CHOOSING HIGH-ALBEDO WALL AND ROOF COATINGS

HAZARD

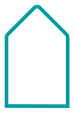
HEAT

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

AREA OF ACTION



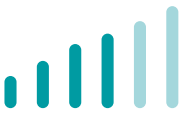
ENVELOPE

COST

€ € €

low medium high

LEVEL OF SKILL



medium

As temperatures continue to rise and heatwaves intensify and multiply, particular attention needs to be paid to the choice of exterior cladding for buildings. As an alternative to greening (on roofs and facades), high-albedo (i.e. reflective) wall and roof coverings can be an effective way of limiting heat penetration into buildings.

IMPACTS

Because they reflect a large proportion of the sun's rays, high-albedo materials absorb and transmit very little heat to the building. The use of high-albedo materials can therefore **reduce the interior temperature of a building** by several degrees and improve thermal comfort for occupants.

High-albedo coverings also help to **combat the intensification of urban heat islands** (i.e. higher temperatures in urban areas than in the surrounding rural areas), as do high-albedo road coatings.

INSTALLATION GUIDE

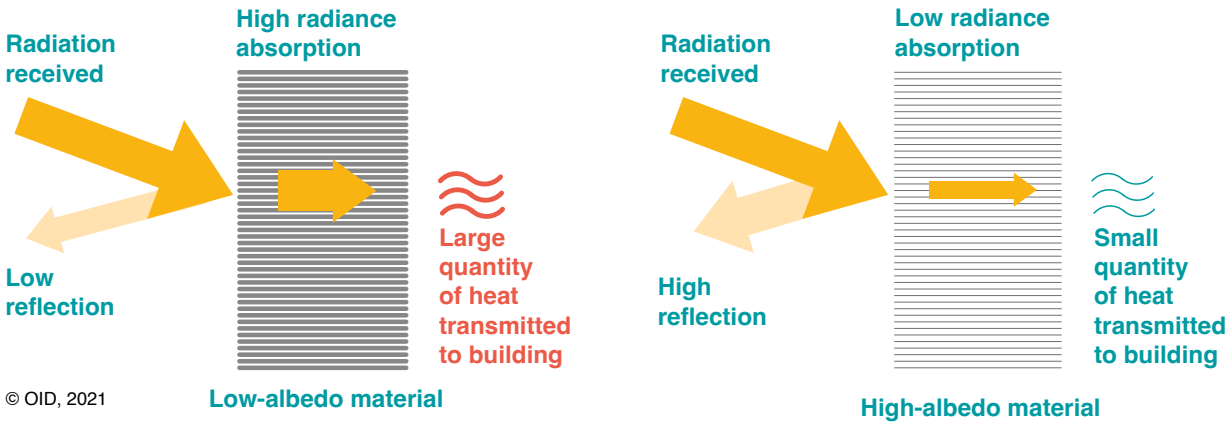
To ensure better thermal comfort inside and out, we recommend using **light-coloured materials for facades** and **light-coloured and/or reflective materials for roofs**. As roofs are the surfaces most exposed to the sun's rays on a building, a number of techniques have been developed to create "cool roofs": reflective elastomer or polyurea membranes, reflective coatings and pale gravel.

Installing high-albedo coatings **doesn't necessarily require major investment or work**: applying white paint to a surface is enough to increase its albedo.

When choosing the external cladding for a building, it's important to take into account both the albedo of the materials and their thermal inertia to select materials that effectively protect the building from external heat gain.

CLICK HERE TO CONSULT THE GUIDE TO ACTION FOR CLIMATE CHANGE ADAPTATION

ILLUSTRATION OF THE REFLECTING PROPERTIES OF HIGH-ALBEDO WALL AND ROOF COATINGS



WEAK POINTS AND STRONG POINTS

⊕ ⊖ Under certain conditions, high-albedo roofs that reflect more solar radiation can reduce the amount of energy absorbed by photovoltaic panels, which can adversely affect their output. However, the cooling effect of reflective roofs can also help to improve panel performance by preventing overheating. It's difficult to determine which factor predominates because it depends on the specific design of the solar system, the environmental conditions and the efficiency of the photovoltaic panels used. A detailed analysis taking all these factors into account is recommended to assess the net impact on energy production of photovoltaic panels in a given context.

⊖ It's important to note that light-coloured surfaces require **more maintenance** because they get dirty more quickly.

⊖ Be aware that the choice of materials and colours used on the exterior of buildings may be **regulated by local authorities**. Before undertaking any work, it's therefore advisable to consult the local urban development plan (*PLU*) and, if necessary, contact the local architecture and land planning office (*CAUE - Conseil d'Architecture et d'Urbanisme et d'Environnement*).

MALADAPTATION

Maladaptation can result from the following:

Pollution from paint

The manufacture of synthetic paints, mainly derived from petrochemicals, consumes considerable amounts of non-renewable raw materials and energy. Waste from these paints (residues, packaging, tools) contains solvents, heavy metals, phytosanitary products and VOCs, making it dangerous for the environment and health. It can also contribute to microplastic pollution in the ocean (Environmental Action, 2022). Poor management of this waste can contaminate the air, water and soil, harming biodiversity, particularly in aquatic environments. Alternatives exist, such as paints based on natural and/or bio-sourced components.

Visual discomfort

When applying high-albedo coverings, it's essential to pay attention to the visual comfort of users. These surfaces reflect the sun's rays, causing glare that can be a nuisance, particularly for urban mobility. It's therefore advisable to avoid applying high-albedo coverings on sloping facades and roofs.

Increased light pollution

Light pollution results from the excessive diffusion of artificial light into the nocturnal atmosphere, particularly from street lighting, buildings, illuminated advertisements, etc. Reflective surfaces such as high-albedo roofs and walls in urban areas can act like mirrors reflecting artificial light, contributing to light pollution that disrupts biodiversity and nocturnal ecosystems.

MONITORING INDICATORS

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/- : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/- Percentage of roof covering surface area with an albedo higher than 0.4 (%)	To be maximised
+/- Percentage of facade covering the surface area with an albedo higher than 0.4 (%)	To be maximised

INDICATORS OF RESULTS	INTERPRETATION
+/- Comparison between the temperature of a high-albedo roof and that of a control situation* (°C)	Temperature of high-albedo roof < control area*
+/- Comparison between the temperature of a high albedo facade with that of a control situation* (°C)	Temperature of high-albedo facade < control area*.

** The control situation is defined by the parameters established to isolate the influence of the adaption action (similar conditions: weather, time of measurement, space, etc.).*

REGULATION / CRITERIA

- A **high albedo** is **close to 1**. A coating is characterised as having a **low albedo** if it's between **0 and 0.4** (ADEME, 2021). An albedo greater than 0.4 is recommended.

TOOL

- An **albedometer** comprises two identical pyranometers facing each other: one pointing upwards (sky), the other downwards (earth). The upward pyranometer measures the incoming global solar radiation (direct + diffuse) on the ground, while the downward pyranometer measures the global solar radiation reflected by the ground (C2AI, 2020).

FIND OUT MORE

ADEME (2012), *Guide de recommandation pour lutter contre l'effet d'îlot de chaleur urbain à destination des collectivités territoriales*

ADEME (2021), *Rafraîchir les villes : des solutions variées*

Institut national de Santé Publique Québec (2009), *Mesures de lutte aux îlots de chaleur urbains*

Ville de Paris (2023), *Mission d'information et d'évaluation du Conseil de Paris - Paris à 50°C*

Roof of the Leclerc store in Quimper

REAL-LIFE EXAMPLE

SAS KERVILLY, E.LECLERC

BUILDING: E.LECLERC CENTRE, QUIMPER
SURFACE AREA: 7,000 M² OF ROOFING
USE: COMMERCIAL, SHOPPING CENTRE
COST: €140,000 INCL. TAX

On this building built in the 1980s, a reflective coating was added in 2014. This reduced the expansion and contraction of the two-layer bituminous roof, and solved the regular leaks in the building, without requiring new waterproofing. After seven years, the results are very positive: the white coating has reduced the need for air conditioning by 50%. The operation paid for itself in four and a half years, thanks to lower energy consumption (€28,000 to €32,000 per year), fewer interventions by waterproofing specialists, and no longer having to use sprinkler roof condensers during very hot periods. This action is an interesting alternative for buildings that cannot structurally support options like green roofing or the installation of photovoltaic panels. It only took two weeks to carry out, with no interruption to the centre's activities. The centre, which has cleaned the roof twice since it was installed, has extended the lifespan of its roof by at least 15 years, and could potentially extended it further if a new layer is added in a few years' time.