ECRC EUROPEAN COOL ROOFS COUNCIL

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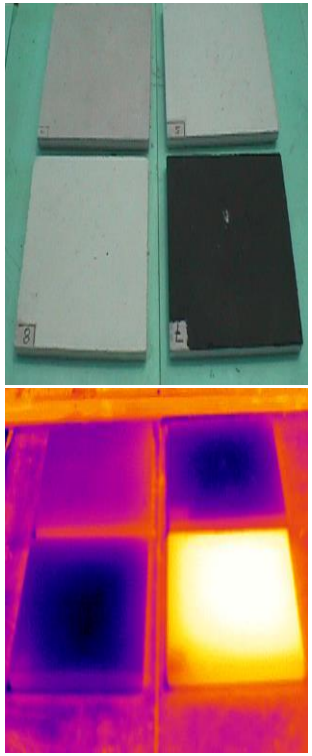
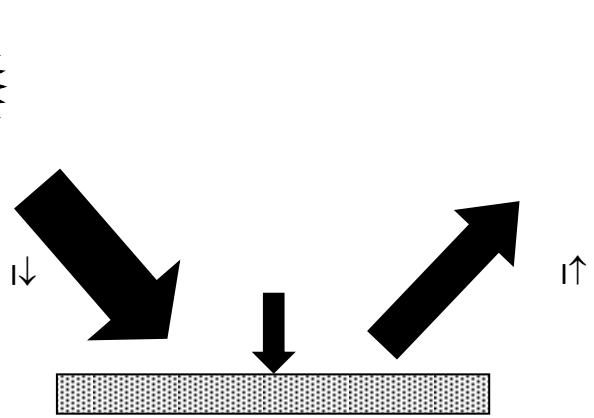
TUC

Cool Roofs and The European Cool Roofs Council

Cool Roofs have high solar reflectance

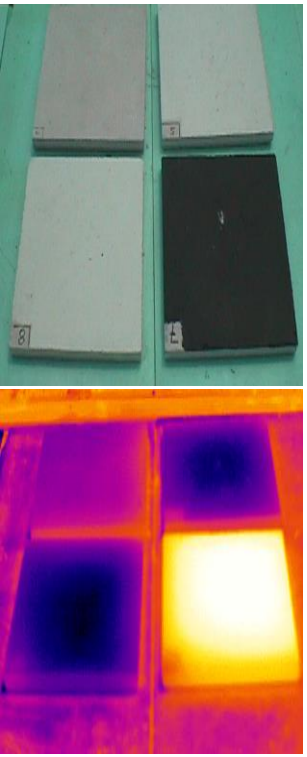




Solar reflectance is a measure of the ability of a surface material to reflect sunlight (including the visible, infrared, and ultraviolet wavelengths) on a scale of 0 to 1 (or 0-100%)

Cool Roofs have a high infrared emittance

The emittance of a material refers to its ability to release absorbed heat



Emissivity (ε) is a measure of the thermal emittance of a surface and is defined as the ratio of the radiance of a given body to that of a black body.

➢Higher emissivity values indicate faster heat transfer

SRI index

Another measure of a roof ability to stay cool:

<u>Solar Reflectance Index(SRI):</u>measure of the roof's ability to reject solar heat, as shown by a smaller rise in surface temperature (T) above ambient

		T rise		SRI*
Stand. black (r=0.05,ε=0.90)	→	50ºC	→	0
Stand. White (r=0.8,ε=0.90)	→	8 º C	→	100

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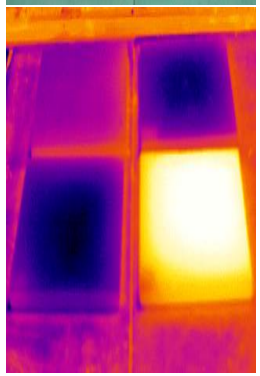
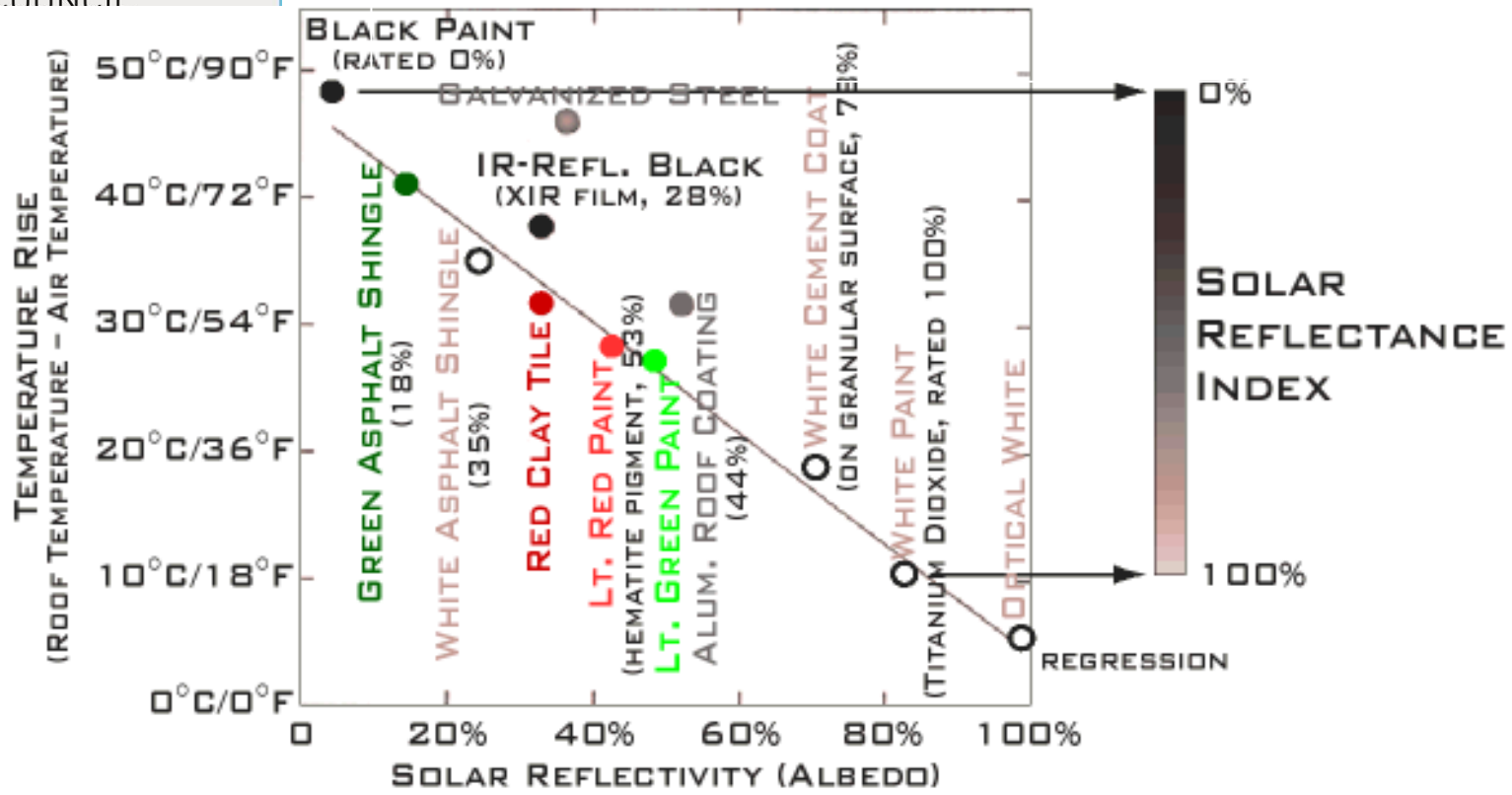
SRI definition





Once the maximum temperature rise of a given material has been computed, the SRI can be computed by interpolating between the values for white and black

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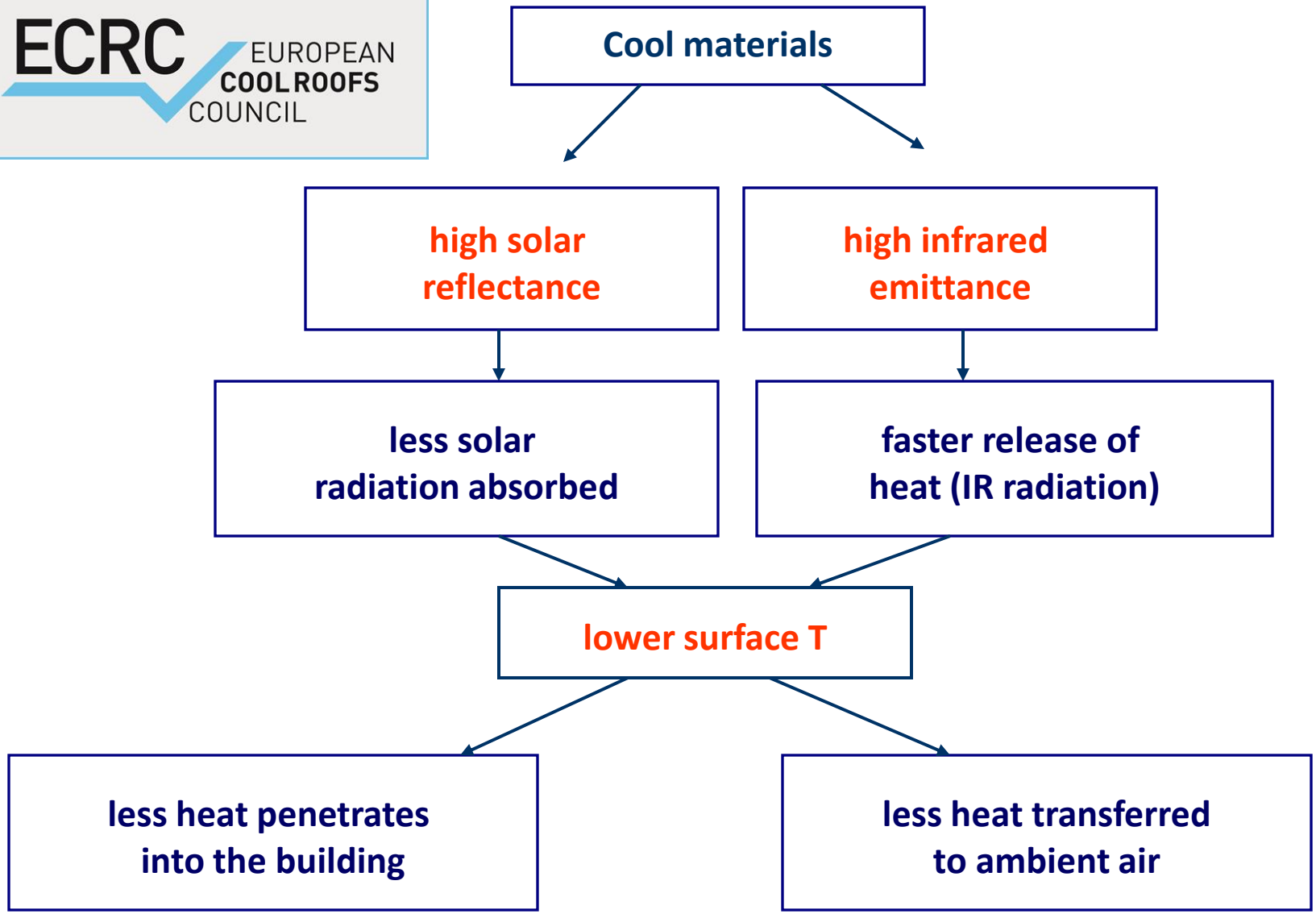

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Categories of cool materials

Cool materials

Cool roofing materials

-coatings
-membranes
-tiles
-metal roofing
-shingles

Cool paving materials

-tiles (concrete, stone marble etc.)
-asphalt pavements
-porous pavements

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Benefits of cool materials

- Reduction of building heat-gain: the T of a cool reflective roof typically increases only a few degrees C above ambient temperature during the day.
- Create savings on summertime air conditioning expenditures, in conditioned buildings.
  - AC savings averagely 10-40%
  - AC savings are more important for: hot climatic conditions, low levels of insulation, large roof surface compared to other surfaces of the building, temperate climatic conditions for buildings with increased heat gains (industrial buildings, etc)
- Improve thermal comfort conditions in non AC buildings
- Reduce peak electricity demand
  - downsizing of equipment,
  - reducing likelihood of power failures on extremely hot days,
  - saving money (commercial and industrial electricity customers are also charged for the largest amount of power (watts) they demand during a billing period)

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Benefits of cool materials

- Reduce of heat resulting air pollution and greenhouse gas emissions
  - Direct reduction : less cooling energy is used → fewer power plant emissions produced
  - Indirect reductions: if cool roofing is used widely enough throughout an area → heat island effect reduced →smog formation reduction (NOx +VOCs mix to produce smog,reaction = f(Tair)).
- The energy efficiency attributed to CR ranges between **2.5-10 kWh/m^2 (with average of 6.25 kWh/m^2) of Cool Roof**. In most countries, these savings may be sufficiently large to provide incentives to keep the roof cool permanently.
- Assuming an emission rate of 750 gCO_2/kWh of electricity savings, **the annual CO_2 savings ranges from 1.9 to 7.5 kg/m^2 of roof area , with 4.7 kg/m^2 as an average**.
- Increasing the solar reflectance by 40% of a roof area of 93m^2 (1000 ft^2), results in CO_2 emission offset of 10 tones. Europe emitted CO_2 is traded at $25/tonne; this total CO_2 offset of 10 tones is worth $250

Skepticism related to cool materials

➢**"We can not paint the cities white"**

-Glare problems

-Aesthetic preferences especially for steep slope roofs

More skepticism….

➢**"Cool roofs will significantly increase my heating bills in the winter months "**

- ✓ No matter where cool roofs are installed, they cut down on the urban heat island effect and lower a building's carbon footprint.
- ✓ Even in cold climates the cooling benefits of a cool roof far outweigh the potential winter month heating benefits of a less reflective, or black, roof surface. Energy calculators generally show a yearly net savings.

  - the sun path is lower to the horizon in winter and not hitting the roof as directly or as intensely as it would in summer,

  - it shines fewer hours

  - there are more cloudy days, and snow cover reflects the sun's energy.

  - cool roofs cut peak use in summer when rates are the highest, they reduce the demand charge that a building pays all year on the basis of its greatest energy use

…. more skepticism …

➢**"Are there commercially available cool products"**





✓Cool materials are available in every common product type and come in an unlimited range of colours – including "cool" black in some cases.

➢ ***"The effect of insulation totally negates the need for a thin cool coating"***

-

Q = - A x U x ΔT *where the cool coating reduces* ***ΔT***

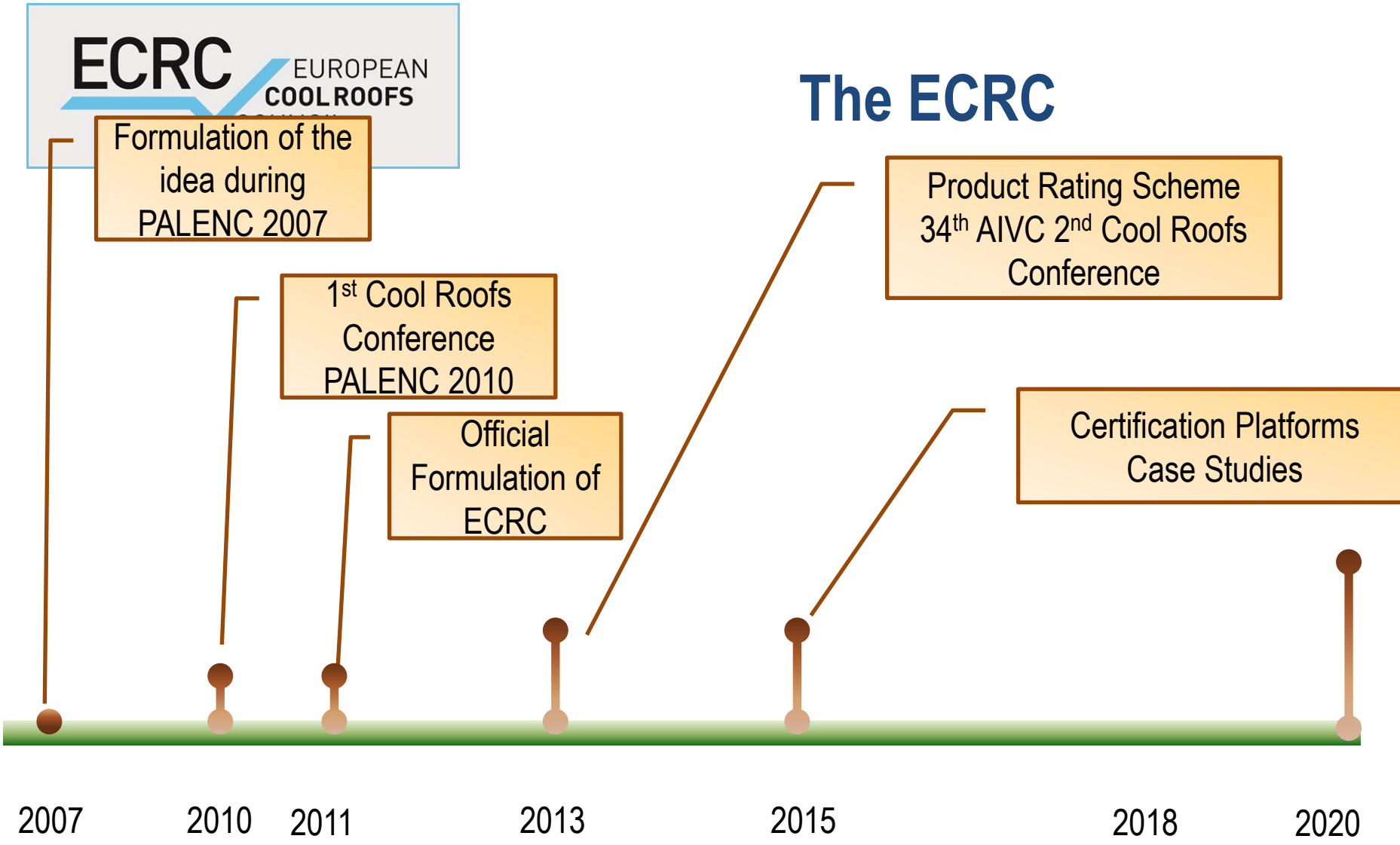
THE ECRC

- The **European Cool Roofs Council (ECRC)** is a non-profit European association whose initiatives are driven and paid for by its members through an annual membership fee. It is a voluntary organization that brings value by promoting the benefits of cool roofing products to regulators, policy makers, consumers and other stakeholders. The ECRC also intends to enable cool roof products to be identified through the creation of an accreditation scheme. This will be released this year.

http://coolroofcouncil.eu/

- **ECRC is managed** by the Board of Directors (elected every three years by the Assembly) and has established three Committees to supervise the various activities:
- The **Technical Committee** which is responsible for the technical aspects of cool materials (performing inter-laboratory testing, development of rating schemes, etc.)
- The **Communications Committee** which is responsible for the policy, marketing and communication of our organization (website, promotion in events, policy promotion and landscape, etc.).
- The **Legal and Organizational Committee** which is responsible for the administrative aspects.

The ECRC


ECRC
EUROPEAN COOL ROOFS
Formulation of the idea during PALENC 2007
1st Cool Roofs Conference PALENC 2010
Official Formulation of ECRC
Product Rating Scheme 34th AIVC 2nd Cool Roofs Conference
Certification Platforms Case Studies
2007
2010
2011
2013
2015
2018
2020

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Strategic Objectives

- Formulation of cool roofs product rating programme in Europe.
- Inclusion of cool roofs in European Standards, Energy Assessment Methods.
- Promote the benefits of cool materials to engineers, stakeholders, etc.

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Activities

- The ECRC is engaged in the following activities:
  - Research and study of ‘cool roof’ technology.
  - Production of information material relevant to ‘cool roof’ technology.
  - Support to bodies, organizations, governments, the European Union on particular issues relevant to the ‘cool roof’ technology and policy.
  - Education of members, teachers, students, legislators and the general public on ‘cool roof’ technology issues.
  - Networking, connection and association with relevant organizations in and outside the European Union.
  - Development of product rating standards concerning thermal and optical characteristics of roofing products.

What is a Cool Roof ?

Cool Roofs allow building owners, architects, civil engineers, energy consultants and policy makers to optimise the energy and environmental performance of a single building or an urban environment, depending on the use, design, environment and the surrounding climate.
A Cool Roof minimises solar heat gain keeping roof surfaces cooler under the sun. This is due to the materials used, which both reflect the solar radiation (solar reflectance) and release the absorbed heat (infrared emittance).

A Cool Roofing product is characterised by higher solar reflectance in comparison to conventional roof materials of the same colour and high infrared emittance values.

Cool Roofing products can be applied to all types of roofs including those of residential buildings, apartment blocks, industrial structures, commercial buildings, hospitals, and offices.

The benefits of a Cool Roof products can be summarised as follows:

For building owners

- reduce the energy required for interior cooling
- reduce thermal stresses on the roof potentially improving system lifetimes
- improve indoor thermal comfort

Cool roofs offer many benef

- Reduce energy required for cooling
- Lower related greenhouse gas emiss
- Improve thermal comfort
- Increase system lifespan
- Reduce maintenance costs
- Mitigate urban heat islands
- Reduced peak electricity demand

Ask about the benefits of Joining ECRC

ECRC News and Events

MaTrID "Market Transformation Towards Zero Energy Buildings Through Widespread Integrated Energy Design" »
17/05/2013 11:52

2nd Cool Roofs Joint Conference September 2013 Athens Greece »
10/04/2013 00:20

Job Opportunity in ECRC »
09/03/2013 17:12

European Coatings SHOW: 19 – 21 M

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ECRC Members

- 25 members