



CommONEnergy

ams | ADVANCED  
MANAGEMENT  
SOLUTIONS

## SMART COATINGS



Coatings are generally used in their many forms mainly for aesthetic reasons. But, recently, specialized coatings were developed to address problems in the building envelope.

These problems are related to mould, water penetration and, lately, solar reflection as well as thermal and sound insulation.

Even so, no coating or paint exists to address all problems with multiple or combined properties, to reduce the application time, as well as reduce short or long-term building operative costs by its sole application.

Therefore, in the framework of the CommONEnergy project, a new multi-functional formulation was developed for an additive with advanced surface properties suitable to be integrated to any aqueous-based paint (for almost every substrate, excluding glass and laminated surfaces such as wood, plastics, etc. which have been excluded from this research due to the synthesis of the resins used for their production, as proved to be incompatible with the multi-functional formulation synthesis).

The final user thus has the ability to pick from a list of properties those suitable for the climate conditions of his/her area, and just add the formulation in the desired commercial coating product.



## USE

In the framework of the project and with the aim to test the achieved results, many different samples were created and tested for their visual properties, porosity, water absorption, water steam permeability, coating hardness, coating adhesion, thermal behaviour, anti-mould / antibacterial behaviour and their self-cleaning properties.

From those tests, a reduction of porosity in the total sample area was achieved, which in case of cement reaches 23.05% and, in lightweight concrete, 22.72%.

The water absorption behaviour was improved by up to 81,82% (Portland cement), while a high grade of improvement in water steam permeability was noticed, where values indicated steam water transmission well below 20%.

Moreover, the coating archived high shore D hardness, with values above 60, which considers being industry standard while the adhesion capability for all samples was within manufacturers' standard, as the percentage area removed < 5% and is classified as CAT 4b.

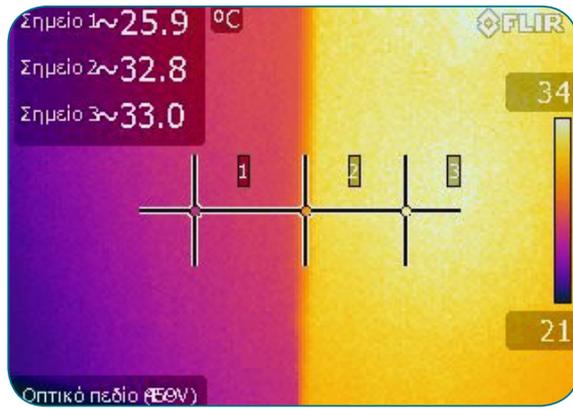
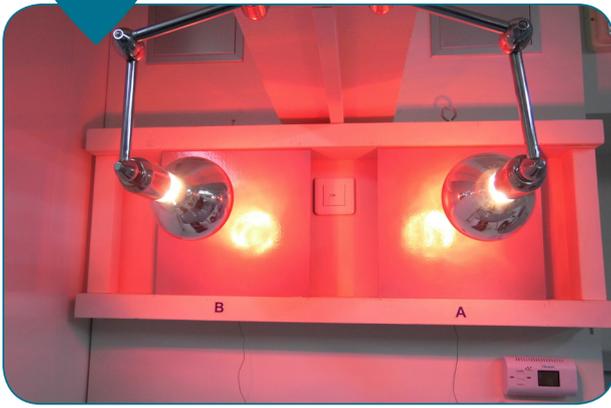
A significant decrease (on average 11.33%) of the measured temperature was recorded on the back side of the samples, and a high reflectance value reaching 93,98% in case of steel sample to 89.12% for the elastomer membrane was achieved.

Finally, coated substrates maintain their anti-moulding properties as they can be categorized as CAT 2 substrates (coatings).

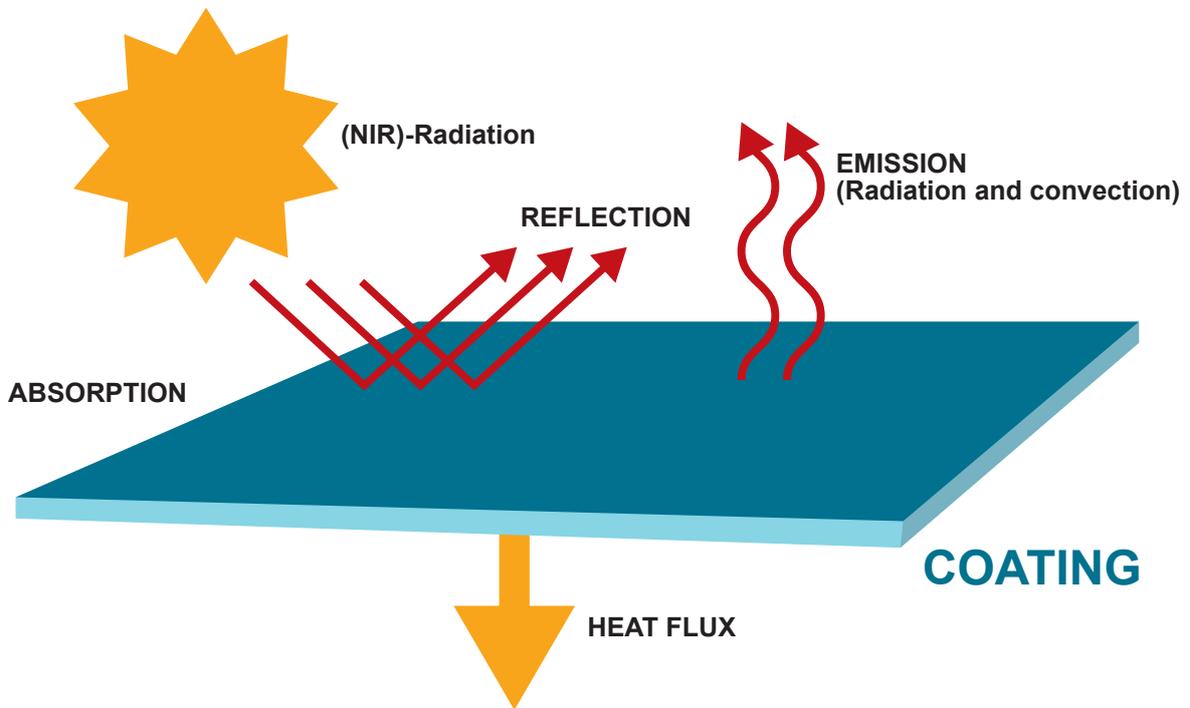
Their antibacterial activity exceeds  $\log >2.00$ , indicating high antibacterial protection while maintaining the hydrophilicity as recorded during the DSA test. It was also found to be active in the photocatalytic degradation of nicotine and, as a conclusion, to the most organic pollutants.



## TECHNOLOGY



## HOW IT WORKS



## FEATURES

The possible characteristics that the final user can choose from are:

- Thermal behaviour enhancement
- IR reflective or IR absorbing
- Anti-bacterial / anti-moulding
- Self-cleaning / VOC elimination
- Hydrophilicity / Hydrophobicity





## BENEFITS



By using this kind of coating additive, a **decrease in the energy consumption** can be achieved, as the IR reflecting or absorbing technology could lead to a **reduction of up to 50% of the energy cost** for heating or cooling. This was especially the case for the area of Catania, one of the project reference buildings where simulations were performed with the TRNSYS model: a time to ROI of less than three years was calculated.



Moreover, coatings with hydrophobic and IR characteristics form a **barrier against harmful UV radiation** and add an additional **layer of weather and moisture protection** which reduces the substrate's fatigue.



The antibacterial properties of the coating add the ability to form a **protective shield against mould and algae growth**.

These factors add up to **extend the life of the substrate materials**, especially for membranes in roof applications.

Environmental benefits associated with the use of sustainable coatings extend beyond the energy savings.

As a result, lowering the ambient temperature of the roof can contribute to **reduced smog in urban areas**.

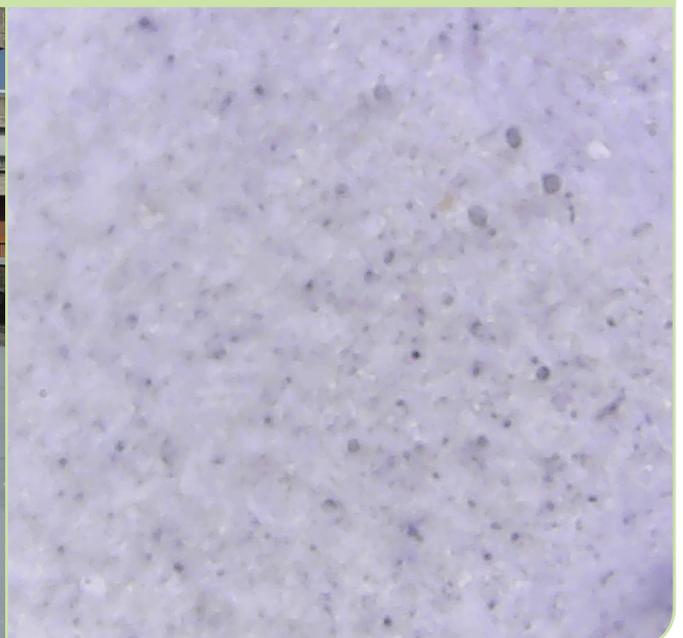


Besides the obvious cost savings, longer lasting construction materials mean **less waste going to the landfill**.



## CASE STUDIES

The technology was applied in the demo site of Modena Canaletto (Italy). The smart coating applied has thermal insulating, IR reflective, anti-bacterial / anti-moulding, self-cleaning and hydrophobic characteristics.





## COMPATIBILITY WITH OTHER TECHNOLOGIES

The smart coating technology doesn't affect - and is not affected by- other technologies and can be applied independently without any compatibility issues.



## CONTACT DETAILS

**FOTIS MANESIS**  
fotis.manesis@amsolutions.gr

**CONSTANTINOS TSOUTIS**  
constantinos.tsoutis@amsolutions.gr

The project *CommONEnergy* (2013-2017) focuses on transforming shopping centres into energy efficient and high-indoor-environmental-quality buildings, by developing smart renovation strategies and solutions supporting their implementation and assessing their environmental and social impact.

- 3 demo cases, 8 reference buildings & 23 partners from across Europe
- 25 technologies developed and installed in 4 years
- Up to 75% reduction of energy demand, leading to costs reduction
- A payback time of maximum 7 years



**CommONEnergy**



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