

SVENSKA AEROGEL

Quartzene® in Cool Roofs



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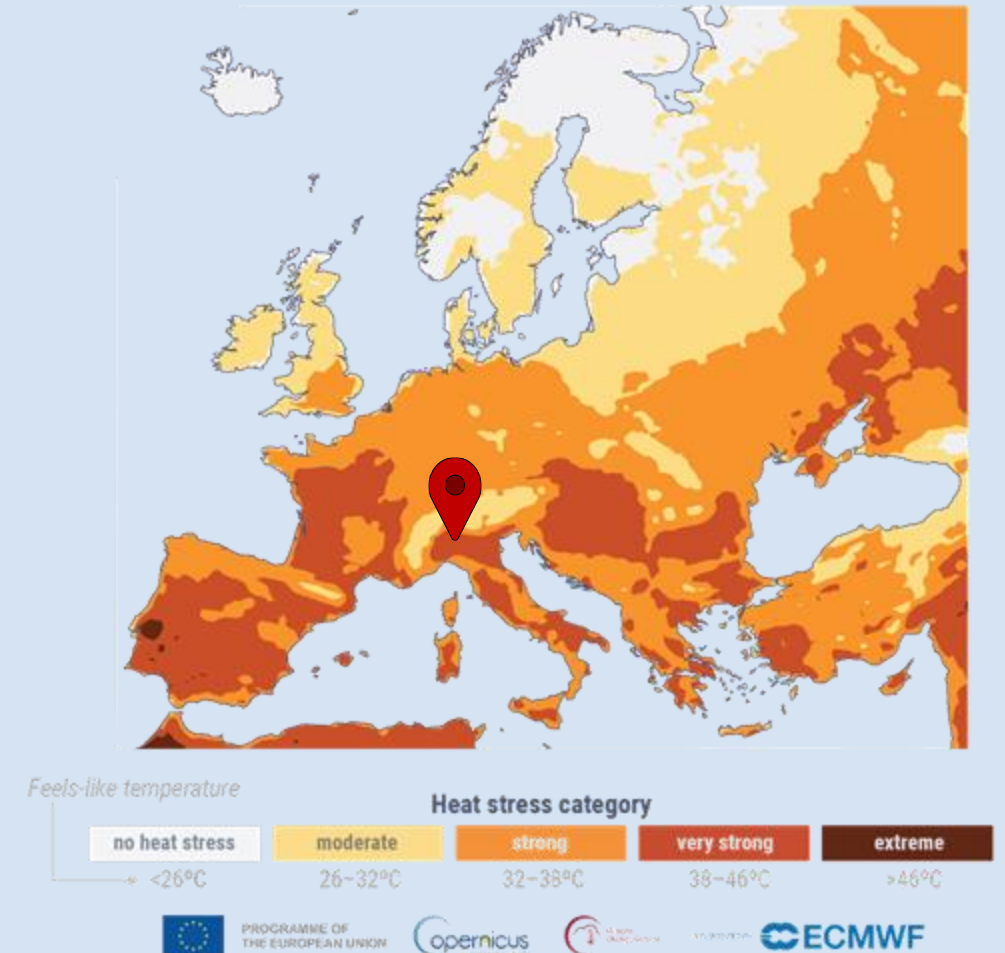


INCREASING TEMPERATURES

- As the global temperatures continuous to increase, heatwaves across Europe become more frequent.
- Increasing urbanization and an aging population makes us more vulnerable to higher temperatures.
- Heatwaves cause the largest share of fatalities related to climate extremes in Europe according to EEA.
- As energy consumption needs to be controlled the need for smarter, passive solutions continue to grow.

Maximum heat stress category experienced in June 2025

Data: ERA5-HEAT Universal Thermal Climate Index (UTCI) • Credit: C3S/ECMWF



[Heatwaves contribute to the warmest June on record in western Europe | Copernicus](#)

CITIES AND URBAN HEAT ISLANDS

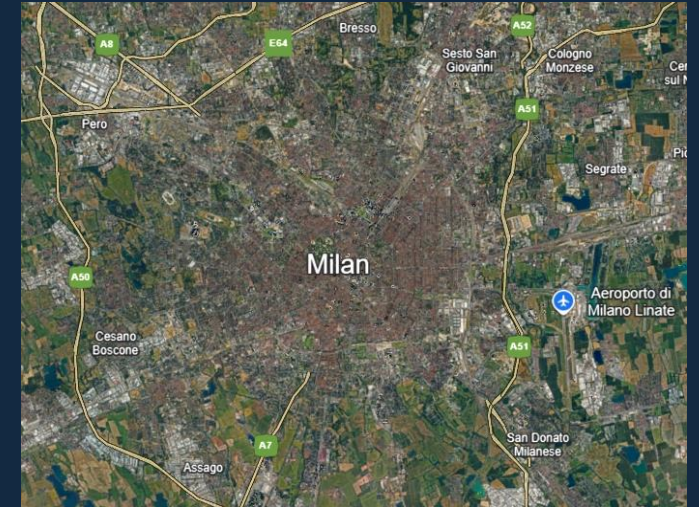
Cities can consist of up to 30% of roofs considering the surface from above.

As many surfaces are dark, with a low solar reflectance a lot of the heat is absorbed in the cities.

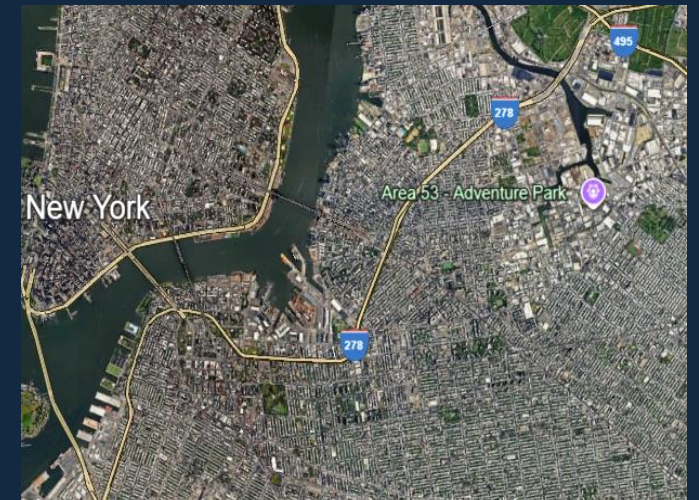
This points out the possibilities for other types of solutions as green roofs or cool roofs to be retrofitted on the building stock, which can contribute to:

- Less energy need
- Increased living comfort
- Higher yield for PV's

Also, economic payback is expected within the lifespan of a cool roof according to multiple studies.



Milano from above, Google Earth



New York from above, Google Earth

AEROGELS

Aerogels have been around for almost a century but have found more commercial applications the last 30 years.

Aerogels are:

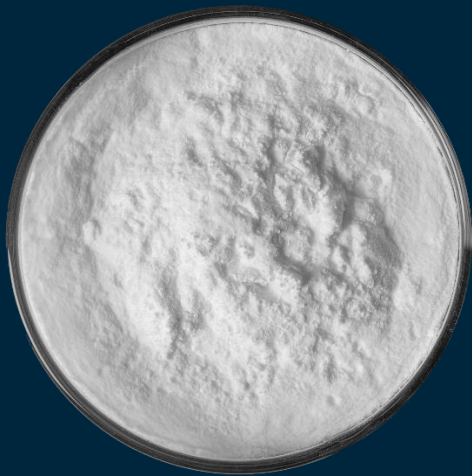
- Ultra-lightweight and highly porous
- Up to 98 % air
- Excellent thermal insulators
- Sometimes called “frozen smoke”
- Silica based aerogels are the most common



Courtesy NASA/JPL-Caltech - [NASA Stardust Website](https://www.nasa.gov/stardust)

QUARTZENE® - OUR UNIQUE SOLUTION

Advanced aerogel powder that is added to products to enhance their performance
Makes products more sustainable and energy-efficient



SILICA



MESOPOROUS



LOW
DENSITY



THERMAL
INSULATION



HEAT-REFLECTIVE



FIRE RESISTANT



HYDROPHILIC



HYDROPHOBIC



MATting
ADDITIVE



CONTROLLED
RELEASE

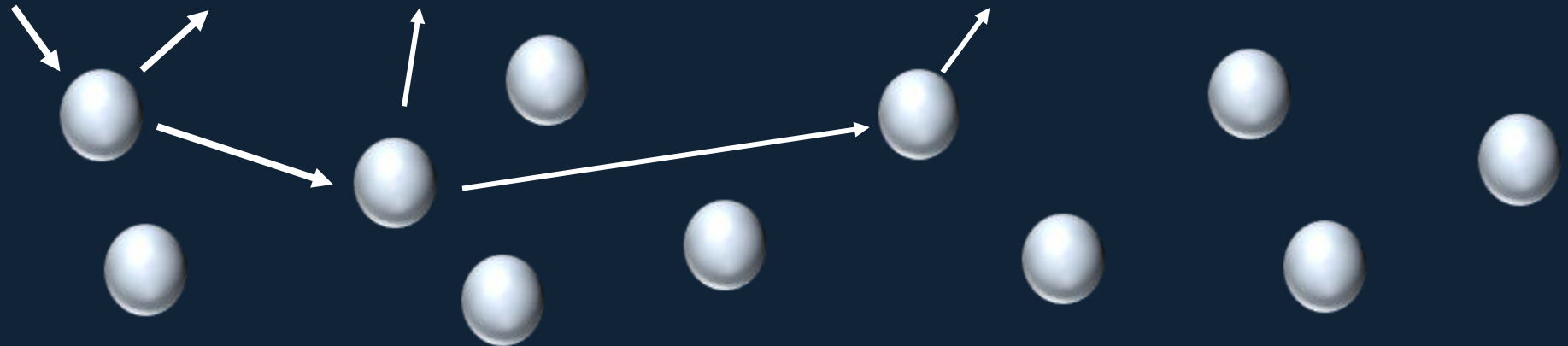
QUARTZENE® - REFLECTION IN COOL ROOF

Formulating a coating with Quartzene introduces a lot of enclosed air inside the particles in the system giving rise to some interesting properties:

- Multiple surfaces where the light can scatter
- Big difference in refractive index gives rise to light reflection

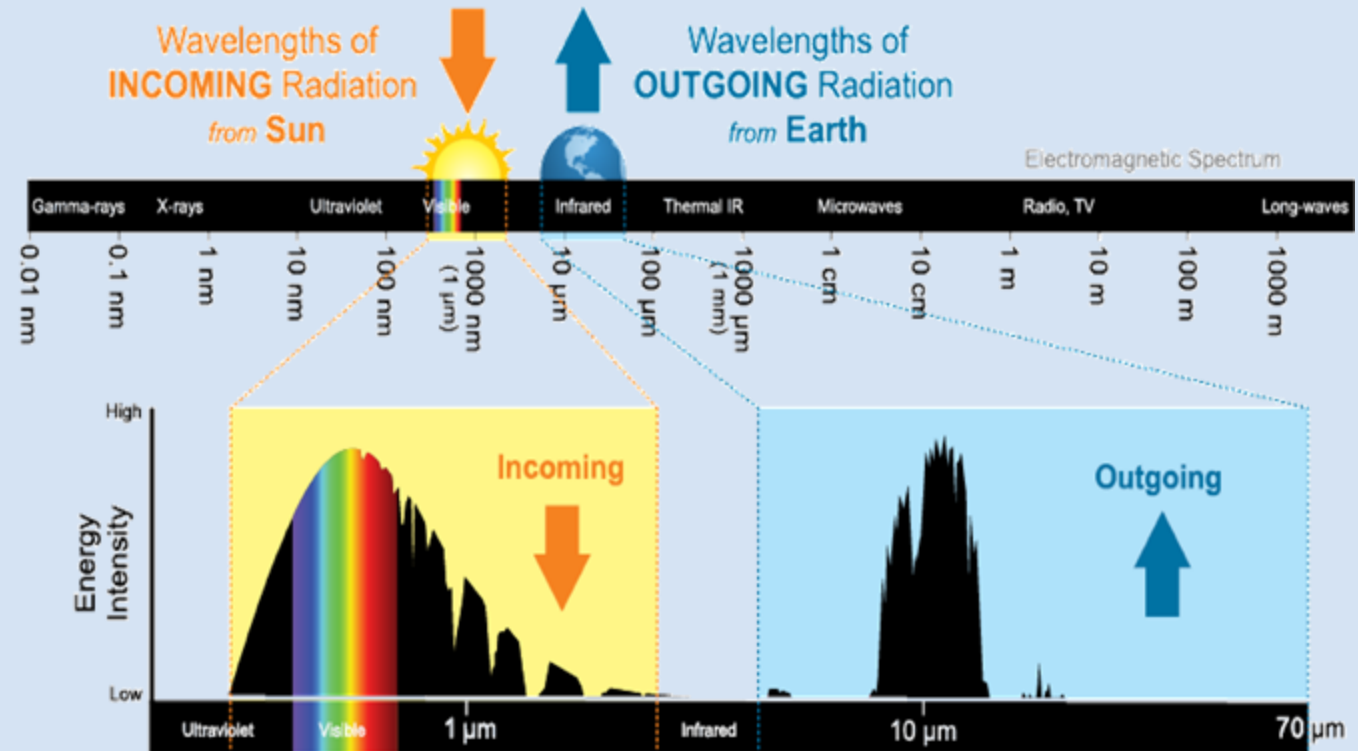
Binder
 $n \sim 1.5$

Quartzene



THE ATMOSPHERIC WINDOW

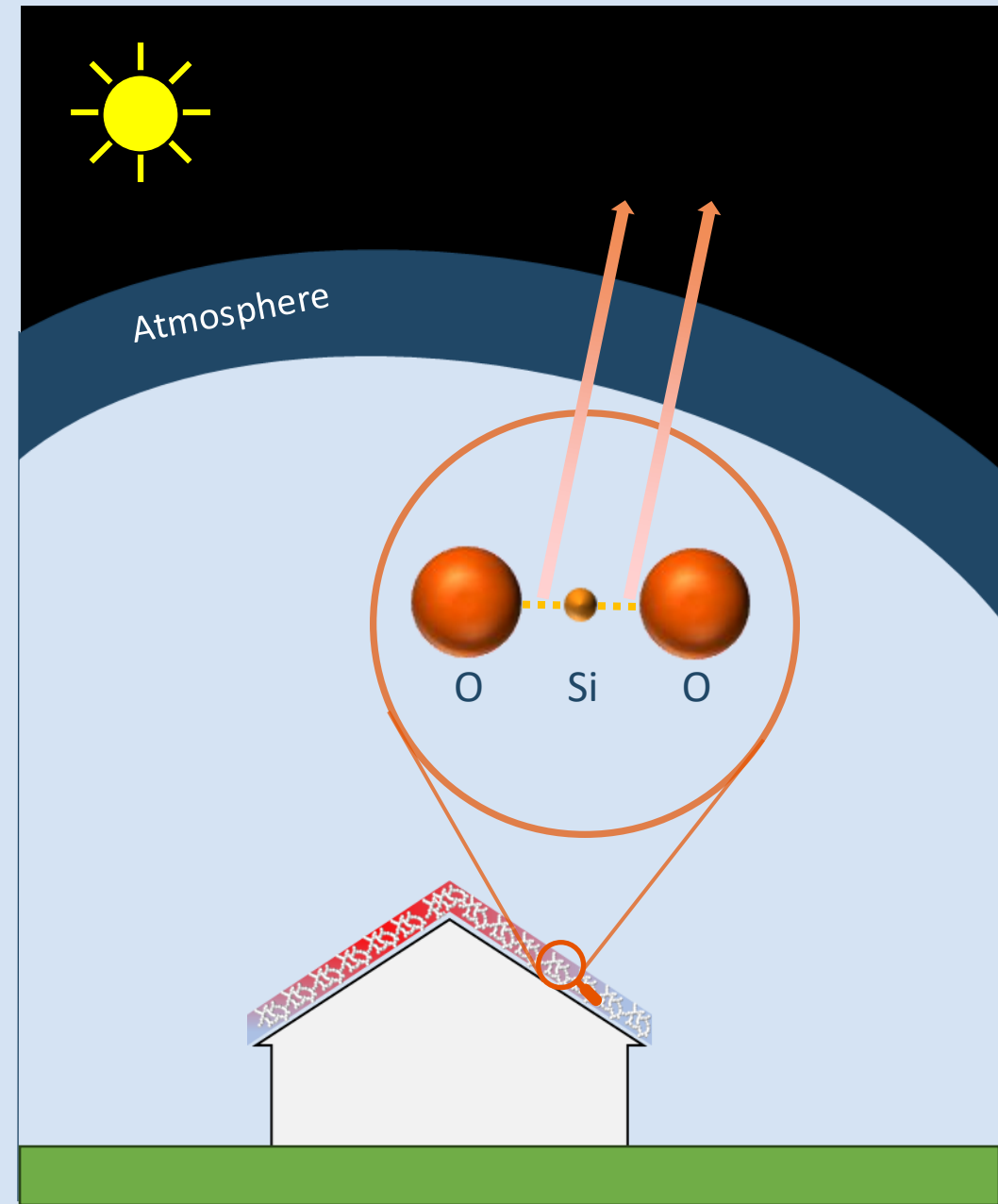
- The solar radiation comes through the atmosphere to ground in ultraviolet, visible and near-infrared ranges.
- All outgoing energy is within the infrared range.
- The most transparent range is 8-13 μm , known as the atmospheric window.
- A cool roof is optimally designed to emit in the atmospheric window to let heat radiate out in space and not get stuck in the surroundings.



[Courtesy National Oceanic and Atmospheric Administration](#)

QUARTZENE – SILICA BASED

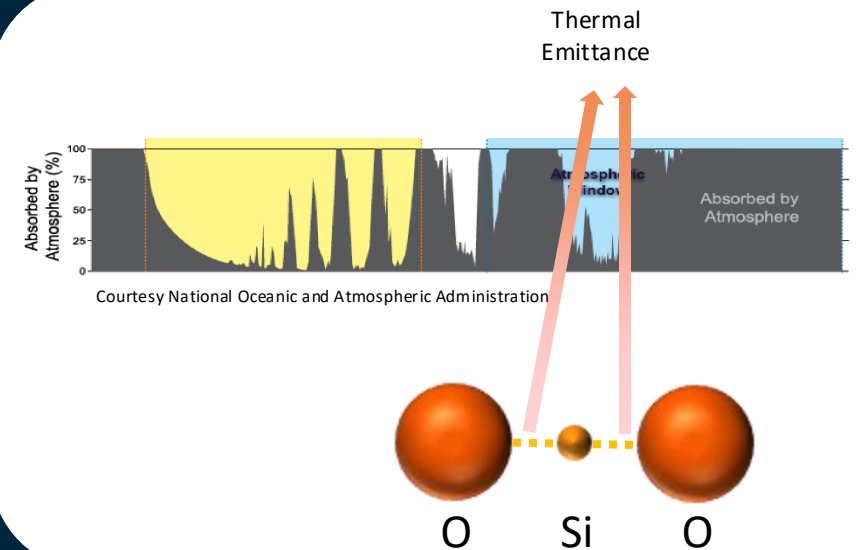
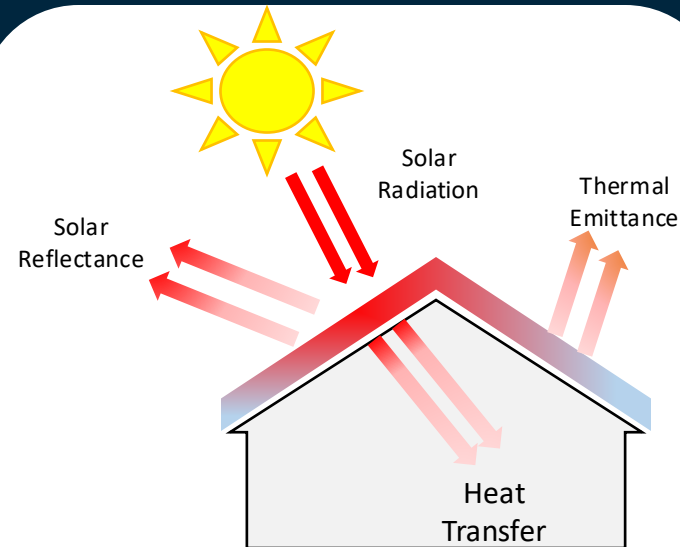
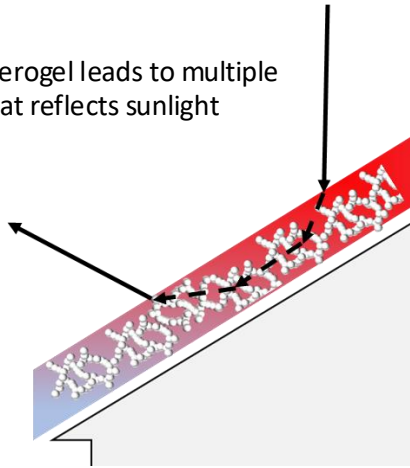
- Silica based aerogels have a multitude of Si-O bonds effective at emitting radiation in the atmospheric window
- This effect is important to enable absorbed heat to escape out in space and not be absorbed by the surroundings and thereby heating them up



QUARTZENE FOR RADIATIVE COOLING

Solar Reflective Index is calculated from a combination of solar reflectance and thermal emittance. Combining these properties are essential during paint formulation to achieve a high performing effect.

Porosity of aerogel leads to multiple scattering that reflects sunlight



PROJECT WITH RISE

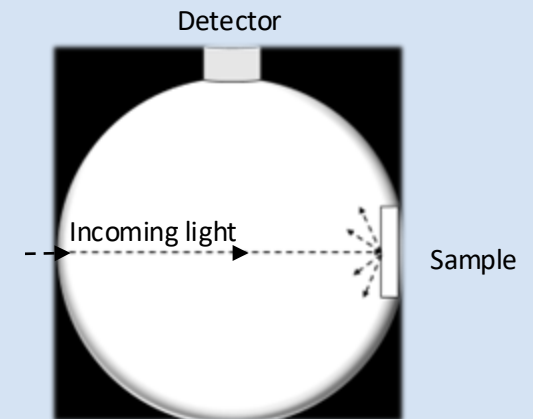
A guide formulation containing aerogel was developed by Svenska Aerogel and tested by the Research Institutes of Sweden (RISE). A spectrophotometer equipped with an integrating sphere was used to measure solar reflectivity of the coating and an FTIR equipment to measure the infrared range.

Reflectance

- Measurement in solar range: 250 nm to 2500 nm
- Total solar reflectivity is calculated integrating over the spectra of AM 1.5 (standard for solar spectra)

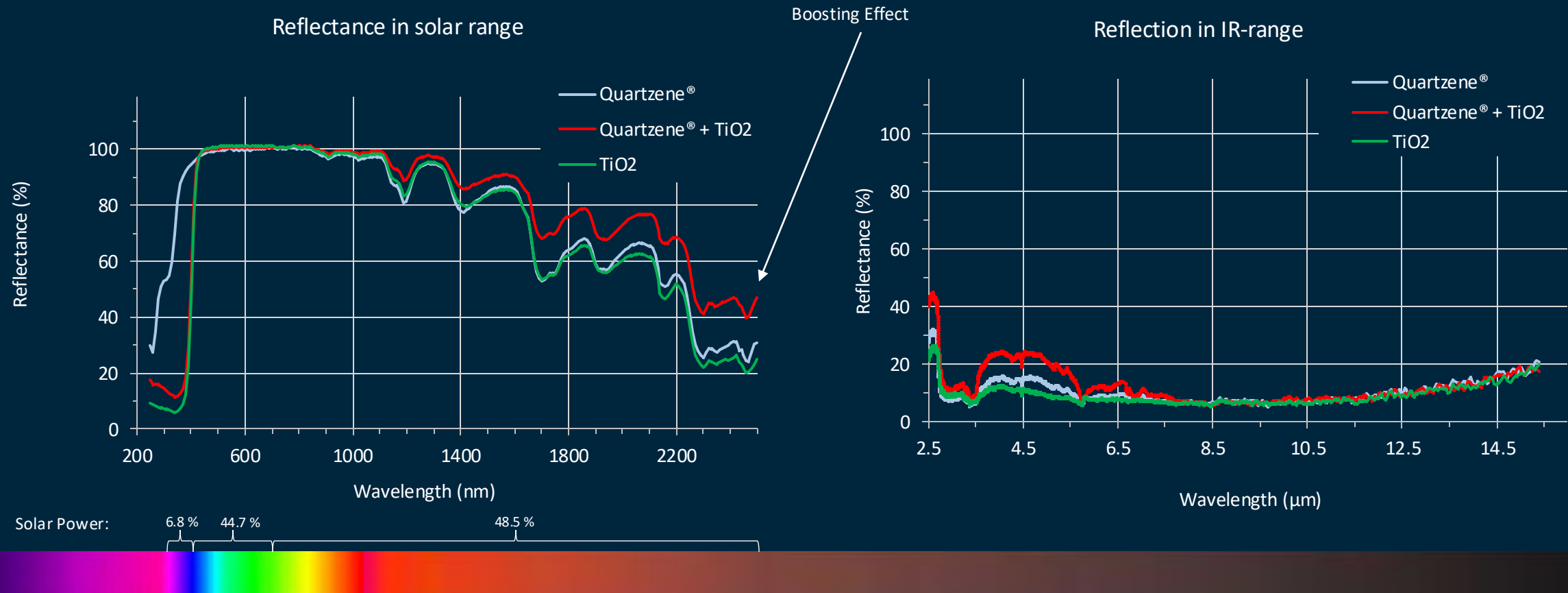
Thermal emissivity

- Measured in IR range: 2.5 – 15.4 μm
- Calculated after measurement of the reflectance in the thermal range and
- considering transmittance = 0 (insulating sample + thick paint)



REFLECTANCE MEASUREMENTS

The total reflectance showed in the solar and IR-range (250 nm – 15.4 μm).



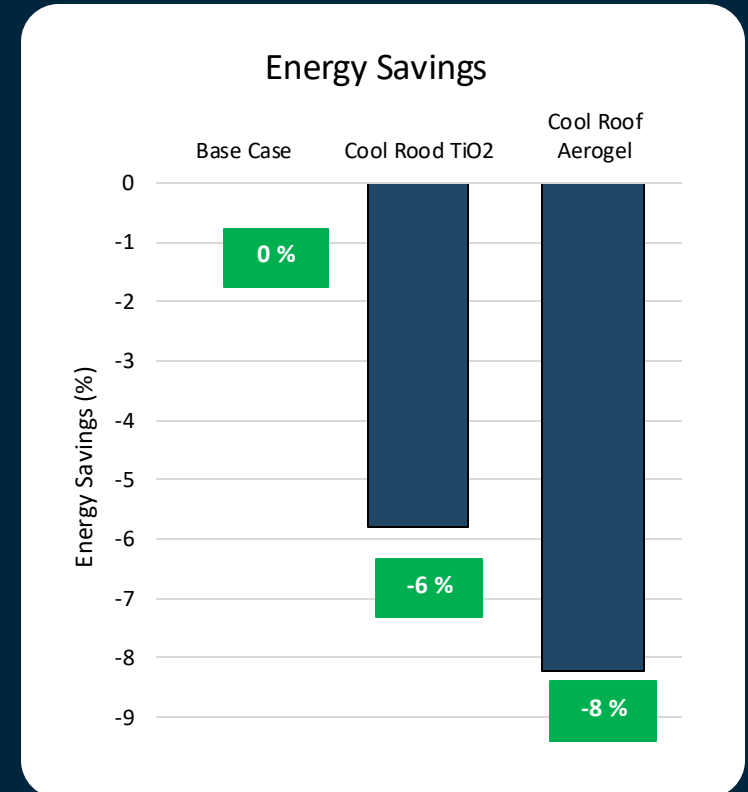
SRI AND IMPACT ON ENERGY CONSUMPTION

Calculating solar reflectance index and surface temperature from results using ASTM E 1980 gives:

- Solar Reflective Index (SRI) of 123 in the guide formulation with aerogel compared to TiO₂ reference of 114
- Surface temperature of decreased with 3.6°C

These values were used by University of Gävle to simulate the energy consumption of a standard building, according to the ANSI/ASHRAE Standard I 40-2017.

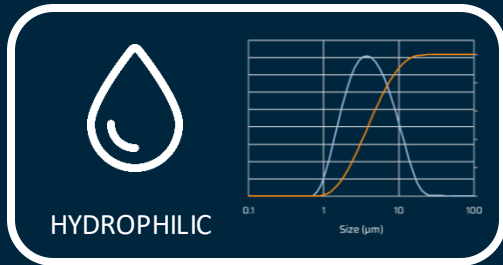
- Quartzene® in a Cool Roof paint reduce energy consumption with 3 % compared to a TiO₂ cool roof paint and 8 % compared to a non-cool roof



QUARTZENE GRADES

Hydrophilic

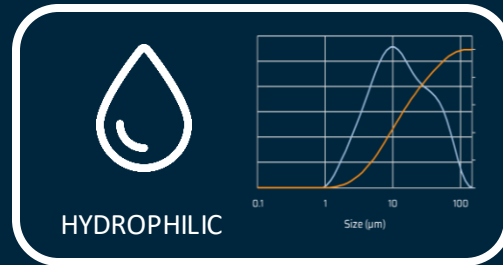
Quartzene® Z1



KEY FEATURES

- Hydrophilic material
- Super low thermal conductivity
- Particle Size Range ~1-15 µm
- Very smooth coating surfaces
- Non-combustible/non-flammable

Quartzene® Z2

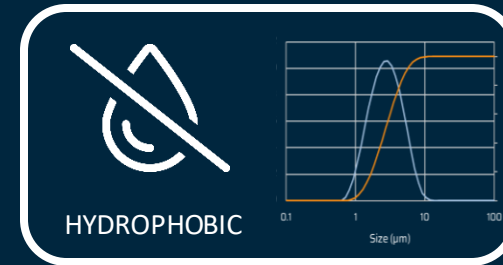


KEY FEATURES

- Hydrophilic material
- Super low thermal conductivity
- Particle Size Range ~1-100 µm
- Medium viscosity impact
- Non-combustible/non-flammable

Hydrophobic

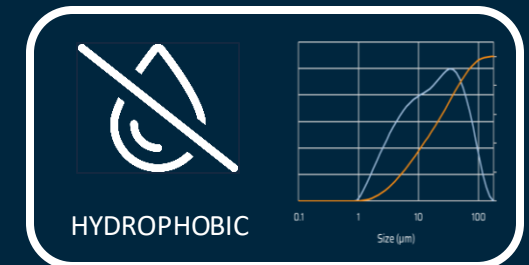
Quartzene® Z1H1



KEY FEATURES

- Hydrophobic material
- Super low thermal conductivity
- Particle Size Range ~1-15 µm
- Very smooth coating surfaces
- Non-combustible/non-flammable

Quartzene® Z2H1



KEY FEATURES

- Hydrophobic material
- Super low thermal conductivity
- Particle Size Range ~1-100 µm
- Medium viscosity impact
- Non-combustible/non-flammable

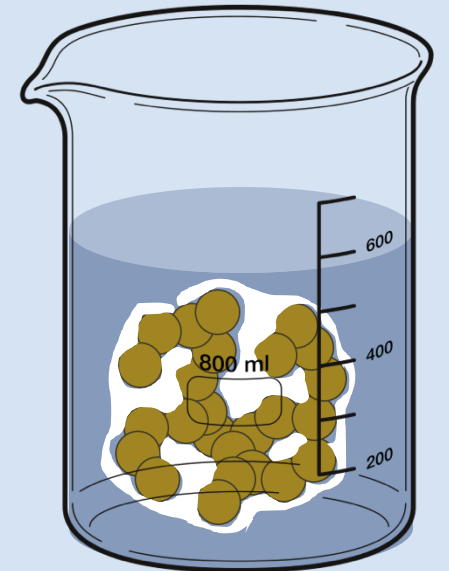
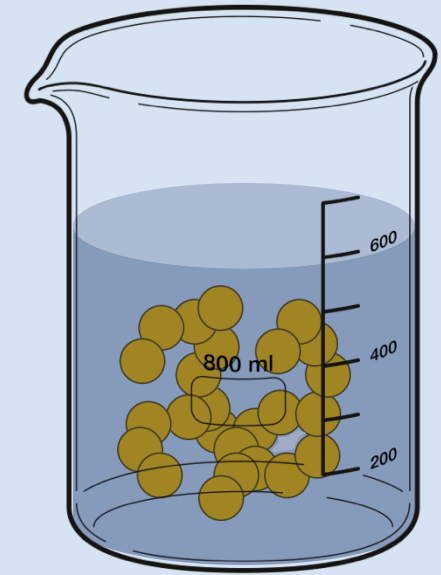
FORMULATING WITH QUARTZENE

Formulating with aerogel are a bit different compared to classical pigments.

Key consideration to be taken into account when working with aerogels is to preserve the porosity of the particles and keeping the binder system outside of the porous structure.

Partial or surface wetting is ok but not wetting out the pores as this will negatively impact thermal insulation, refractive index and overall paint consistency.

- No high shear forces to be used during incorporation.
- The formulator should see a density reduction in the formulation when adding aerogel (mostly air).



HIGH PERFORMACNE COOL ROOFS



Get in touch with us to start your new development project with the Quartzene® material.

Thank you!

Contact us at info@aerogel.se

More information is available at aerogel.se

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