

ClimateCoating®

Reflective Membrane Technology



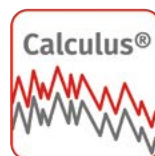
ThermoProtect

Long-lasting facade protection with energy-saving effect

Protects effectively and algacide-free against algae growth.



GERMAN
**INNOVATION
AWARD '18
WINNER**



Reflective
Membrane Technology

ThermoProtect – the long-lasting facade protection

The ready-to-use facade coating protects against weathering, algae, moss and fungal growth and improves the year-round energy balance of the building. *ThermoProtect* has a moisture and temperature regulating and keeps the façade dry. It is above-averagely robust and delights its users with durability and a huge colour spectrum.

ThermoProtect is the long-lasting facade protection with a positive balance for energy saving, attractiveness and resistance for almost all climatic zones.



- keeps the facade dry
- reduces algae growth in the long term
- remains robust, colourfast, free of embrittlement
- extends renovation intervals
- conserves material and financial resources
- is environmentally friendly and helps to save CO₂



This coating improves the building energy balance all year round, in both warm and cold climates.

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Dehumidification and temperature regulation

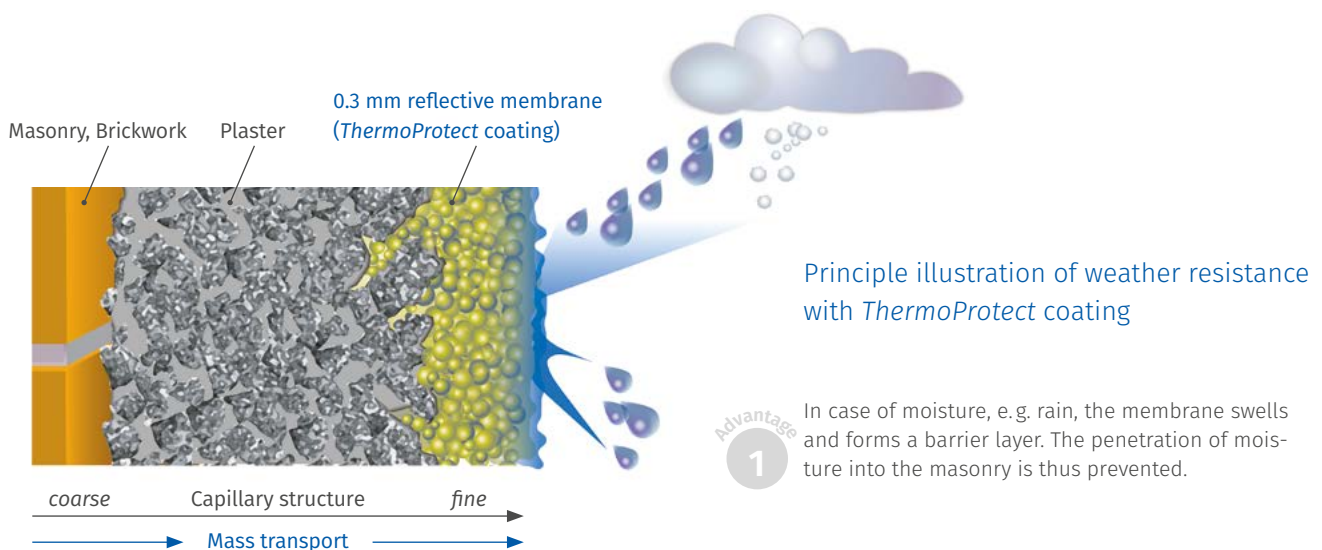
The unique synthesis of a polyacrylate dispersion with ceramic hollow spheres and activators creates a reflective membrane after application, which ensures an above-average long intact, dry and weathering-free facade.

Dehumidification

This membrane acts as a barrier that protects the masonry from the penetration of precipitation and condensation. At the same time, the capillary effect dehumidifies the masonry. A dry masonry insulates much better than a damp one! The loss of transmission heat is reduced. The dry masonry absorbs solar input from the low sun more effectively in winter and thus improves the energy balance of a building.

Temperature regulation

In summer, the exterior walls are cooled by short-wave sunlight reflection and by directional evaporation processes. This reduces cooling loads and thus energy costs. At the same time, the exterior walls are kept dry, which counteracts the development of algae growth, especially on insulated facades. When used in hot climates, heat transport from the outside to the inside is reduced.



Advantage 1

In case of moisture, e.g. rain, the membrane swells and forms a barrier layer. The penetration of moisture into the masonry is thus prevented.

Advantage 2

ThermoProtect allows mass transport, due to the capillary structure of the materials, in only one direction: from the inside to the outside. This means that the moisture gets to the outside, but not to the inside. In technical jargon, this is called a hygric diode.

Reflective Membrane Technology

The secret lies in specially developed glass ceramic spheres which enclose a vacuum. Combining these glass ceramic spheres with a strong adhesive and specially developed dispersion as well as activators creates a „liquid ceramic heat shield tile“ in the figurative sense, which forms a reflective membrane upon application.

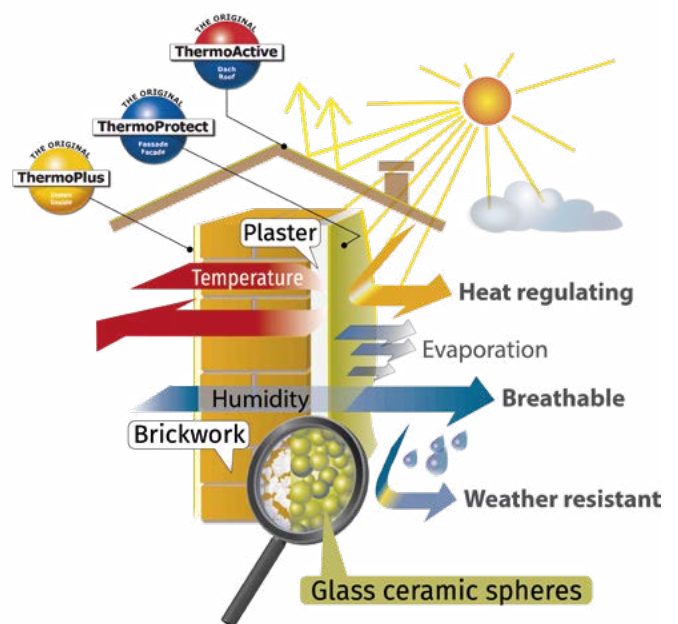
The effect of the reflective membrane technology is better understood as part of the physical processes which typically apply various forms in buildings including reflection, directed evaporation, anti-electrostatics and material resistance. These special properties are combined in the *ThermoProtect* facade coating and other products under the *ClimateCoating®* brand.

Practical problem solutions

ClimateCoating® products offer practical solutions to several problems and effectively eliminate, prevent and avoid mold, fungi, algae, mosses; brittle, dirty facades and moisture ingress due to hard rain on roofs. The heating load of e.g. roofs, interiors, containers, pipelines, or tanks is significantly reduced. This results in benefits related to e.g. time, reduced budgets, healthier living conditions and better protection of building structures.

The environmental plus

All *ClimateCoating®* products are water-based and solvent-free. They carry the „Greenguard“ certificate in gold. The technology or the products and their application have received several awards worldwide, including the German Innovation Award. The justification states:



Reflective Membrane Technology –
Physical principle of action inside / outside



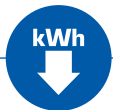
The product range ... clearly demonstrates that heating and cooling energy can be saved with a thermoceramic coating in a simple, economically compatible way that conserves resources. Without environmentally harmful biocides, ThermoShield® ensures reduced algae formation on the facade and prevents mold growth indoors. In the long term, this saves material, energy and labor resources, sustainably protects expensive building materials, preserves values for future generations and protects the environment.





ThermoProtect ensures a better energy balance
of the building in the long term –
in warm and in cold climates.

Properties, processing of ThermoProtect



ENERGY SAVING

- regulates moisture
- regulates temperature
- reduces heat radiation to the environment

→ Helps keep facades dry, reduces energy consumption and improves the energy balance of the building.



ENVIRONMENTALLY FRIENDLY

- water-based
- mild odour, very low VOC
- free from aromatics
- free from organic solvents

→ ThermoProtect is algicide-free and protects the environment.



PREVENTIVE AND ROBUST AGAINST

- Algae and moss growth
- Fungal attack and mould
- Acids, alkalis, ozone
- Nitrogen, sulphur oxides

→ The facade remains intact, dry and weathering-free for an above-average period of time.



LONG-LASTING

- UV-resistant
- dirt repellent
- material resistant
- weather resistant
- colourfast

→ The extension of renovation intervals saves effort and costs.

It also works without algacides

Most facade paints contain specially developed algacides, i.e. biocides, which are chemical poisons designed to prevent the growth of algae and fungi on the facade. Algacides work through the constant transfer from the facade paint to the condensation water that forms on the facade. They can only work in aqueous solution. This process is slow, because otherwise the protective effect would quickly be used up.

The problem: With time and rain, the algicide is washed out of the facade paint. Practice shows that facades become unsightly after five years at the latest because algae and fungi suddenly re-colonise and multiply. This is a sign that the algacides have finally been washed out of the facade paint. Ecologically, the process is viewed critically by the water industry, among others, because the algacides get into the soil and thus also into the groundwater and the sewage system. But algacides for facade protection are not supposed to work there! **The good thing is** that the prevention of algae and fungal growth on facades is also possible without algacides. Simply through physical principles of action, see „Reflective membrane technology“, page 4, because a moisture-regulating coating works with the weather! **The result:** clean and intact facades without algae or fungal growth for considerably more than five years, as practice shows.



PACKAGING UNITS, SHADES, PROCESSING

- Container sizes: 19.0 (= 5.02 gal) / 12.5 / 5.0 litres in oval, round buckets
- > **100,000 colour shades** (can also be tinted according to NCS, RAL)
- easy application
- **brushing, paint roller, spraying method**
- Consumption: 330 ml/m² on smooth, non-absorbent surfaces with 2 applications
- cleaning with water



No life without water – from algae formation and moisture management

Through the moisture management of a paint coating, it is possible to make the interior climate more comfortable, to positively influence the energy balance of the building and to act preventively against mould and algae.

Moisture is water in the air and in building components, which is present in liquid and vapour form. It is well known: without water there is no life.

Damp surfaces, in combination with the specific food supply indoors, lead to mould growth. Outside, it is algae, often joined by fungi and other microorganisms. Particles blown in with the airborne dust, in combination with the condensation on the surface, are already sufficient as a food base. Black and green discolouration on facades, and in particular red discolouration, as in the case of the church in Mönkebude (see page 7), are well-known in the cityscape.

Mould in living spaces is hazardous to health. Algae on facades are a defect according to general case law. To solve the problem, the paint industry has already tried different approaches – alternating between hydrophilic and hydrophobic, rarely without algicidal admixtures.

The *ThermoProtect* coating from *Climate-Coating®* is different. The coating, which is only 300 µ thick and forms a membrane after application, contains millions of microscopically small glass ceramic hollow spheres with a vacuum and an average size of 40 µ. Due to their quality in shape, wall thickness, material composition and as a result of the diameter distribution, a special inner structure is created in combination with the other materials (bin-

der, filler and aggregate), which is finer than that of plaster and masonry. This results in directed capillary moisture transport – to the outside.

In winter, the coating supports the drying processes of the wall, while in summer it blocks and thus reduces the penetration of water vapour into the wall. *ThermoProtect* is variably open to diffusion! Due to this physical effect, the facade is supported in the drying process and algae cannot settle or cannot settle as easily. It should be emphasised that *ThermoProtect* is algicide-free. Long-term documentation shows that even after 10 years, facades treated

with *ThermoProtect* are clean, crack-free, and colourfast.

From an economic point of view, *ClimateCoating®* coatings are an advantageous solution with great added value for buildings, people, and the environment. Many worldwide references prove this.

The coating *History* was developed for historic building facades. Studies by the Polish Institute for the Preservation of Historical Monuments PKKZ (Polskie Pracowni Konserwacji Zabytków S. A.) already proved in 2004 that the drying behaviour of the *History* product, which was specially developed for the preservation of historical monuments, is better than the German brand products used for the comparative test.

Algae on facades are a defect according to general case law.



Test surface coating and comparison with competitor product after 6 years.

Assessment by a building expert of the outdoor weathering test in 2009: Damage-free condition, without cracks, without algae formation. The result clearly exceeds the result of the competitor after 6 years.



www.climatecoating.com/en/references/reference/residential-house-in-berlin-after-6-years/



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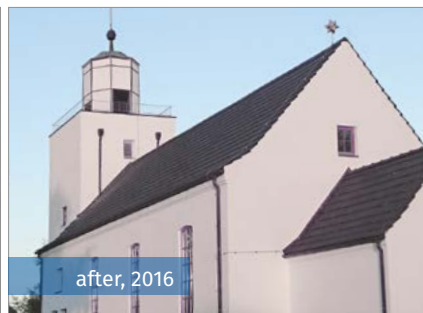
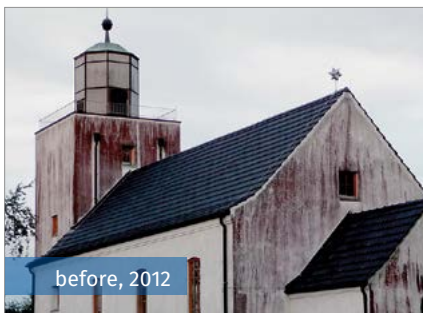
Practice examples

Algae removal and prevention

temperate
climate zone:

Germany
Church in Mönkebude
2012 2022

„Still algae-free and
bright white.“



Initial situation and problem

The facade of St. Peter's Church in Mönkebude was becoming increasingly discoloured due to increasing red algae infestation and had become so unsightly that it was leg named the „Red Church“.

Idea and solution

Following a structural measure on the apse, it was painted white with *ThermoProtect* in spring 2013 for testing purposes. After three years, when the test

coat had been applied without complaint, the renovation of the entire facade was commissioned in July 2016. The church facade surfaces were cleaned and treated with an algicide. In August 2016, all facade surfaces were coated with *ThermoProtect* white.

Conclusion

Even in 2022 – six years after the algicide-free coating – the facade view is immaculate.

”

As early as November 2009, the Sch. family from Quirnbach reported on their good experiences with *ThermoProtect* (formerly *ThermoShield* Exterior): *We had decided to have our house re-plastered last year. Through the company Thorsten Rotthus, Rothselberg, we became aware of ThermoProtect and decided to use it. So far, we can only report positive things: we finally got rid of algae growth, pleasantly cool rooms in summer, less heating oil consumption in winter.*

Long-term project housing blocks in Perleberg

See picture above. Since 1998, various apartment blocks have been coated with *ThermoProtect* and regularly inspected until today. Result: no cracks, no peeling of the paint. New algae growth, compared to other identical properties, is extremely low.

www.climatecoating.com/en/references/reference/apartment-blocks-in-perleberg/



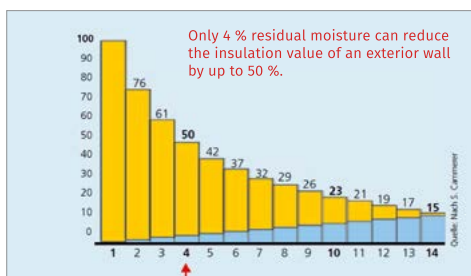
Thermal protection in winter

Winter thermal protection is primarily about reducing heat loss that occurs when heating indoor spaces. There are many methods, but most are non-adaptive approaches that address pure heat transport but ignore influential environmental factors, such as humidity

The problem in practice

Most facades are insufficiently protected against precipitation and driving rain. Conventional facade coatings absorb a lot of moisture during precipitation and release it to the wall behind. Wet walls result in a dramatic loss of insulating effect. The result is high heat loss and a consequent increase in heating requirements.

„Only 4 % residual moisture can reduce the insulation value of an exterior wall by up to 50 %. This is massively underestimated,“ states construction engineer Matthias Bumann and refers to the bar chart by building physicist J. S. Cammerer.



Decrease in the thermal insulation capacity of a damp wall.

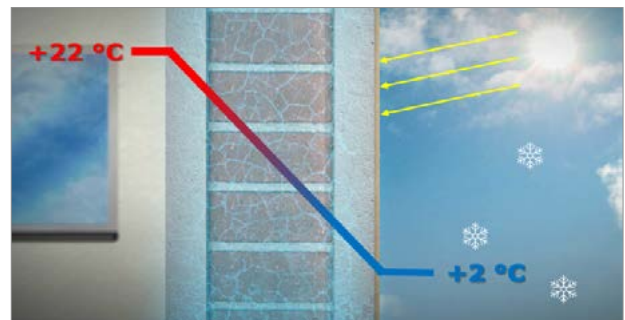
But energy loss also occurs through the evaporation of moisture on the facade: the energy required for evaporation is withdrawn from the masonry – the heating requirement increases.

The solution

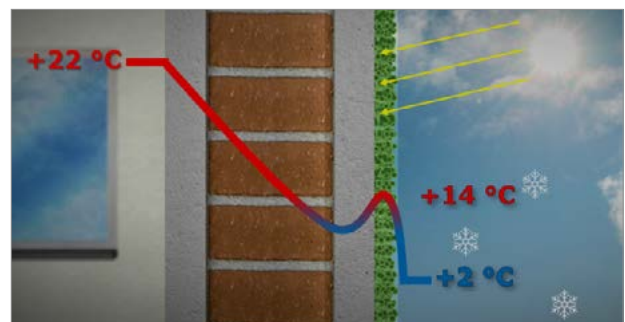
ThermoProtect protects in two different ways at the same time: When the sun is low, *ThermoProtect* absorbs the heat better and warms the outer building envelope. This built-up temperature barrier reduces heat loss and thus energy consumption. In the event of precipitation, *ThermoProtect* absorbs only small amounts of moisture, forms a barrier layer, and thus prevents moisture transport into the wall. The wall remains dry and does not have to be dried by the heat coming from the heating.

Conclusion: The moisture absorbed by *ThermoProtect* is passively dried by the solar gains. Drier walls in-

sulate better than damp ones – energy consumption decreases.



Temperature gradient in winter without *ThermoProtect*.



Schematic temperature gradient with *ThermoProtect* in winter. Solar gain of 12 °C.



Using the example of the Energy Master House in Austria, long-term measurements in 2015 showed that energy losses via the facade are reduced and solar gains are supported via the outer wall. that the energy losses via the facade are reduced and the solar gains are supported via the outer wall. For details see www.climatecoating.com/en/references/reference/energy-master-house/.

This is what *ThermoProtect* brings out:

- raises the dew point
- reduced condensation
- reduced water absorption during driving rain
- reduced soiling = fewer nutrients for fungi, algae, moss, etc.



Reducing energy consumption
means conserving resources and
saving money.

The *ThermoProtect* facade coating physically helps to protect the building from too much heat energy loss to the outside. What was proven in practice was already calculable beforehand. In order to be able to compute the reduction in energy consumption through *ClimateCoating*® coatings in terms of building physics, a method for including such a coating in the calculation of the **heat transfer coefficient (U-value)** was developed in 2006 in collaboration with Prof. Dr.-Ing. Manfred Sohn, a specialist in regenerative energies and former member of the Berlin Chamber of Buildings and former professor at the htw.

The U-value is a formula for calculating the effect of insulating materials. However, *ClimateCoating*® products are not insulation or insulating materials. This means that the facade coating cannot be assessed as an insulating material like insulating material. The fact that the coating with *ClimateCoating*® *ThermoProtect* nevertheless has an energy-saving effect and that – with a modified U-value formula – the energy-saving effects can be calculated very well in advance is clearly shown in a video.

$$U = \frac{1}{R_{si} + \sum \left(\frac{d}{\lambda_R (1 - f_{cc})} \right) + R_{se}}$$



YouTube: ClimateCoating

The thing with the heat transfer coefficient: U-value



Housing blocks in Karstadt and Perleberg, Germany.
Facade coating of 28 housing blocks, 1998 to 2009.

↓ 14,1% to 23,4%

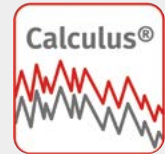
Reduction rates of the energy consumption for space heating as a result of coating with *ThermoProtect* are between 14.1% and 23.4% for the properties, according to „Evaluation of implemented measures to reduce energy consumption in residential buildings of the Blockbau 1.1 Mp and WBS 70 construction series in the stock of the Wohnungsgenossenschaft Perleberg e. V.“ by Prof. Dr.-Ing. Manfred Sohn, Dipl.-Ing. Hermann Bomhauer-Beins and Dipl.-oec. Wolfgang Sieburg.

Quality assessment: In 2014, the facade coating is still intact (no microcracks, no chipped paint) and the colour tone is stable.

For further references and to view the documentation, please contact SICC Coatings GmbH.

Legend for the U-value formula: λ_R = calculated value of thermal conductivity according to DIN 4108 in W/m.K; R_{si} = heat transfer coefficient inside in m².K/W; R_{se} = heat transfer coefficient outside in m².K/W; d = thickness of building material layer in m; f_{cc} (vormals f_{TS}) = ClimateCoating® correction factor.

The temperature calculator Calculus®



The coatings' special mode of action means that heat is kept inside the building longer in winter. In summer, the roofs and façades coated with *ClimateCoating®* products reflect the sun's rays, which prevents the interior of the building from heating up too much. The AI-based temperature calculator Calculus® can predict how significant the temperature difference will be – and thus how much less cooling power may be needed. This offers building planners and the housing industry the opportunity to better calculate the cost and energy efficiency of buildings.



Calculus® –
Making temperature reduction and energy saving
visible with artificial intelligence.

Artificial intelligence, building physics and globally collected data

Calculus® is an AI-based web tool for predicting the difference in indoor temperatures and deriving potential energy savings when walls and/or roofs are coated with the *ClimateCoating®* products *ThermoProtect* and *ThermoActive*.

AI-Calculus
powered by
AI-based building physics and globally collected data

Location: Berlin
Address: Wackenbergstraße 78-82, 13156 Berlin
Building Type: not climatised

Orientation	Component	Insulation	Amount	Width [m]	Height [m]	Area [m²]	Coat
-	Roof	yes	1	3.0	3.0	9.0	yes
N	Wall	yes	1	3.0	5.0	15.0	yes
E	Wall	yes	1	3.0	5.0	15.0	yes
S	Wall	yes	1	3.0	5.0	15.0	yes
W	Wall	yes	1	3.0	5.0	15.0	yes

Predict

مجموعة موانئ أبوظبي
AD PORTS GROUP

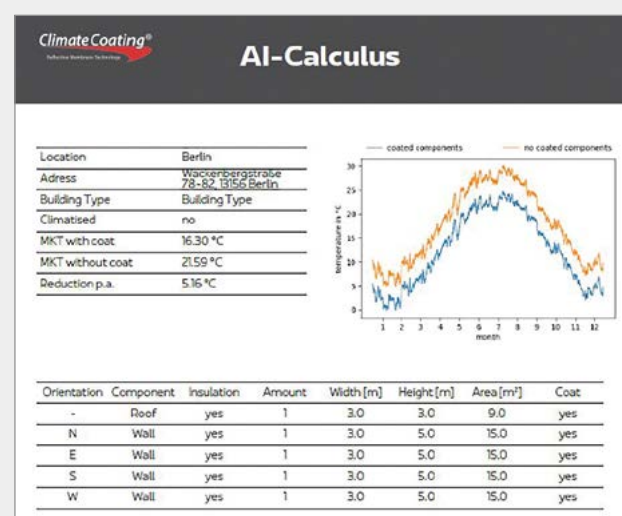
SICO Coatings **M&M**
SICO Coatings is a leading manufacturer of high-quality industrial and marine coatings. M&M is a leading manufacturer of high-quality industrial and marine coatings.

Artificial Intelligence (AI), has been and is being trained with large amount of data from worldwide practice, including very hot climates. The algorithm uses data from building physics: the reflection of solar radiation.

Reaching the goal with just a few parameters

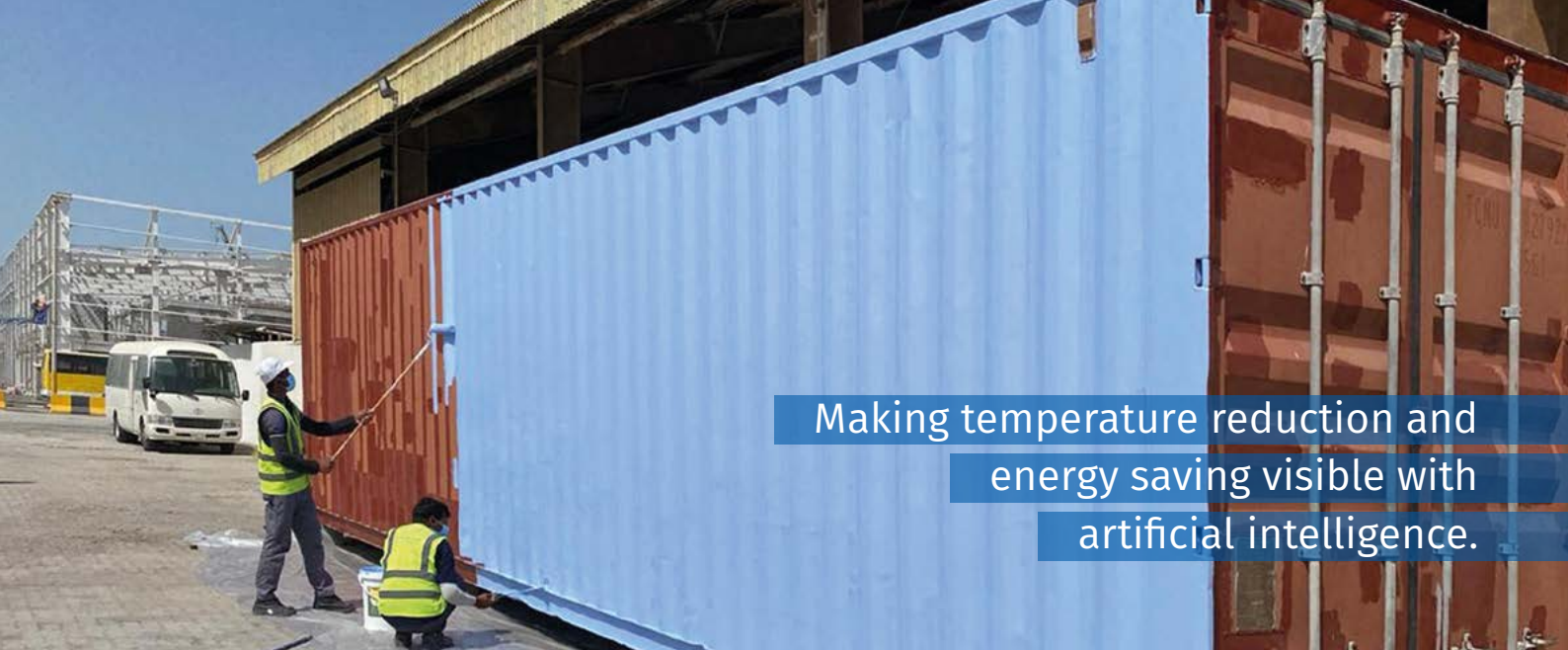
The user interface of the web tool allows a selection of numerous parameters to make predictions as accurate as possible. Location, building type, air-conditioned or non-air-conditioned are among the options that can be set, as are the type of building component, existing insulation, and the dimensions of the object.

Based on these values, the web tool immediately provides a result that shows the relative energy consumption and its development within a year – with and without coating. In addition, instead of the energy consumption, the average indoor temperature difference of a building can be calculated and how this is reduced overall per year by means of coating. With the help of Calculus®, the energy efficiency of buildings can be better calculated. This facilitates the planning of the energy concept of different building types under climatically divergent conditions.



The web tool is under permanent development.

More at: www.climatecoating.com/en/calculus/



Making temperature reduction and energy saving visible with artificial intelligence.

An idea and the joint implementation

Since 2020, SICC Coatings GmbH has been cooperating with the logistics group AD Ports Group, which is committed to reducing its ecological footprint and was looking for ways to improve the energy efficiency of its infrastructure. In one of the hottest places in the world, the initial aim was simply to test the performance promise of the coatings. For this purpose, freight containers were coated with the *ClimateCoating®* products *ThermoProtect* and *ThermoActive* and the temperature curves were measured in comparison with standard coated containers and both variants with additional interior insulation.

Over the course of twelve months, the engineers collected extensive data, based on which the start-up M&M Network-Ing UG developed the web tool, the temperature calculator *Calculus®*, on behalf of SICC Coatings..



YouTube: AD Ports Group
The Future of Abu Dhabi Ports is Now

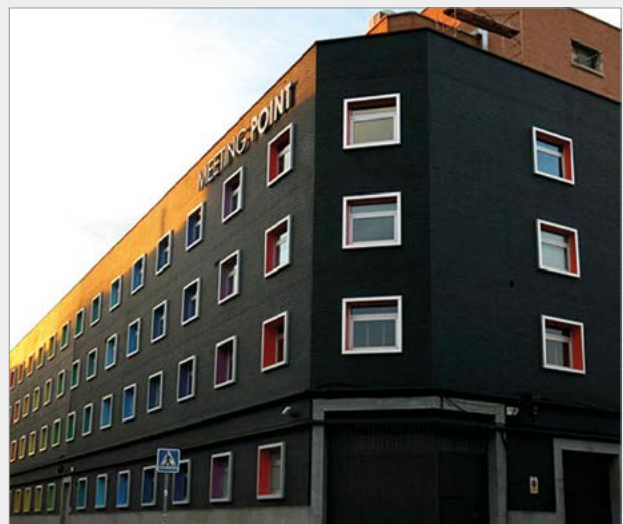
Practice: Less cooling ventilation in livestock house.

Jaworz-Jasienica (PL), 2015. The air volume exchange for cooling could be reduced from 300 % to 25 %. Roof and facade were coated.



Practice: Black house under a hot sun

Madrid (ES), 2014. Temperature reduction inside despite black paint outside. Reflective membrane technology makes it possible.



Project references worldwide



South Korea:
Yeonsan, primary school



Spain:
Alvarado, modern villa



Czech Republic:
Brno, administration building



Slovakia:
Kanianka, residential complex

*Are you looking for a paintable solution for facades?
Then please contact us. We would be pleased to provide you with our worldwide practical experience.*

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Your authorized dealer:

*ClimateCoating® – Intelligent coatings with added value.
For buildings, interiors and industrial applications.
Environmentally friendly. Powerful. Effective.*

Made in Germany. Made for you.

SICC Coatings GmbH from Berlin is the leading specialist supplier of climate-active coatings with the longest experience in all climate zones and application areas. The functional coatings are based on the reflective membrane technology. For the energy-saving effect of the technology, SICC Coatings was awarded the „German Innovation Award“ in 2018 as well as with the „Energy Efficiency Award“ in Singapore, among others.

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