **ventilation flaps** to enable ventilation in all weather conditions (rain and/or wind). Installed between the sealing upstand and the smoke outlet, it does not reduce the effective ventilation area of the smoke outlet.



CONTROLS & *natural ventilation*



Air inlets and outlets open at night

Night Cooling Management

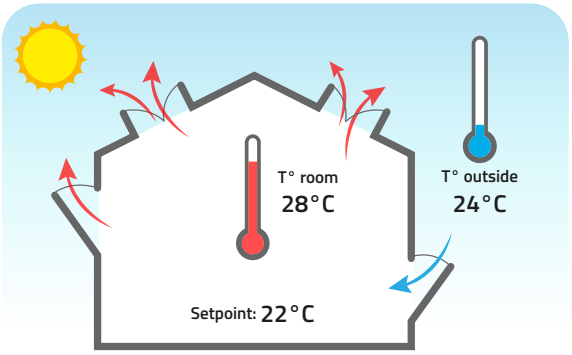
Natural ventilation can be **optimized** through control systems, especially at night. The diagram illustrates the importance of control, particularly during nighttime hours. Temperatures are lowered **without human intervention.**

By utilizing **night cooling,** the need for daytime cooling can be significantly reduced because nocturnal outdoor air is used to **thermally unload** the building interior based on daily temperature forecasts.

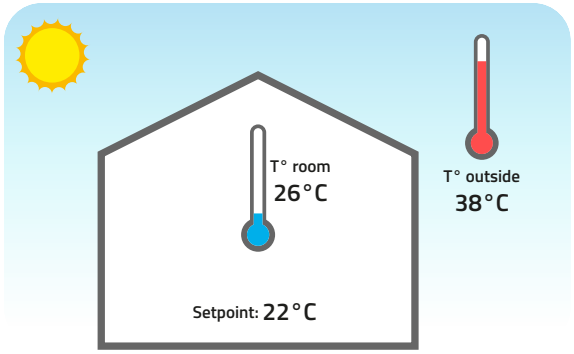
Optimizing Comfort - Free Cooling

It's important to note that various control equipment such as sensors, probes, and automation systems play a crucial role throughout the day by considering natural elements such as rain, outdoor temperature, CO_2 levels, and humidity.

The automation system can, for example, **select optimal time slots** during the day for indoor air renewal. This control helps improve indoor air quality by removing pollutants, thereby creating a healthier indoor environment that positively impacts occupants' health by reducing risks associated with indoor air pollution.



Air inlets and outlets open during the day



Air inlets and outlets closed during the day

The various sensors identify optimal times to **maintain** or **lower** indoor temperatures. Roof and facade openings facilitate this **controlled regulation.**

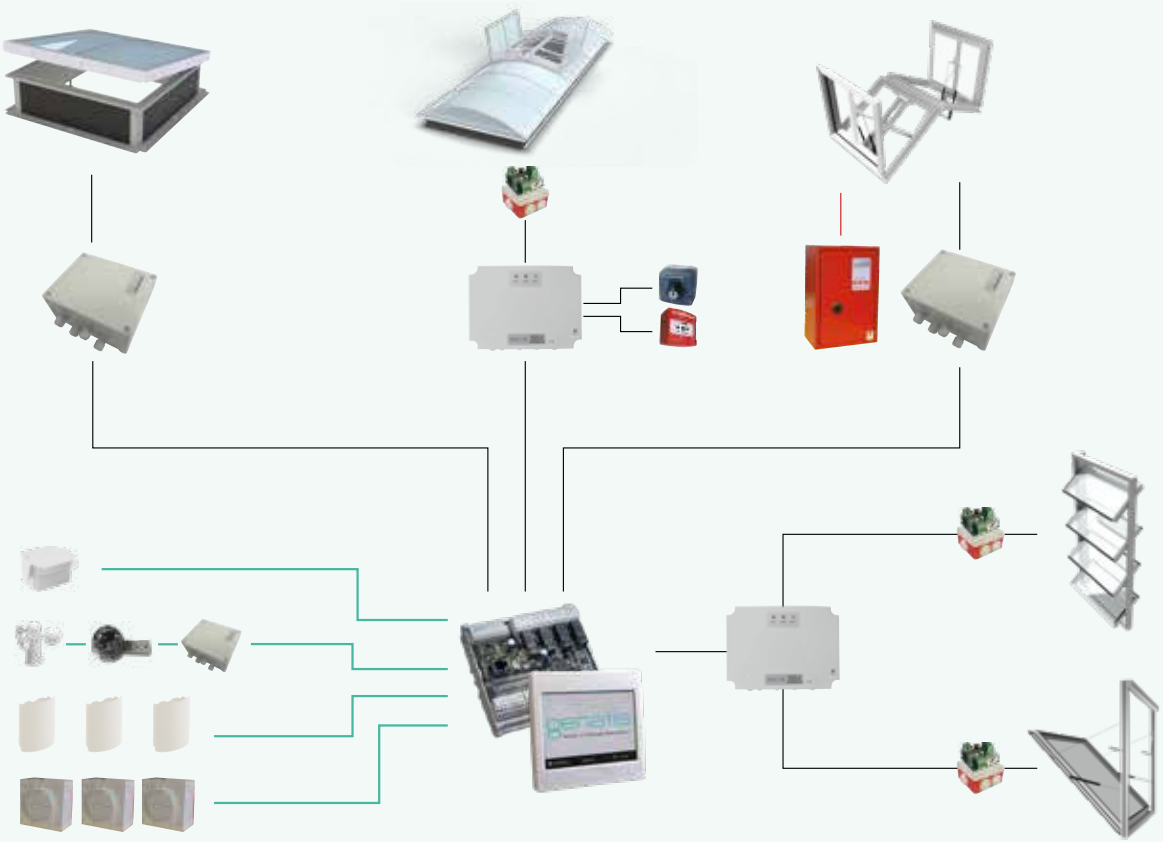
This setup ensures building **comfort** day and night.

Instructions linked to specific building activities and occupant requirements will also be considered, granting the automation system a true role as the «conductor» of comfort.

CONTROLS & *natural ventilation*

The majority of Genatis **Natural Smoke and Heat Exhaust Ventilators (NSHEV)** are **CE/NF certified** with dual functionality for smoke extraction and ventilation. This allows mandatory installations primarily for fire safety to also enhance **indoor comfort** and building **performance,** minimizing additional costs.

Principle schematic: natural smoke extraction and natural ventilation



Ventilation peripherals
Temperature (internal/external), wind, rain sensors, push button...

Adiabattic COOLING

ADIABATIC *cooling*

In a few words

Known as **adiabatic cooling** or bioclimatic air conditioning, this simple ecological process uses hot outside air to transform it into cooled air.

The hot and dry air passes through a wet exchanger where it **cools down.** The energy required for the evaporation of water is extracted from the air.

This natural phenomenon is similar to what can be observed near water bodies where the temperature is lower in summer.

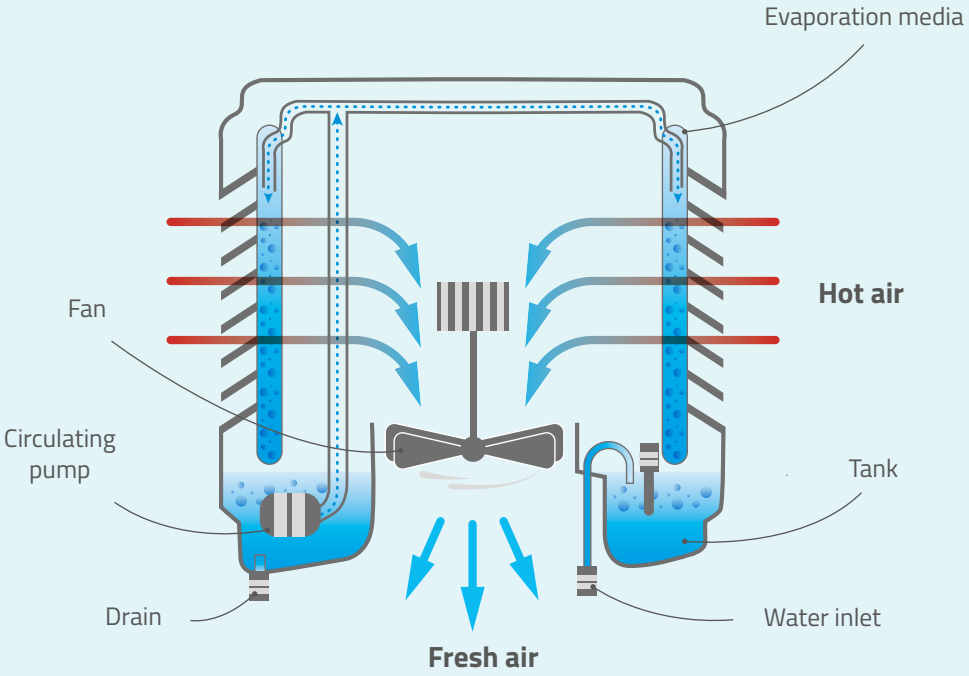
Operating expenses
6 to **10 times lower**
than traditional
air conditioning

With an initial investment that can be divided by 3!

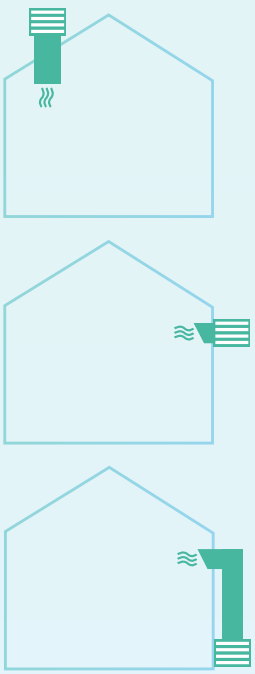
Learn more about adiabatic cooling through the guide developed as part of the PROFEEL program. This guide, aimed at building professionals, aims to present adiabatic cooling systems suitable for the renovation of tertiary buildings, their advantages, disadvantages, and associated best practices.

To know more about the Profeel program:
https://programmeprofeel.fr

ADIABATIC COOLING
IN IMAGES



Installation



Benefits & advantages OF **ADIABATIC** COOLING

SAVINGS

Compared to traditional air conditioning, initial investment costs can be **reduced by 3,** and maintenance and operating expenses are **6 to 10 times** lower than traditional air conditioning.

The device's electrical consumption is negligible as it is limited to the operation of the fan. Water consumption can be sourced from **rainwater harvesting.** The module only uses the necessary flow for evaporation and mineral concentration cycles.

ENVIRONMENT

Compared to traditional air conditioning, **electrical consumption is reduced by 10,** and **operational usage is reduced by 6.** The reduction in ecological footprint is attributed to the low energy consumption of the devices.

Furthermore, this process **does not use any refrigerant fluids** (which have a detrimental effect on the ozone layer). Therefore, this solution is currently the best alternative, even for buildings with frequent openings and large volumes, as it **does not lead to any overconsumption** unlike more energy-intensive air conditioning systems.

Using adiabatic cooling (instead of conventional air conditioning) contributes to reducing the urban heat island effect.

HEALTH

The system is automatically drained to control water hardness. The well-being and health of occupants are not affected because there are no microdroplets present in the device, which ensures the absence of legionella.

MAINTENANCE

It's a simple technology that requires easy and regular maintenance. Winterizing is the only recurring maintenance needed. Due to the low number of moving mechanical parts for its operation, the device is reliable, robust, and **less prone to breakdowns.** Only an electrical supply and a water inlet are required for its operation.

COMFORT

Adiabatic cooling introduces fresh air into your buildings while maintaining a comfortable humidity level.

RE2020

Adiabatic cooling (used directly or via an air handling unit) helps achieve summer comfort goals without impacting primary energy consumption (Cep) (see Th-BCDE rule).

Our CASE **STUDY** *adiabatic cooling*

CONTEXT

Aerial view of the Trigano site - Tournon-sur-Rhône

Our **adiabatic cooling** case study concerns an **18,000m²** industrial building located in Tournon-sur-Rhône, in Ardèche. Specializing in the manufacture of leisure vehicles, caravans and campers, it is the largest production unit in Europe (13,000 vehicles assembled per year).

The customer was facing significant challenges, including **excessive heat** that compromised productivity and posed a potential risk of production line shutdown. The solutions previously considered proved either excessively expensive or unsuitable for their specific needs. Additionally, working with the doors open was imperative due to the constant flow of goods, making the installation of a traditional air conditioning system impossible. The client was therefore looking for an **effective solution** that would not only be **economical** in investment, but also in operation. It was also crucial not to disrupt the existing smoke extraction system and to minimize production interruptions when implementing the new cooling solution. Finally, the client expressed the need to be able to integrate and control the coolers from their existing Technical Building Management (BMS).

The **adiabatic cooling** solution happens to be the **ideal answer** to meet the client's needs. The objective is to provide a **customized solution** that adapts to the building constraints and achieves the desired **level of comfort.**

STUDY

For this study, the following points are considered:

- The areas to be cooled are:
  - o Zone 1 : **14 688 m²** at a height of 6 m
  - o Zone 2 : **2 592 m²** at a height of 6 m
- Desired ambient air temperature of **27°C** during the summer period, when the building is occupied, in the middle of the day.
- There are obstacles to consider when installing the coolers, notably sprinklers and luminaires. However, it is considered feasible to install ducts and diffusers at approximately 5 m above the ground.

The proposed solution integrates a complete kit including a Wetbox WFP 30,000 cooler on the roof and a textile duct distribution system (half-sphere). Special attention must be paid to the type of diffuser because the existing sprinkler network poses a significant constraint on the installation and placement of the coolers. This all-in-one solution allows installation from the roof without impacting production.

Simulations

As part of this study and to size the installation, we simulate the cooling of the building during the summer period:

SCENARIO 1	
AIR ENTERING THE COOLER	
Temperature	37°C
Relative humidity	23%
CALCULATION OF THE DISCHARGE TEMPERATURE	
Discharge temperature	23,4°C
Relative humidity of the air discharged	81%
ESTIMATION OF AMBIENT CONDITIONS	
Desired ambient temperature	27°C
Estimation of thermal stratification	6°C
Estimation of ambient relative humidity	58%

SCENARIO 2	
AIR ENTERING THE COOLER	
Temperature	30°C
Relative humidity	33%
CALCULATION OF THE DISCHARGE TEMPERATURE	
Discharge temperature	20,2°C
Relative humidity of the air discharged	85%
ESTIMATION OF AMBIENT CONDITIONS	
Desired ambient temperature	26°C
Estimation of thermal stratification	5°C
Estimation of ambient relative humidity	57%

Air diffusion and exhaust

To cover the entire studied area, a half-sphere textile diffusion system has been chosen. These diffusers consist of long-range blowing nozzles to ensure that the air velocity at occupant height contributes to **lowering the perceived temperature.**

Air exhaust is mandatory to ensure **indoor air quality** and regulate ambient humidity levels. Extractors will be integrated with any roof or facade opening systems that allow the evacuation of air entering the premises via the coolers. It is advisable, where possible, to place these openings as far as possible from the cooled zone to create a homogeneous and effective flow of cool air over the largest possible volume.

Regulation

Each zone is independently managed with a **two-speed manual control.** This allows users to adjust the blowing rate. Additionally, optional peripherals such as **temperature probes** (indoor and outdoor) and a **hygrometric sensor** are included to complement the installation.

CONCLUSION & RESULTS
after renovation

36 Wetbox WFP 30 000 coolers were recommended for this project to achieve the desired thermal comfort for the client. According to the established simulations, they are capable of evacuating approximately 2700 kW of heat during the summer period. Finally, the total installed electrical power for the entire installation is 108 kW, with a water consumption rate around 4.3 m³/h..

The client is **fully satisfied** with the installed adiabatic cooling solution. Productivity has increased, and recruitment has become easier. Operators can now work in **more comfortable conditions,** even during periods of high heat. And as expressed in the project requirements, the production was not disrupted during the installation of the coolers, which was carried out directly from the roof.

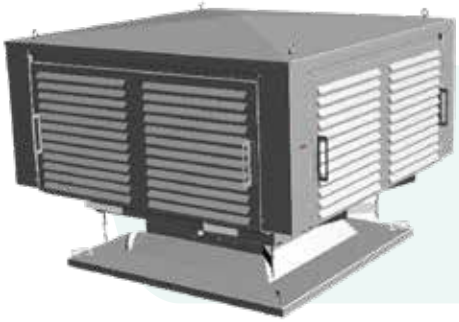

LIGNE 41

How to INTEGRATE ADIABATIC COOLING SYSTEMS into buildings?

CTA COMPATIBLE COOLING

ADIABOX V3 NFG is the most economical cooling solution that guarantees **healthy and comfortable air.** Evaporative cooling is a **100% natural** and straightforward principle: hot air passes through a humid exchanger and is thus cooled. The hotter and drier the air, the **more effective the cooling!**

Adiabox V3 NFG



COOLING FOR ERP

ADIABOX V3 WFA ERP is a cooling solution specifically designed for Establishments Receiving the Public (fire rating M0). It can be connected for downward airflow.

Adiabox V3 WFA ERP

COOLING WITH OR WITHOUT FAN

ADIABOX V3 (NFP and WFP) offers a simple and economical air cooling solution through evaporation. Three connection possibilities (downward, upward, or lateral for the NFP model) have been developed to adapt to different architectures.

Adiabox V3 NFP and Adiabox V3 WFP

MANUAL CONTROL COOLING

Evaporative cooler with two-speed fan and manual control. **WETBOX WFP** offers a simple and economical cooling solution ensuring healthy and comfortable air.

Wetbox WFP

KIT COOLING

A complete adiabatic kit for quick installation with a standalone air cooler with integrated diffuser that can cool up to 250m². Enjoy fresh, healthy, and comfortable air inside your premises, whether in new constructions or renovations.

Kit Adiaplay

ADIABATIC STRATIFICATION CASING

Contributes to optimizing the thermal comfort of buildings by promoting adiabatic cooling in summer and destratifying hot air in winter, thus limiting energy consumption.

CONTROLS & *adiabatic cooling systems*

The **adiabatic cooling solution** lowers the temperature inside the building. Managing this solution leads to better control of the installation. The equipment and sensors allow for managing indoor humidity levels, as well as indoor and outdoor temperatures. Based on information received from various sensors, the controller will trigger actions on the adiabatic system as needed.

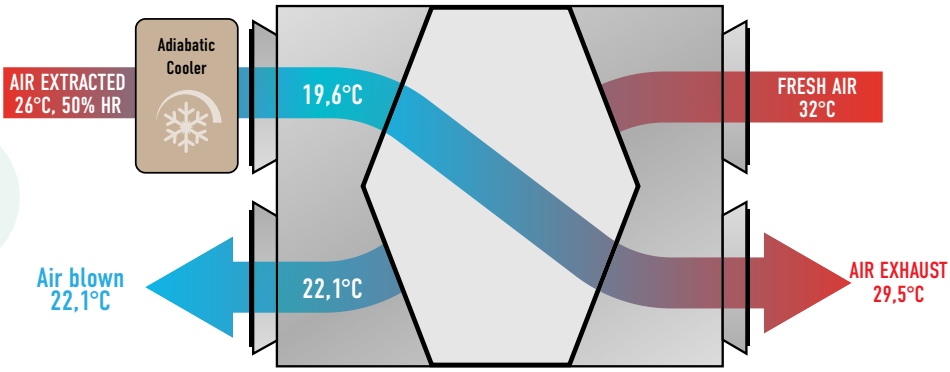
When cooling is not required, only fresh air intake is sufficient. **Activation is thus automated** through the control system, optimizing to **minimize energy expenses** and ensuring optimal comfort within the building. However, it's important to integrate this control with openings that depressurize the building, expel hot air, and **discharge humidity** from the volume.

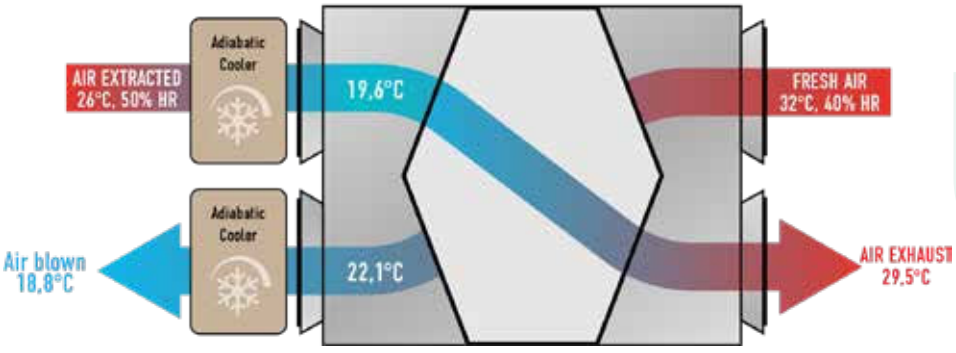
The **ADIABOX** range encompasses both the coolers and the dedicated controller. In installations with multiple **ADIABOX** units, they are designated as either «master» or «slave» in the operational scenario planned. The master **ADIABOX** controller acts as the conductor for the entire Genatis system, including facade and roof openings.

Direct coupled cooling

For all Air Handling Units (AHUs), it is possible to incorporate a cooling unit on the exhaust air.
This allows the supply air temperature to be lowered using the AHU's heat exchanger.

TYPICAL CASE
Adiabatic cooler directly on the exhaust air.





COUPLED CASE (Twin configuration)
Adding a second adiabatic cooling system directly to the blown air.

CONTROLS &
adiabatic cooling systems

Typical operating scenario including night-cooling and adiabatic mode during the summer period:

1

Time	00h
Indoor temperature	28°
Outdoor temperature	15°
Wind speed	15 Km/h

The PLC activates the opening of the skylights and façade openings to maximize the efficiency of the building's ventilation, exhausting a high volume of stale air, with very little energy demand, by taking advantage of the night cooling.

The PLC closes the façade openings. The fan of the adiabatic module starts working and blows air into the building to improve its cooling.

2

Time	04h
Indoor temperature	24°
Outdoor temperature	15°
Wind speed	00 Km/h

3

Time	10h
Indoor temperature	26°
Outdoor temperature	26 en augmentation constante
Wind speed	00 Km/h

The adiabatic module is fully operational (fan and water pump) and transforms the outside air, hot and dry, into cooler and humid air to lower the temperature inside the building. An open skylight serves to evacuate excess heat and moisture.

The use of an **adiabatic cooling system** will maintain a comfortable temperature inside the building regardless of the rise in outside temperature.

Air Treatment
SYSTEMS

air TREATMENT SYSTEMS

In a few words

The **air treatment system** with a rotary heat exchanger operating on all-fresh-air is an **ecological system**, free from refrigerant gases. Utilizing renewable heat sources such as solar thermal panels, biomass, or district heating, this innovative air treatment system provides an environmentally-friendly solution for **ventilation, heating,** and **air conditioning** in buildings.

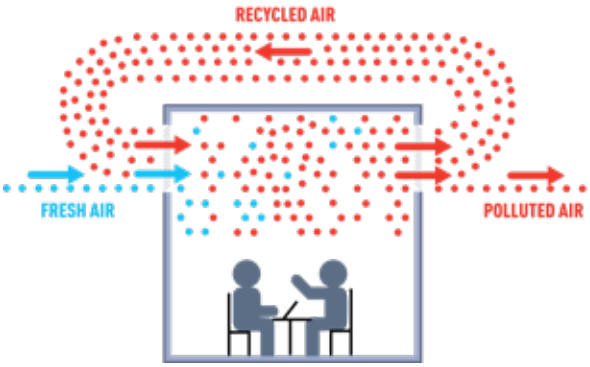
An air handling unit enables **continuous control** of temperature and humidity.

Intelligent control, utilizing one to three rotary exchangers (for heat recovery/enthalpy/desiccation), ensures consistent **indoor comfort** throughout all seasons.

The **all-fresh-air** system saves **25%** of heat, **50%** of electricity

Compared to equivalent standard systems like AHUs coupled with a heat pump.

AIR TREATMENT SYSTEMS
IN IMAGES

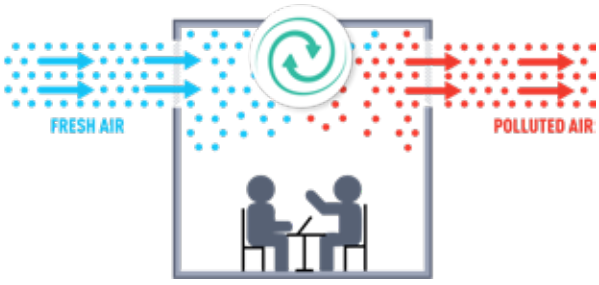


Existing system

Commonly used air handling systems operate by air recirculation to achieve energy savings. However, recirculating air extracted from the building can contaminate incoming fresh air with viruses or bacteria, and air recirculation may lead to a buildup of pollutants in the air.

The Genatis solution

Genatis has designed an air handling system that operates with 100% fresh air and without air recirculation, thereby avoiding contamination of fresh air by extracted air.



Benefits & advantages OF AIR TREATMENT SYSTEMS

SAVINGS

The **various rotary exchangers** allow for the recovery of either heat or humidity while reducing the use of the hot battery. Using an adiabatic cooler to **lower the temperature** in summer avoids the use of an electricity-consuming cold battery.

ENVIRONMENT

A renewable heat source combined with the heat recovery wheel results in **low energy consumption** related to heat production. Additionally, the cooling system **does not contain refrigerant gases** (harmful to the ozone layer). Throughout all seasons, the bioclimatic operation of the system adjusts the air flow to its maximum efficiency level to **reduce electrical consumption.**

HEALTH

The air handling system operates without air recirculation and uses **100% fresh air.** The variable air flow of the system automatically delivers the **correct amount of fresh air** to continuously remove pollutants (such as trichloramines, volatile organic compounds, CO_2, humidity...).

COMFORT

Throughout all seasons, the air handling system delivers **the appropriate amount of fresh air at the right temperature and humidity level** without any human intervention. Temperature and humidity settings can be adjusted at any time based on requirements.

RE2020

Our air handling system reduces energy consumption year-round for heating and cooling needs. This technology helps achieve objectives related to Primary Energy Consumption (PEC).

Our CASE STUDY air treatment systems

CONTEXT

In the context of renovating the Sarralbe swimming pool, the Sarreguemines Confluences community has decided to replace its aging installation. The previous setup consisted of two air handling units: one for the main pool area and another for the changing rooms. The existing system was undersized and partially non-functional.

The swimming pool includes a pool of 250m² with a total area of 990m². The total volume to be treated is around 4000m³.

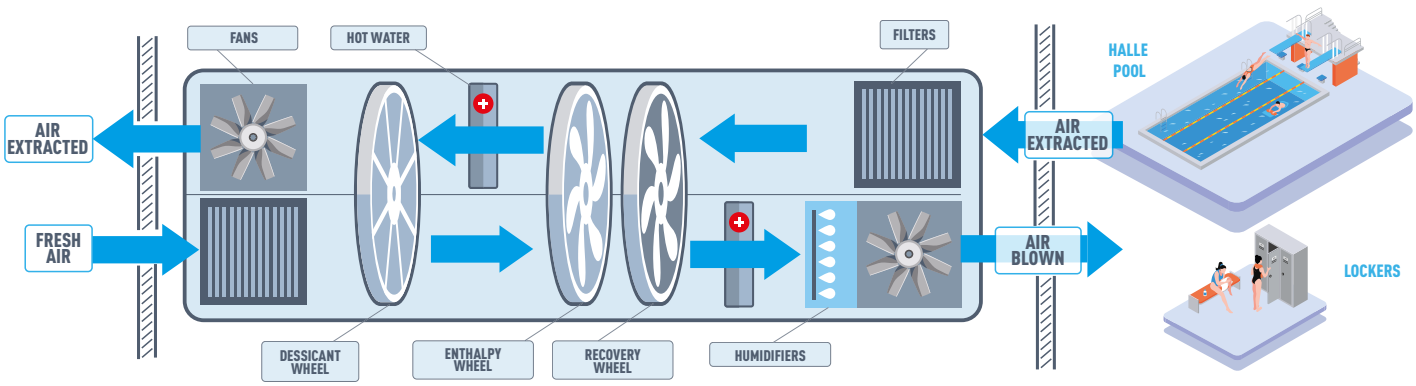
For this project, the client has chosen to open the roof of the pool during summer, thus accepting the outdoor temperature and humidity without specific treatment (dehumidification/cooling) via the air handling unit.

Halle pool of the Sarralbe swimming pool

The objective of the project is to **improve the thermal comfort** of swimmers and staff in the various zones of the building and **effectively treat indoor pollutants** that are harmful to health, such as trichloramines, which are often present in aquatic centers.
The modernization of technical installations will also enable **control of temperature and humidity** throughout all seasons and **reduce energy consumption.**

STUDY

We recommended the installation of a variable air volume double-flow air treatment system equipped with **3 rotary exchangers.** The system operates with **100% fresh air** and no air recirculation, ensuring **excellent air quality.** The **heat recovery rotary exchanger** reduces the use of heating from an existing old gas boiler. The **enthalpy wheel** recovers both humidity and temperature from the air intake during mid-season and winter. Lastly, the **desiccant wheel** dehumidifies excessively humid fresh air in summer, which also helps cool the air after adiabatic treatment while controlling humidity levels.



Simulation

SCENARIO	Winter	Summer
FRESH AIR		
Temperature	-10°C	30°C
Relative humidity	90%	35%
CONDITIONS MAINTAINED IN THE POOL HALL		
Temperature	28°C	28°C
Relative humidity	45%	65%

The comfort expected by the client in the pool hall, during opening hours, is as follows: **between 27°C and 29°C temperature** and **between 30% and 75% humidity levels.**

To achieve the desired objective and size the installation, we simulated its operation over **two periods: winter and summer.**

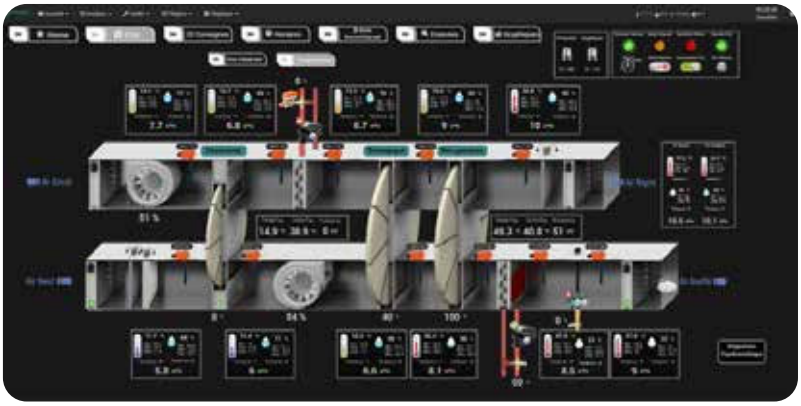
Regulation

The air handling unit (AHU) is controlled by an automation system that includes regulation algorithms. In order to manage temperature and humidity conditions within the treated area, this regulation system makes real-time decisions to achieve the most suitable and energy-efficient air transformation.

The regulation system allows for:

- **Gathering information** from sensors (conditions within the treated area compared to client setpoints, external conditions, status of AHU components)
- **Determining the best course of action** based on this information (which components to use and to what extent)
- **Calculating and adjusting the air flow of the AHU** to reduce supply when conditions in the area are optimal, thus saving energy.

Air Handling Unit (AHU) for the Sarralbe swimming pool



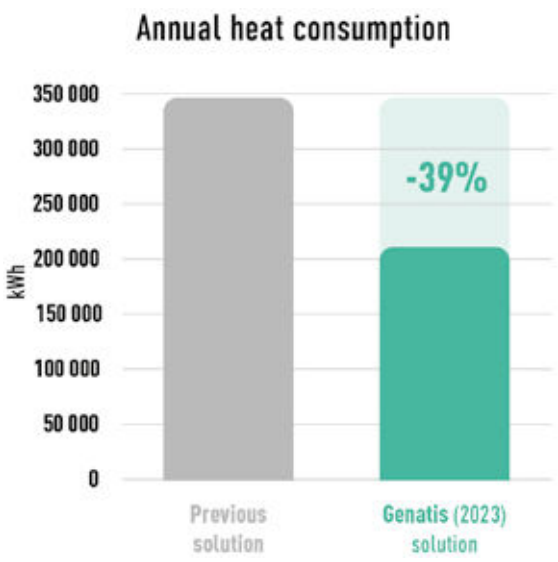
The air handling unit (AHU) is also equipped with the latest supervision system called **«BOX SUSTAIN'AIR».**

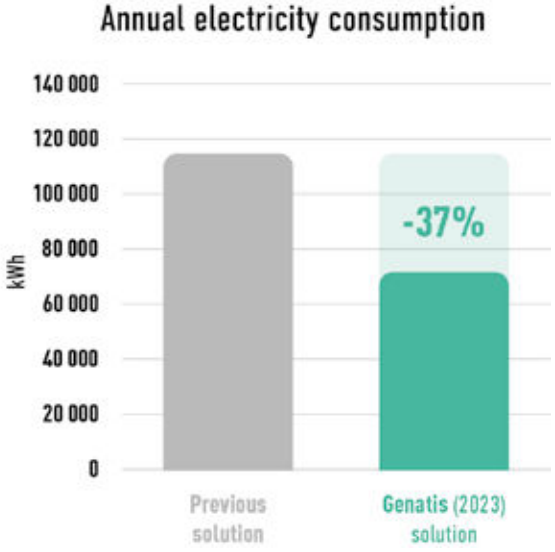
The BOX ensures real-time traceability of operations by indicating **temperature and humidity points** upstream and downstream of each exchanger, as well as **supply and return temperatures.** It supports predictive maintenance and monitors energy performance. All data is stored in a database for analysis and reporting.

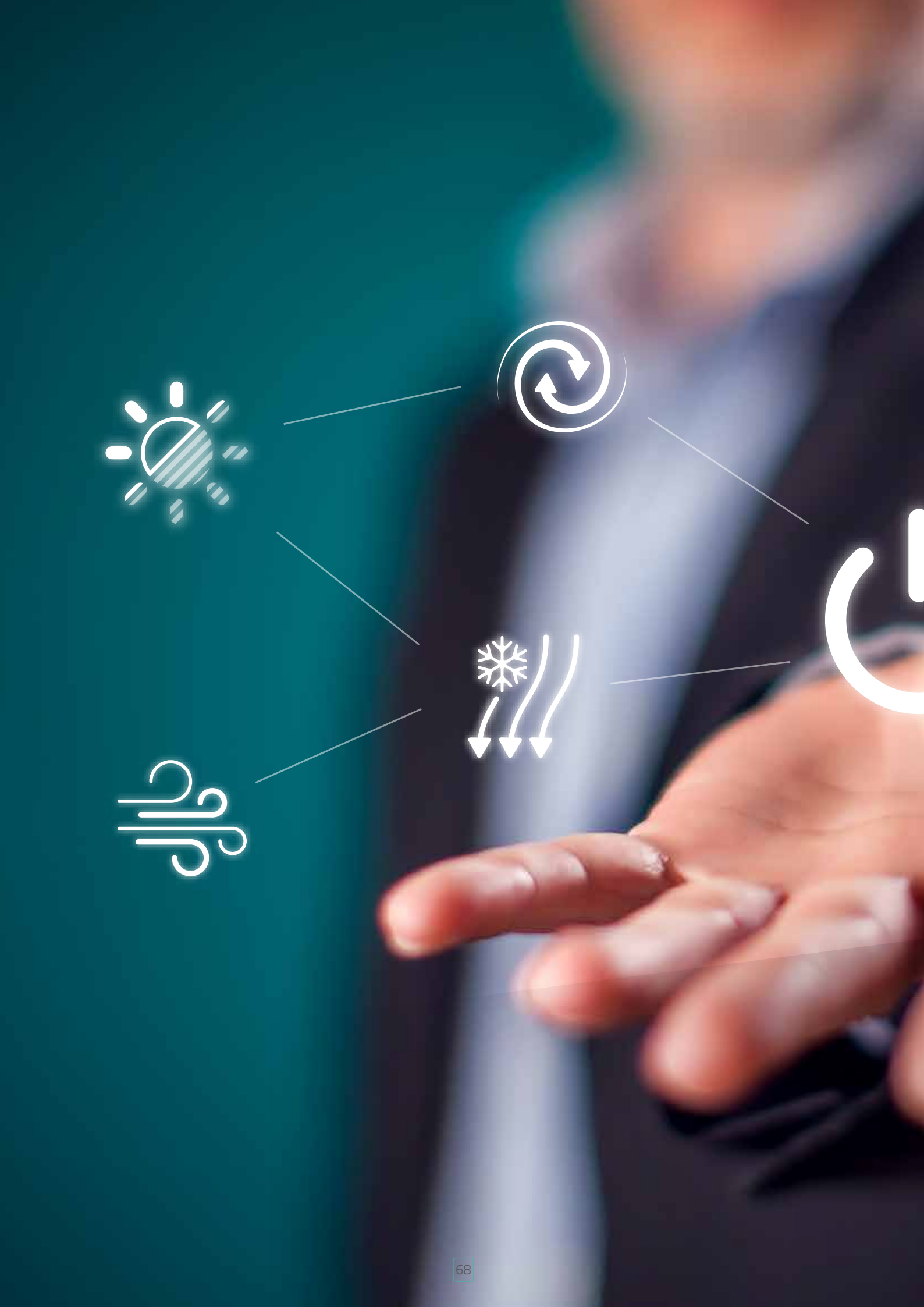
RESULTS
after renovation

Several months after replacing the old installation with the new **Genatis** air treatment system, the feedback has been very positive. The pool hall and changing rooms are treated with **«All fresh air»,** and the **comfort** requirements (temperature and humidity) desired by the client are met.

Furthermore, the **energy performance** of the installation has significantly **reduced electricity and heat consumption,** resulting in **substantial savings.**







CONTROLS & MANAGEMENT

CONTROLS & Management

Genatis offer

Through its solutions in **natural ventilatio**n systems, **adiabatic cooling, air treatment systems,** and **destratification, Genatis** offers **fully adaptive and comprehensive solutions for intelligent building management.** To optimize their management, **Genatis** develops its offering and proposes 3 levels of performance:

- **Servo control:** Electrical control panels allowing the opening and closing of openings on the facade or roof of buildings. These controls manage either natural smoke extraction functions, natural ventilation functions, or both combined. In the latter case, priority is given to natural smoke extraction.
- **Automated control:** More advanced than electrical control panels, these control boxes enable the management of a Genatis solution. The controller includes embedded intelligence to autonomously manage scenarios of Free Cooling and Night Cooling. It can be connected to a Building Management System (BMS).
- **Supervision:** Supervision boxes enable higher performance levels. Centralizing information in a user interface allows easy access and management of all installations within the building. Designed for simplified Plug & Play installation, supervisors are compatible with all standard protocols (ModBus RTU, ModBus IP, LoRaWAN...) and are fully flexible. Control is simplified and intuitive via any web browser (Google Chrome, Firefox, Edge, Safari...).

Service industry decree and BACS decree

In France, the **energy renovation** of service industry buildings is regulated by two decrees imposing obligations of means and results: the «décret tertiaire» (service industry buildings decree) and the «décret BACS» (Building Automation and Control Systems decree). The objective is to involve all owners and tenants of **service industry buildings** in an ecological transition project.

The «décret tertiaire» aims to **reduce energy consumption** by setting specific objectives for 2030, 2040, and 2050. The «décret BACS» **complements** the «décret tertiaire» by determining the means to achieve the **consumption reduction objectives.** It aims to **improve the energy performance of service industry buildings** by requiring the installation of **automation and control systems (BMS - Building Management Systems).**

ENTRY INTO FORCE

All non-residential service industry buildings, for which the heating or air conditioning system, combined or not with a ventilation system, must comply with:

- from **April 8, 2024** for new buildings with a nominal power greater than **70 kW**
- from **January 1, 2025** for systems with a useful nominal power greater than **290 kW**
- from **January 1, 2027** for systems with a useful nominal power greater than **70 kW**

DID YOU KNOW?

Since **April 7, 2023,** the decree includes a new provision requiring **mandatory periodic inspection** of control systems (every 2 to 5 years). This inspection extends beyond system installation to include monitoring of calibration and operation to ensure expected energy savings.

BMS - BUILDING MANAGEMENT SYSTEMS AND EXPECTED FUNCTIONALITIES

Article R175-3 of the French Building and Housing Code provides details on the expected functionalities of automation and control systems. These systems must, among other things:

- Continuously **monitor, record,** and **analyze** energy production and consumption data of building technical systems by functional zone and on an hourly basis, adjusting technical systems accordingly. This data is stored on a monthly scale for five years.;
- **Benchmark the building's energy efficiency** against reference values, corresponding to energy study data or characteristics of each technical system. These systems detect inefficiencies in technical systems and inform the building operator of opportunities to improve energy efficiency;
- Be **interoperables** with various building technical systems;
- **Allow for manual shutdown** and autonomous management of one or more building technical systems.

The generated and archived data are accessible to the owner of the automation and control system, who owns them. The owner makes them available to the building manager upon request and provides each operator of the connected technical systems with relevant data.

THE DIFFERENT CLASSES OF BMS - BUILDING MANAGEMENT SYSTEMS

The standard NF EN ISO 52120-1:2022 distinguishes four classes of **BMS,** classified from **A to D.**

Three of them meet the requirements imposed by the BACS decree:

- **Class A BMS**, a **high-efficiency management system** with comprehensive functionalities. It allows full control of heating, ventilation, air conditioning (HVAC), lighting, and all energy-consuming devices. It maximizes energy savings and optimizes resource management with real-time monitoring and predictive maintenance features..
- **Class B BMS**, system with **advanced functionalities.** It monitors consumption and controls major energy equipment systems. It often strikes a good balance between cost and performance.
- **Class C BMS**, system with **standard functionalities,** less efficient in terms of energy savings.

Regardless of their class, all **BMSs** are designed to **reduce energy consumption** and **CO_2 emissions** from the building's main equipment. However, it's important to note that the performance of a **BMS** is directly linked to its class. A Class A **BMS** with high performance offers **much greater energy savings potential** compared to a Class C **BMS.**

Financial incentives (CEE) available for installing a BMS help support managers and facilitate its implementation. It's worth noting that **only Class A or B** automation and control systems **qualify** for these incentives.

Multipack Box

The **MULTIPACK BOX** allows for the supervision of an entire Genatis installation, including control systems for adiabatic cooling for natural ventilation (Adiabox V3 and Aéropack V3). It is also the only supervisor on the market equipped with weather forecasts for advanced management of local ventilation.

With a wide-ranging control capability, the supervisor can:

- manage 5 adiabatic zones (Adiabox V3),
- control up to 6 VNI zones (Aéropack V3),
- supervise bi-function smoke extraction/ventilation cabinets in the building across ten DACs (SADAP, Hypérion, Astérion).

A significant feature of the **MULTIPACK BOX** is its ability to retrieve information from a meteorological forecasting site (such as Météo France). This enables optimization of the FreeCooling setpoint by anticipating maximum external temperatures, a method for free cooling in buildings based on forecasted external temperature peaks.

The entire data history stored by the **MULTIPACK BOX** is accessible at any time. Data can be overlaid from day to day, week to week, month to month, or year to year for better comparisons, and can be exported by product families or predefined points. Additionally, exported information can be simultaneously sent via email.

Biostore Box

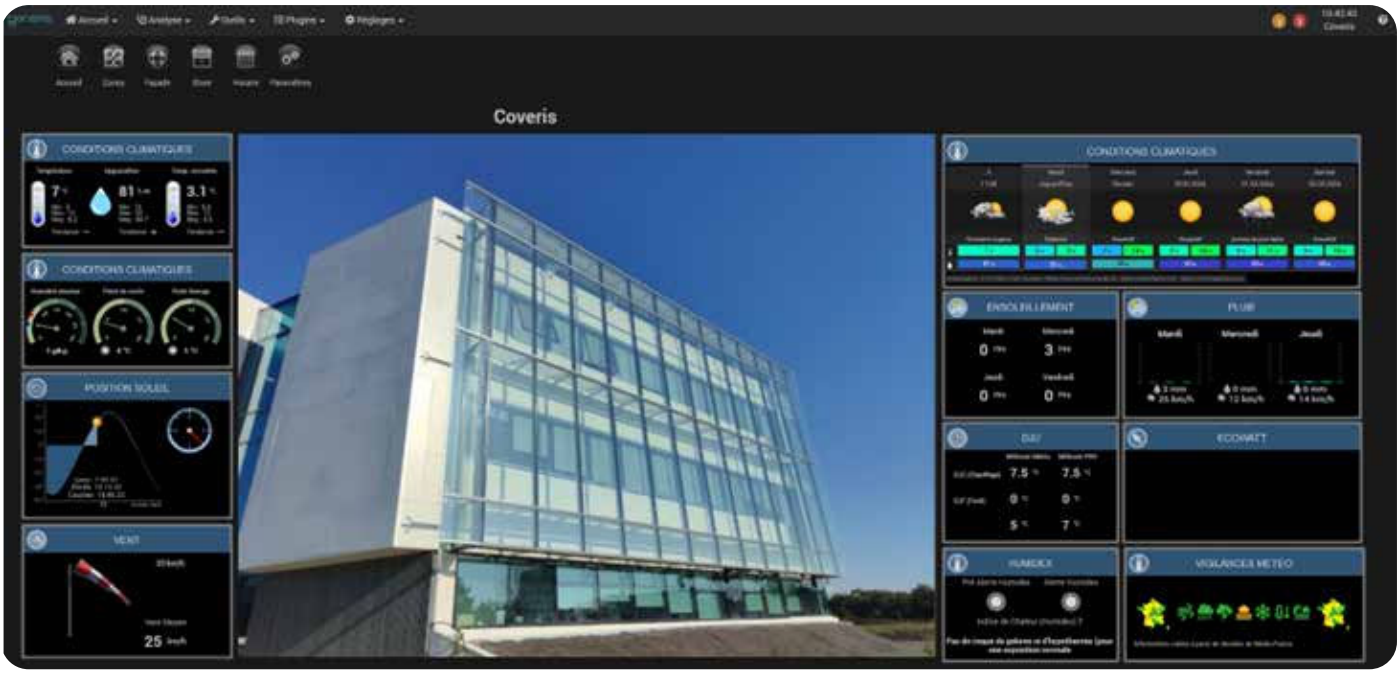
The **BIOSTORE BOX** allows for the control of facade frames and blinds installed on the bioclimatic facade. It enhances energy optimization of installations through additional algorithms like weather forecasting.

This supervisor enables:

- limiting overheating of the double-skin facade,
- avoiding condensation risks,
- controlling fresh air intake,
- managing the opening of ventilation or smoke extraction openings (thermal discharge),
- controlling blinds based on brightness levels.

The entire data history stored by the **BIOSTORE BOX** is accessible at any time. Data can be overlaid from day to day, week to week, month to month, or year to year for better comparisons, and can be exported by product families or predefined points. Additionally, exported information can be simultaneously sent via email.

It serves as a comprehensive control and supervision tool that combines management of thermal discharge and solar gains in the double-skin facade, making it a true bioclimatic facade solution.



CONTROLS & Management

Control Box

The **CONTROL BOX** meets the requirements of both the «décret tertiaire» and the «décret BACS», serving as a comprehensive supervision tool for energy optimization. This remote and real-time supervision system relies on automated programming to minimize the need for operator intervention. Operators can adjust heating and cooling parameters according to preferences and respond to needs based on data analysis.

The **CONTROL BOX** offers full automation of energy systems without requiring a complex infrastructure, leading to energy savings through improved management of terminal devices and centralized equipment. It can be financed through Energy Efficiency Certificates (CEE).

This **Class A** supervisor, as per the «décret BACS», optimizes the energy performance of a building, capable of managing:

- 12 energy zones with control over lighting authorization, heating, air conditioning, and destratification,
- 1 heating generator with operation linked to the heating demand of zones,
- 80 interior units of reversible air conditioning/heating (heat pumps) with control over temperature settings, operational overrides, and automatic restarts,
- exterior building lighting and signage lighting based on hourly schedules, sun position, or twilight switch,
- Air Handling Unit (AHU),
- Analysis of energy meters on hourly, daily, weekly, monthly, and annual periods.

The **CONTROL BOX** also integrates easily with radio technologies such as MQTT, LoRaWAN, and ZigBee, offering a flexible and scalable solution.

As a genuine energy waste reducer, the **CONTROL BOX** enables significant energy savings, making its investment potentially profitable quickly, especially with available **CEE incentives.**

CONTROLS & Management

Sustain'air Box

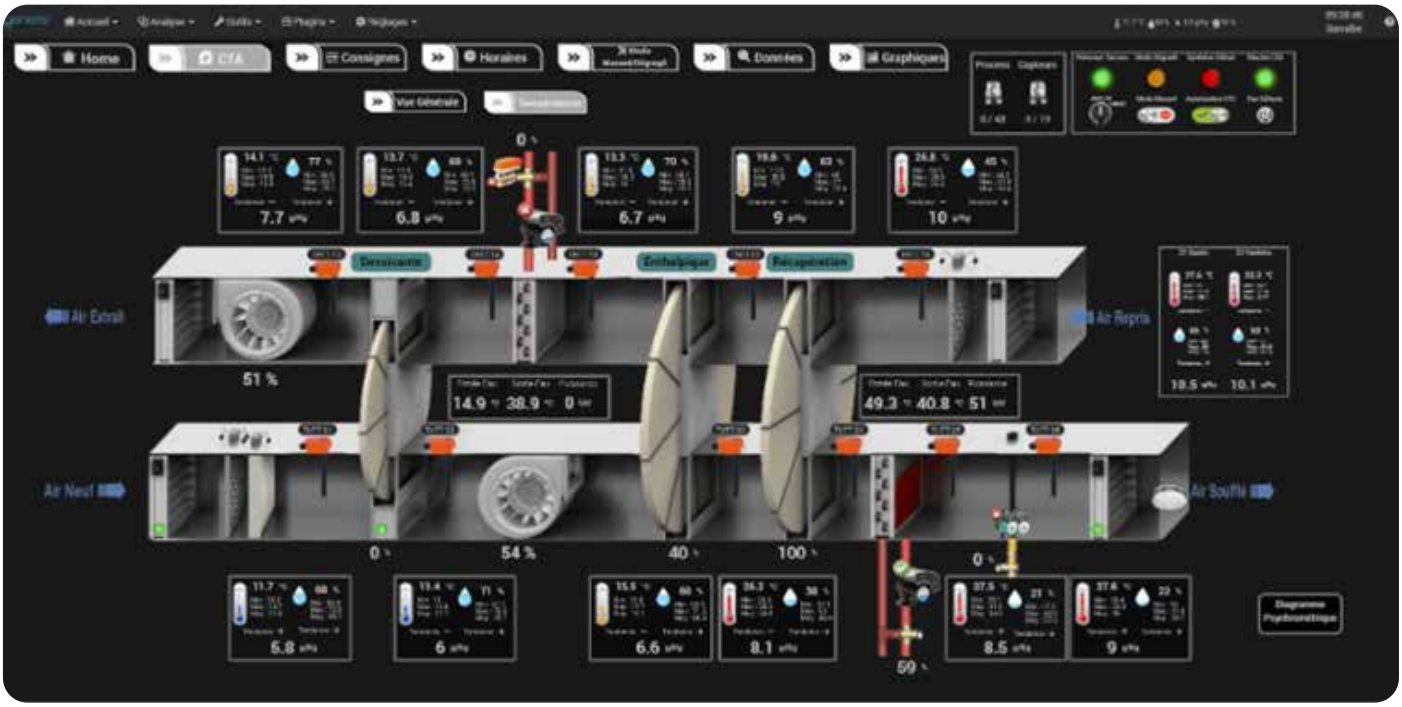
The **SUSTAIN'AIR BOX** allows for precise monitoring of energy consumption in a Genatis Air Handling Unit (CTA) and ensures compliance with user comfort requirements.

We have developed a program that manages CTAs through an automation system supervised by the **SUSTAIN'AIR BOX.**

This BOX enables the supervision of the synchronization of various components within the CTA (rotary heat exchangers, fans) and activates the necessary elements to maintain temperature and humidity levels.

The **BOX SUSTAIN'AIR** provides:

- Measurement of desired setpoints and occupancy schedules,
- Monitoring of energy performance,
- Display of performance and comfort indicators,
- Preventive and corrective maintenance capabilities,
- Alarm notifications for malfunctions,
- Optimization of operations for better temperature control and operational efficiency,
- Maintenance of consistent temperature and humidity levels.



CONTROLS & Management

Discover our full range of boxes dedicated to **building energy management!**

Servo Control — Automation

	SADAP/Hypérion Astérion	Aéropack V3	Adiabox V3
Electrical servo control	✓		
Natural ventilation		✓	✓
Adiabatic cooling			✓
Air treatment unit			
Bioclimatic facade			
Blinds			
Destratification			
Artificial lighting			
Heater			
Air conditioning			

SADAP/Hypérion Astérion

Genatis+

- *Ensures the opening/closing of electric NSHEV*
- *Wide range of control boxes*

Aéropack V3

Genatis+

- *Fully automated natural ventilation control*
- *Touchscreen command*

Adiabox V3

Genatis+

- *Optimized and automated control of adiabatic cooling*
- *Touchscreen command*

CONTROLS & Management

Supervision

CEE

	Multipack Box	Sustain'air Box	Biostore Box	Control Box
	✓			
	✓			
	✓			
		✓ *		✓
			✓	
			✓	
				✓
				✓
				✓
				✓

Uniquement CTA Genatis (Sustain'air)

Genatis+

- *Facilitates remote maintenance*
- *Anticipates the day's climate evolution*

Genatis+

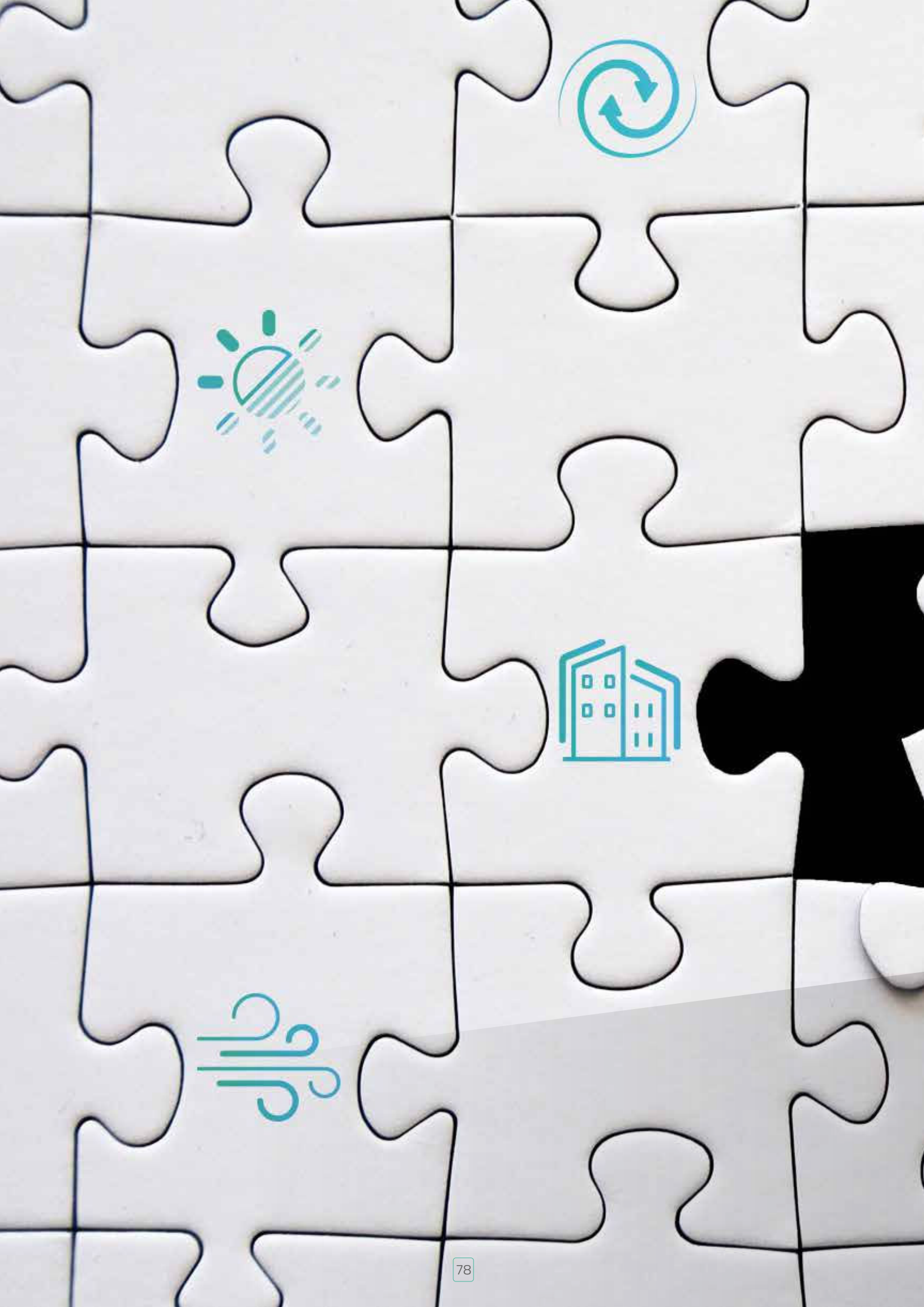
- *Real-time indication of comfort zone*

Genatis+

- *Introduction of warm air from the double skin into the building via the fresh air handling unit (CTA).*

Genatis+

- *Energy optimization*
- *LoRaWAN (Long Range Wide Area Network) technology*



Complementary
SOLUTIONS

air DESTRATIFICATION

Destratification

The principle of **air destratification** involves mixing the air to achieve a uniform temperature within a room or building. This solution addresses the natural issue of air stratification.

Hot air, being lighter than cold air, tends to rise and creates layers of different temperatures. This stratification can result in temperature differences of up to 1°C per meter height, meaning a potential 7°C difference between the floor and ceiling in a 7-meter tall building.

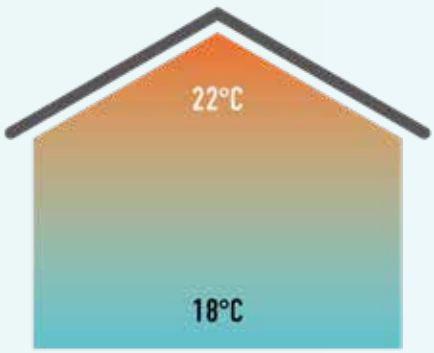
For an optimal installation, it's crucial to consider the volumes and configurations of the building to propose a properly sized system.

DESTRATIFICATION
IN IMAGES

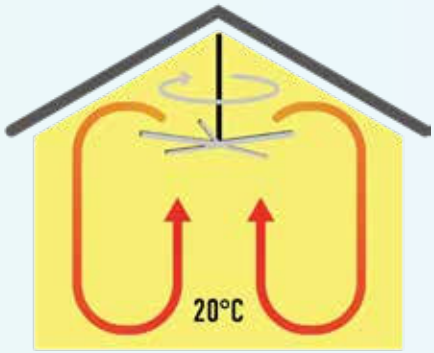
Winter

Air stratification is the **primary cause of heating overconsumption** in a building. Destratification involves mixing the air from the ceiling to the floor to achieve a uniform ambient air temperature in winter.

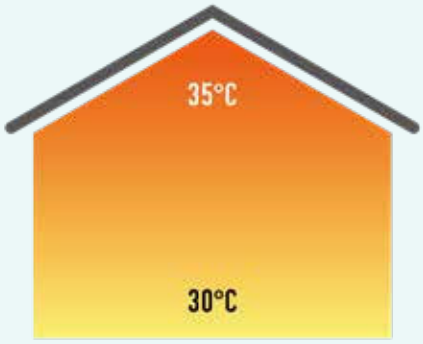
Even distribution of heat enhances **comfort** and **saves energy** (reduced heating costs).



WITHOUT DESTRATIFIER



WITH DESTRATIFIER



WITHOUT DESTRATIFIER


WITH DESTRATIFIER

Summer

Its use in summer is also beneficial as it provides a **feeling of freshness** to users.

Similar to ceiling fans found in residential settings, destratifiers have larger blades and operate at a slower speed.

bioclimatic FACADE

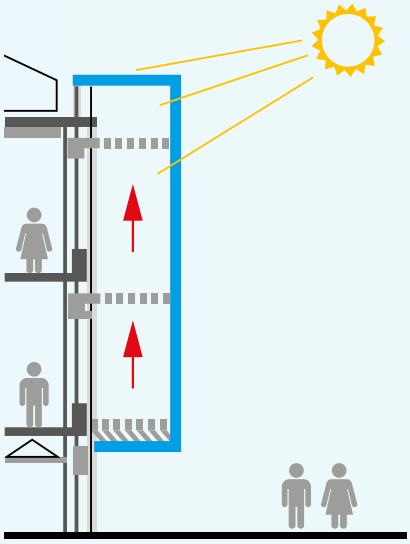
Bioclimatic facade

The **bioclimatic facade** or double-skin facade allows a building to harness its environment for thermal advantages without compromising the comfort of its occupants. Filtering solar radiation, **insulating against cold** in winter and **excessive heat** in summer are its main goals. This type of system enables architecture to adapt to user needs.

On an existing structure, the double-skin facade is integrated into the building. Typically glazed, it consists of both fixed and movable frames to utilize **natural input**. During winter, the openings are usually closed to store heat in this buffer space, warming the interior of the building. However, they can also be partially opened to allow in fresh air momentarily if needed, to prevent excessive temperature rise. In summer, the openings are opened to release the air stored between the two layers that has been warmed in this buffer space. Additionally, the openings of the main facade can be opened to allow hot or cold air circulating in the double skin to enter.

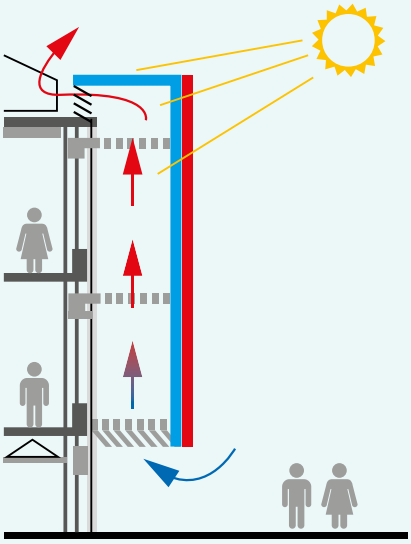
BIOCLIMATIC FACADE

IN IMAGES



Winter

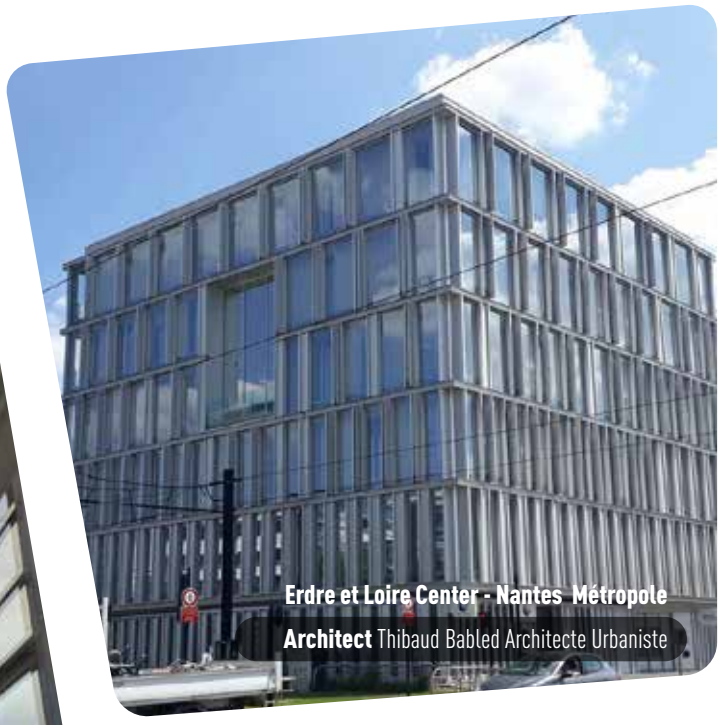
Closed double skin: solar radiation is used to heat the air inside the double skin and store maximum solar heat.



Summer

Preventing overheating of the indoor air by naturally ventilating the air within the double skin allows the hot air in the double skin to be kept outside the building.

Headquarters of the BTP Rhône and Métropole Federation

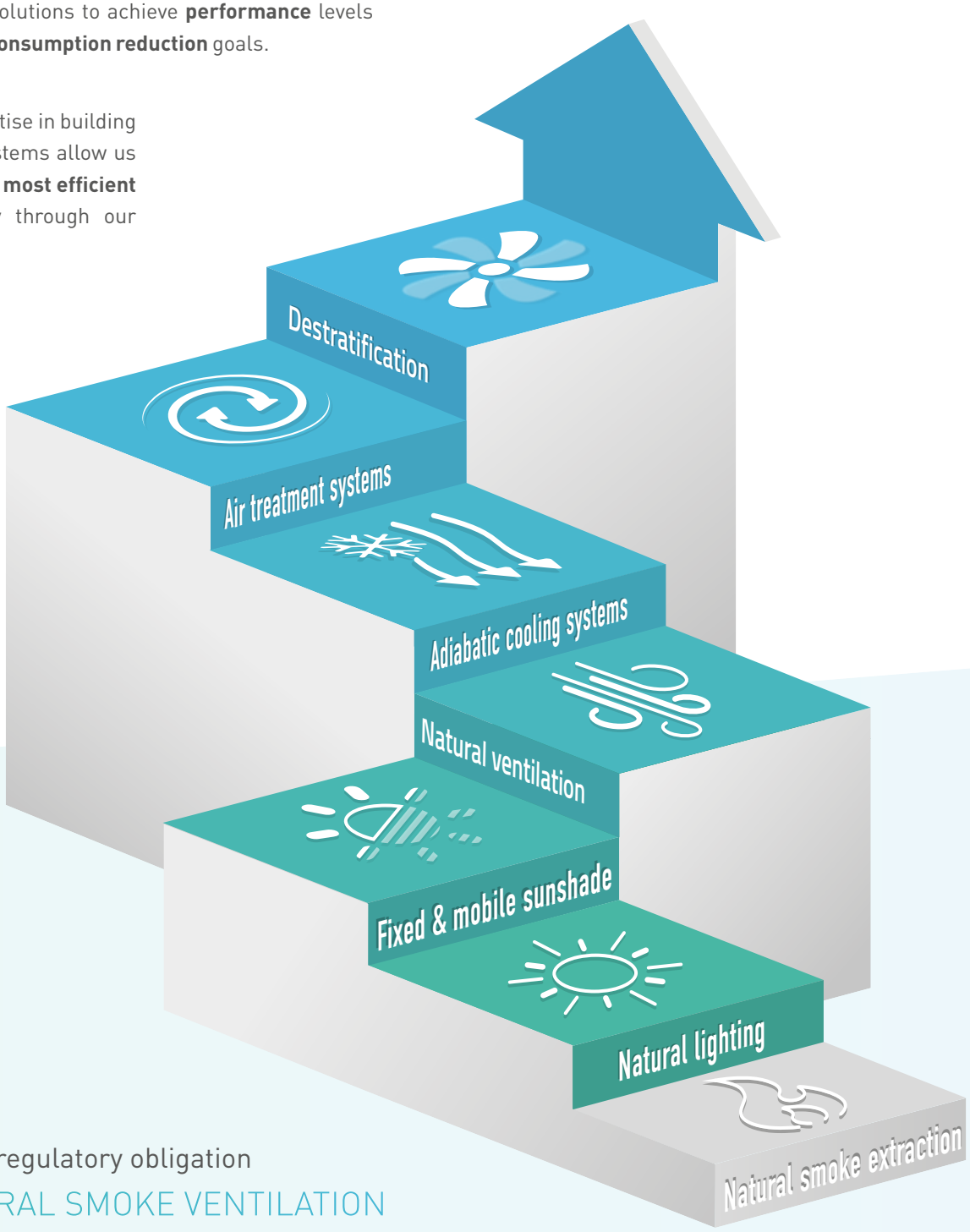


Erdre et Loire Center - Nantes Métropole
Architect Thibaud Babled Architecte Urbaniste

SIMPLE
SOLUTIONS *for* ENERGY PERFORMANCE

At the heart of its natural solutions, **Genatis** enables you to implement a strategy combining solutions to achieve **performance** levels aligned with **energy consumption reduction** goals.

Our **60 years** of expertise in building envelope opening systems allow us today to offer you **the most efficient solutions,** especially through our studies.



TURNING the regulatory obligation of NATURAL SMOKE VENTILATION into an **opportunity** for **IMPROVING** the **building's** ENERGY EFFICIENCY and user **COMFORT.**

REGULATORY TEXTS
standards and labels

RE 2020

To measure improvements and achieve the objectives imposed by the **RE 2020** environmental regulations, various indicators have been established. **Genatis** then positions itself as an important lever of influence on:

Bbio

This indicator of heating, cooling, and natural lighting needs will be positively impacted by all **Genatis** solutions.

Cep, Cepnr

These indicators resulting from the calculation of the building's energy consumption are strongly influenced by the use of air conditioning systems. **Genatis** aims to significantly reduce or eliminate these systems.

DH

An indicator directly related to summer comfort, the degree hour allows measurement of maximum hours of discomfort in the building.

IC

Our range of products benefits from Environmental Product Declarations (FDES), improving the life cycle analysis calculation of the building.

The studies and systems offered by **Genatis** cumulatively enable the achievement of current and future objectives while preserving the balance of energy indicators.

EN 17037

The standard **EN 17037** provides minimum recommendations to achieve a subjective impression of clarity inside buildings using natural light. It offers indicators and information for optimizing natural lighting without compromising occupants' comfort. It specifically addresses metrics such as daylight illuminance level (FLJ), view to the outside, direct sunlight, and glare.

BREEAM

Through the acquisition of points distributed across different «Categories», the BREEAM certification establishes itself as a benchmark for the environmental performance of buildings based on rankings ranging from pass, good, very good, excellent to outstanding.

Category Health

Genatis contributes to earning points in various «credits» within this category, such as visual comfort, indoor air quality, and thermal comfort..

Category Energy Efficiency

Genatis also positively impacts credits related to energy gain calculations, passive solutions, and free cooling.

Category Pollution

With a credit on the impact of refrigerants, **Genatis** solutions help in earning points in this category.

HQE

To obtain **HQE** certification, it is necessary to adhere to the «Commitments» that comprise it:

Quality of Life Commitment: This includes objectives such as indoor air quality, hygrothermal comfort, and visual comfort. **Genatis** and its simple systems bring environmental considerations into living and working spaces, primarily fulfilling this commitment.

Environmental Respect Commitment: Aimed at minimizing the building's impact on the environment, this commitment involves reducing energy consumption, carbon emissions, and adapting to climate change. **Genatis** achieves this ambitious and essential goal through the controlled use of natural energies such as wind, water, air, and light.

Economic Performance Commitment: Controlling building operating expenses requires precise supervision of all its consumption. **Genatis'** Control Box and Multipack enable accurate visualization and counting of flows, along with continuous monitoring of malfunction alerts.

GIFlumière

Would you like to know more?

The **GIF lumière,** Group of Manufacturers and Manufacturers-Installers of fire protection equipment and smoke evacuation (GIF), details all the **standards and references** applicable to natural light in buildings.

https://www.gif-lumiere.com/normes-referentiels/

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