Cool Barrier Roof Coating Systems for Asphalt Roofing

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Cool Barrier Technology for Asphalt Roofing

High solar reflective Cool Technology which noticeably combines the improvement of thermal comfort conditions with the reduction of energy consumption for cooling.

What are the major Asphalt roofing systems?

The two broad categories of asphalt roofing systems for commercial, industrial and institutional buildings are Built-Up Roofing (BUR) and Modified Bitumen Systems (MBS).

What is Built-Up Roofing (BUR)?

Built-up Roofing (or BUR) is the most popular choice of roofing used on commercial, industrial and institutional buildings. BUR is used on flat or low-sloped roofs and consists of multiple layers of bitumen and ply sheets. Components of a BUR system include the roof deck, a vapor retarder, insulation, membrane and surfacing material. The components are assembled at the job site to actually form the built-up roof. At the heart of this roofing system is the roofing membrane, which consists of roofing bitumen and multiple reinforcing plies of roofing felt. Roofing bitumen is the primary adhesion/waterproofing agent used between roofing plies. Bitumen arrives at the job site in solid form, but is heated and applied as a liquid. Roofing bitumens may be either a product of petroleum refining (asphalts) or a product of the coal-cooking process (coal tar pitch).

Multiple reinforcing “plies” are asphalt-coated roofing sheets or felts installed in three or more layers to strengthen and stabilize the BUR membrane. These multiple reinforcing felts also make the membrane more pliable and resilient, protect the bitumen from water degradation, and serve as a fire-retarding element in the membrane system.

BUR roofing membranes can be protected from solar radiation by embedding gravel in the bitumen, applying a surface coating or applying a granular-surfaced “cap” sheet. Light-colored surfacing materials can be used to reflect heat from the building. In addition, surfacing agents can provide additional fire protection.

What is Modified Bitumen (MB) or Modified Bitumen Membranes (MBS)?

Modified bitumen membranes -- MBS -- combine the features of a built-up roof with the added tensile strength from its polymer modification. Using a reinforced sheet that is prefabricated in the plant, modified bitumen systems require a less labor-intensive application and can be applied cross-platform in both commercial and certain residential applications.

A modified bitumen roofing system is composed primarily of polymer-modified bitumen reinforced with one or more plies of fabric such as polyester, fiberglass or a combination of both. Factory surfacing, if applied, includes mineral granules, slag, aluminum or copper. The bitumen determines the membrane's physical characteristics and provides primary waterproofing protection, while the reinforcement adds strength, puncture resistance and overall system integrity.

The finished roofing membrane may consist of one or more modified bitumen sheets, or it may be comprised of a combination of built-up roofing (BUR) felts and one or more modified bitumen sheets. The tough and tenacious properties of the modified bitumen blend coupled with high tensile polyester and/or fiberglass reinforcements provide excellent resistance to foot traffic, punctures, dropped tools, hail storms and other abuse. This makes these products ideal for buildings with high traffic roofs, such as those with mechanical equipment, and schools or structures where objects can be thrown onto the roof.

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What are Modified Bitumen modifiers? How do they work?

Modified bitumens generally use a traditional waterproofing medium -asphalt- modified with atactic polypropylene (APP), styrene butadiene styrene (SBS), synthetic rubber or other agents that create a uniform matrix that enhances the physical properties of the asphalt. SBS and APP are the most common bitumen modifiers.

- SBS (Styrene-Butadiene-Styrene) modifies the asphalt by forming a polymer network within the bitumen. SBS gives the bitumen rubber-like characteristics and improved resistance to aging and weathering. Most SBS-modified bitumen sheets are either set in hot mopping asphalt, torch-applied or adhered with cold-process adhesives. SBS-modified bitumen sheets that do not have factory applied granule or foil surfacing need some form of field-applied ultraviolet protective coating.
- APP (Atactic Polypropylene) is a thermoplastic polymer which forms a uniform matrix within the asphalt. This enhances the bitumen's performance by increasing its UV resistance, increasing its flexibility at low temperatures and improving its flow resistance at high temperatures. APP-modified bitumen sheets are generally applied using a propane-fueled torch. Applicators use the heat to soften the modified bitumen on the underside of the sheet. The sheet's bottom surface becomes a molten adhesive which flows upon the substrate and then cools to form a waterproof adhesive bond. Some APP sheets can also be applied with cold process adhesives.

THE ISSUE

Asphalt Roofs, such as smooth-surfaced built-up or modified bitumen membranes contain light oils, called exudate, which can leave a membrane soon after its application. This process, called "tobacco juicing" is normal and the exudate will generally wash off the roof after rainstorms. Any exudate on a roof prior to coating application should be thoroughly cleaned. Special primers to resist the exudate from bleeding through fresh coating may be required for application of acrylic coatings. Furthermore, the above issue has also direct relation with the quality of the existed asphalt roofing system. In any case, a small more or less discoloration during the application of the coating system must be expected especially when the asphalt roof is new.

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Warnings and Recommendations:

When applying any kind of coating system over Built up Roofs or Modified Bituminous Substrates special care must be taken in order to avoid failures, such as poor adhesion, peeling, shrinks or undesirable discolorations.

Upon our experience, Cool Barrier Roof Coating System performs very good adhesion over the above substrates especially when the named substrates are granular-top surfaced.

In field adhesion tests must be always performed from the user, before the final application, for reasons of suitability and acceptance.

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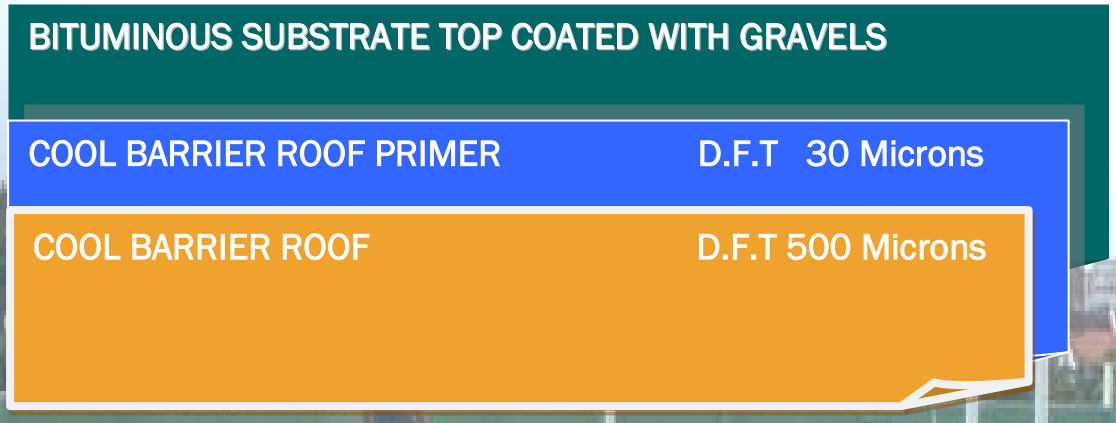
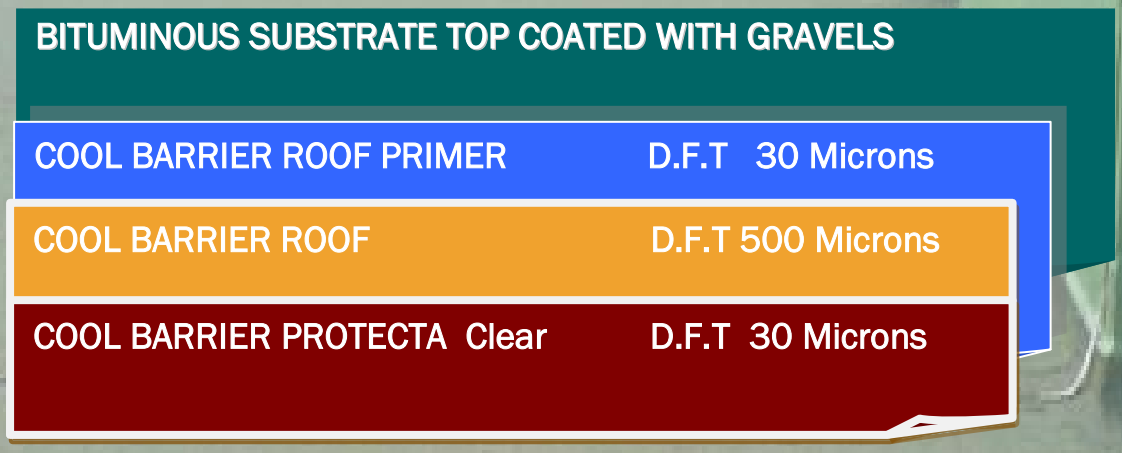
A. System: Cool Barrier Roof Primer,
Cool Barrier Roof



B. System: Cool Barrier Roof Primer,
Cool Barrier Roof,
Cool Barrier Protecta Clear



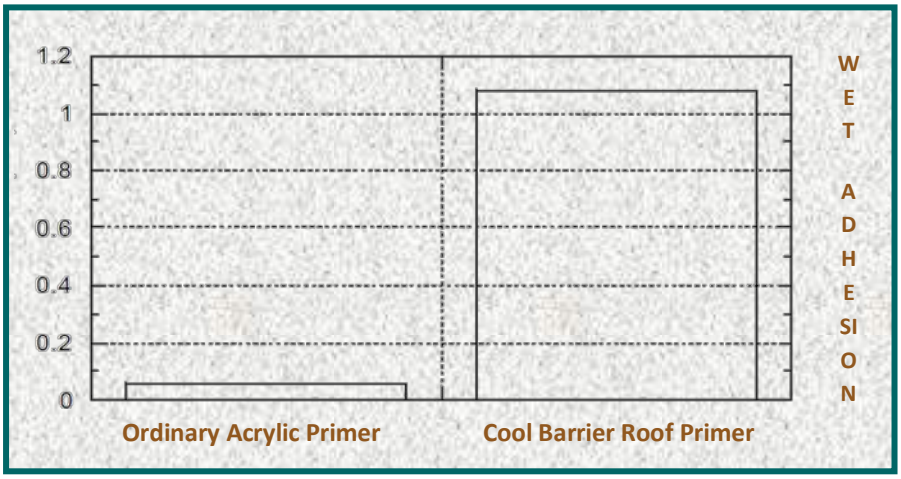
Abolin Co, Cool Barrier Waterbased coating systems are based on premium and environmentally friendly technologies, which fulfill the needs of the sustainable roofing into the field of the residential, commercial, public and industrial buildings. The benefits of these proposed technology supports solutions in terms of:

- Saving Energy by reducing the needs for cooling
- Contributing to “Urban Heat Island” mitigation
- Mitigating the consequences of the Global Warming phenomenon
- Creating thermal comfort conditions
- Saving money by reducing the billing costs for energy
- Decreases the stress heating of the construction
- Increasing the durability of the roof and minimizing the costs for restoration

Cool Barrier Roof Primer

Cool Barrier Roof Primer is an all-acrylic based elastomeric roof coating designed to extend the life of new and existing roofs. Cool Barrier Roof Primer is ideal for use over asphaltic substrates. The technology used enables the coating system to have much greater resistance to continuous ponded water on asphaltic/bituminous roofs. The product is distinguished also by its excellent adhesion properties on different kind of materials. Cool Barrier Roof Coating represents a water-based alternative to solventbased aluminized asphalt roof coatings.

Wet Adhesion of Cool Barrier Roof Primer on APP Modified Bitumen



Areas of Application:

For use externally on non rusty metals, prepainted metals modified bituminous surfaces topcoated with gravels.

OverCoat/Topcoating:

Cool Barrier Roof Primer performs a strong “tacky” surface after the application. Top coating with the Cool Barrier Roof must be performed at least 24 hours after the application of the primer, with special care. It is highly recommended to apply the Top Coat in two layers.
Time of waiting between the two layers minimum 24 Hours.

Coverage:

One litter will cover approx. 4,0 m2. This is equivalent to approx. 200-250 ml/m2 per coat. Determine exact quantities by means of test coats.

Surface Preparation and Thinning Rates:

The surface should be dry, free of contaminants and release agents. Remove loose layers. Use Cool Barrier Roof Primer undiluted in case of roller application. A thinning rate up to 20% with tap water can be obtained in case of Spray application. Prime strongly absorbent or damaged surfaces twice times.

In field adhesion tests must be always performed from the user, before the final application, for reasons of testing the suitability and acceptance.

Characteristics

- Excellent resistance to blistering under extended ponded water conditions.
- Excellent adhesion to asphaltic roofing substrates including built-up asphalt and modified bitumen.
- A barrier to ultraviolet light which prevents degradation of the roofing substrate.
- Resistance to asphalt staining ("bleed through" resistance).
- Excellent flexibility at temperatures as low as 0º C (below the temperature at which unmodified asphalt becomes brittle).
- Application by spray, brush or roller
- Max 10 g/liter volatile organic components (calculated).
- User-friendly (soap and water clean-up), environmentally friendly.

Cool Barrier Roof

Abolin Cool Barrier Roof for low slope and steep Roofs is an excellent quality waterbased elastomeric waterproof coating based on a “cool” raw materials technology. It forms an extremely high reflective mat surface that blocks the incoming solar radiation and remains cooler, contributing to the saving of energy for cooling needs. It is specially formulated to retain its elasticity, even in low temperatures ranging between -20ºC to 80ºC. ASTM 6083 Compliant.

Performances:

Volume Solids	ASTM D 2697	70, 08%
Weight Solids	ASTM D 1644	64, 87%
Initial Tensile 0°F	ASTM D 2370	606, 7 psi
Initial Elongation 0°F	ASTM D 2370	102, 8%
Adhesion to Spayed Polyurethane Foam	ASTM D 903	7, 134pli
Adhesion to Etched Galvanized Steel	ASTM D 903	4, 309pli
Fungi Resistance	ASTM G21	Zero Rating
Water Swelling	ASTM D 471	5, 65%
Permeance	ASTM E 96	8, 09 perms
Solar Reflectance	ASTM E903-96	0, 89
Infrared Emittance	ASTM E408-71	0, 89
Solar Reflectance Index	ASTM E 1980-01	113

PERFORMANCE OF COOL BARRIER ROOF SYSTEM ON APP MEMBRANE

Elongation at Break and Maximum Tensile Strength of Film:

- 20 microns Cool Barrier Roof Primer,
- 500 microns

Temperature		% Elongation	Tensile Strength
- 10°C		40.3	4.60 MPa
23°C		620.4	0.04 MPa
Water Vapour Permeability (Din 52615)	μ H2O	Thickness S(m)	Sd(m) (=μ.S)
	5510	10^{-3}	5.5

Application recommendations

Cool Barrier Roof Coating for asphaltic substrates should be applied at a minimum of 400-500 micron (dry) thickness over Cool Barrier Roof Primer. Depending on the conditions of the existing roof in place, two coats may be necessary. The wet coating will sometimes discolour when applied over treated asphalt surfaces. However, this discoloration which is water soluble will disappear after a few rainfalls.

Characteristics

When properly applied over the Cool Barrier Roof Primer the Cool Barrier Roof System Perfoms:

- Excellent resistance to blistering under extended ponded water conditions.
- Excellent adhesion to asphaltic roofing substrates including new and aged built-up asphalt and modified bitumen.
- A barrier to ultraviolet light which prevents degradation of the roofing substrate.
- Significantly lower roof surface temperatures which can help reduce cooling bills.
- Resistance to asphalt staining ("bleed through" resistance).
- Excellent dirt pick-up resistance.
- Excellent flexibility at temperatures as low as 0º C (below the temperature at which unmodified asphalt becomes brittle).
- Application by spray, brush or roller
- Max 10 g/liter volatile organic components (calculated).
- User-friendly (soap and water clean-up), environmentally friendly.

Cool Barrier Protecta Clear

COOL BARRIER PROTECTA CLEAR is a low-build elastomeric clear protective top coating based on supreme water based PVDF binder that provides the ultimate in reflectivity, color stability and weather resistance over new or existing roof surfaces. Although it is highly flexible, it exhibits tough, enamel like finish that resists abrasion, biological growth, dirt, oil and all types of weather extremes.

Outstanding Water Repellency

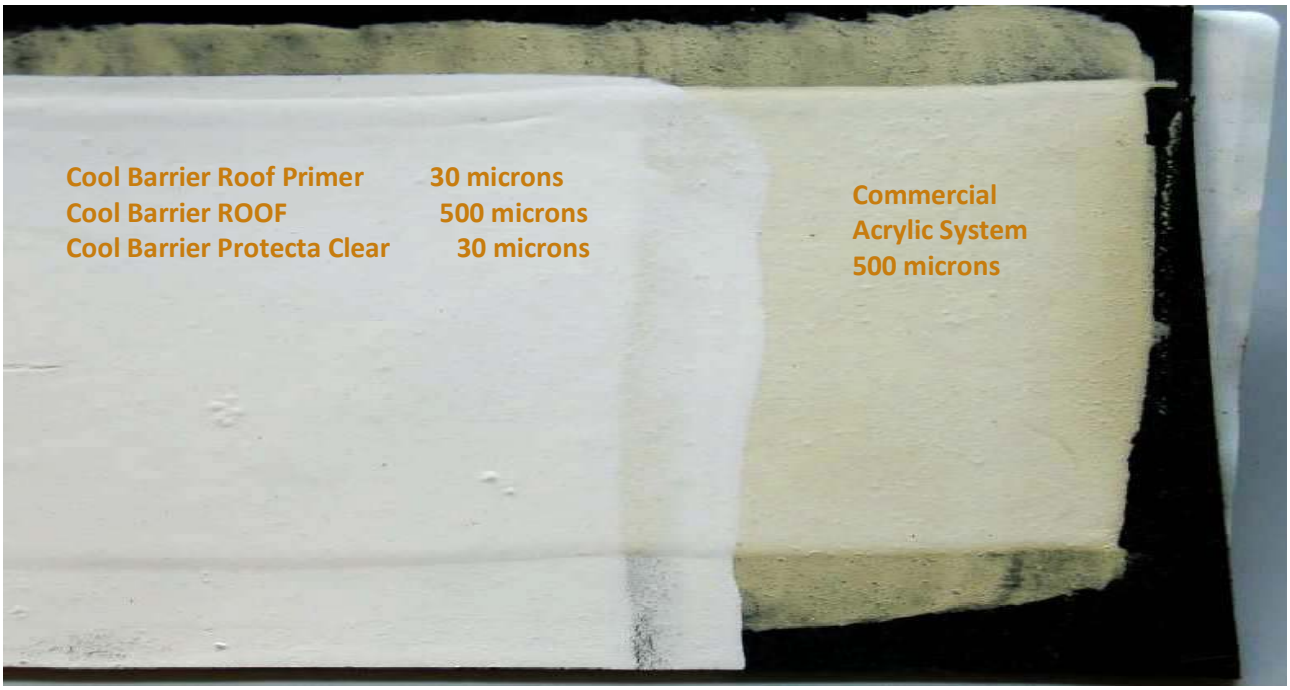
Coatings based on Kynar Aquatec® have excellent water repellency and prevent water from penetrating the surface. Even after 200 hours of immersion, the Kynar Aquatec® coating shows minimal water pick-up. Kynar Aquatec® emulsion-based coatings have excellent substrate adhesion and resist delamination and water damage.

ABSOLUTE PERFORMANCES

COOL BARRIER PROTECTA CLEAR is an innovative technology based on acrylic-modified Kynar® PVDF resin in a convenient emulsion form. Liquid coatings formulated with Kynar® Aquatec™ deliver the durability and performance of traditional Kynar®PVDF coatings. These coatings can be easily applied to a variety of substrates, including metals, PVC, sprayed-in-place polyurethane foam and as a finish over acrylic basecoats.

Stain blocking of asphalt species

Application on SBS asphalt substrate: *Paints applied on SBS asphalt substrate, air dried then baked at 60 °C for one week*



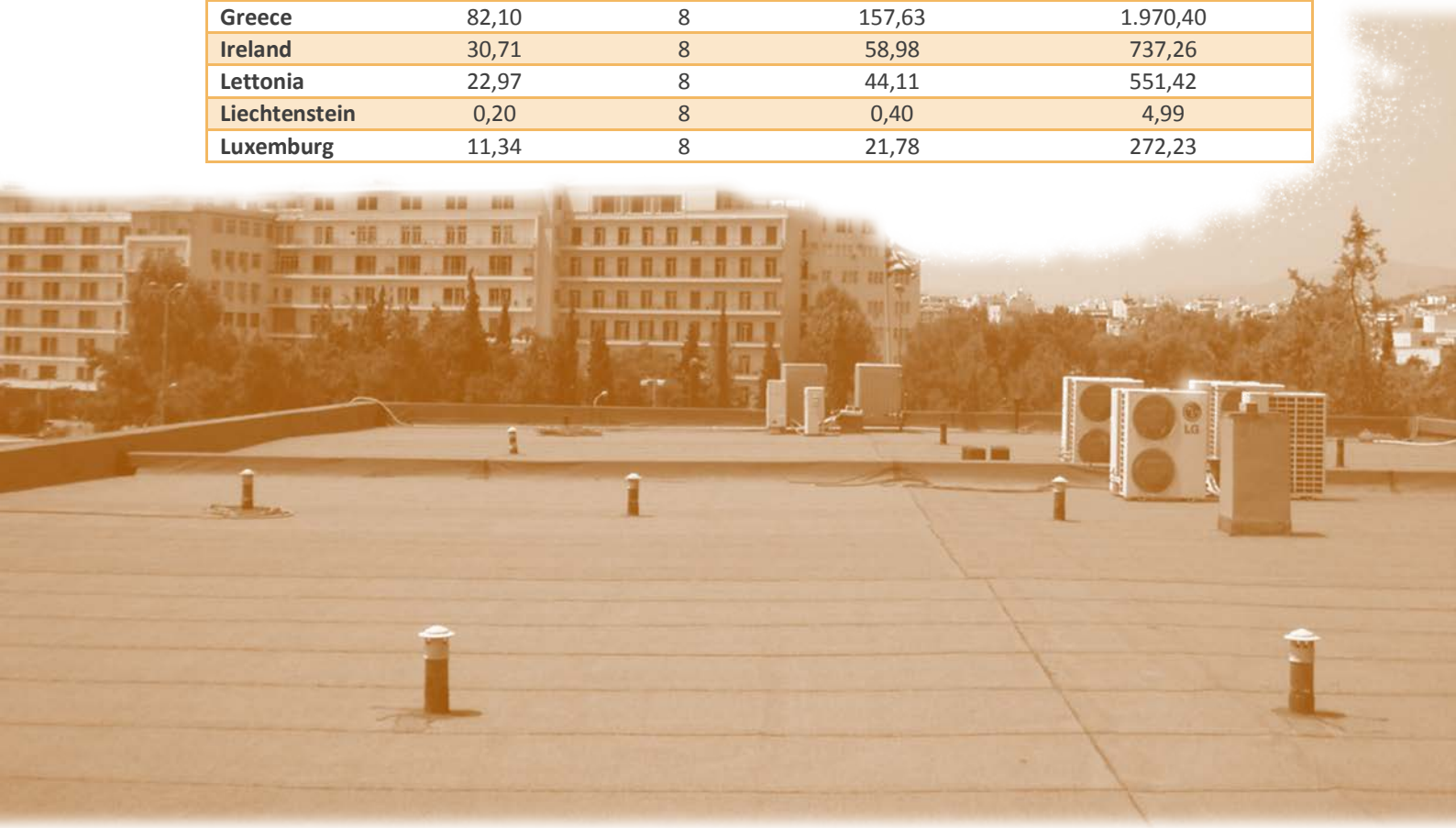
Excellent Dirt Shedding

COOL BARRIER PROTECTA CLEAR pickup very little dirt. This resistance is important for all colors, but none more so that white.

Cool Barrier Technology

Fights Global Warming!

Country	CO_2 emission in 1990 Mt	Kyoto's reduction commitment (%)	Requested white reflecting surface to fulfill Kyoto's goal (km^2)	Cool Barrier Roof White surface necessary to compensate for all CO_2 emission (km^2)
Austria	59,20	8	113,66	1.420,80
Belgium	113,40	8	217,74	2.721,72
Bulgaria	82,99	8	159,34	1.991,76
Canada	457,44	8	658,72	10.978,58
Denmark	52,10	8	100,03	1.250,40
Estonia	37,79	8	72,57	907,13
Finland	53,90	8	103,49	1.293,60
France	366,53	8	703,75	8.796,86
Germany	1.012,44	8	1.943,89	24.298,63
Greece	82,10	8	157,63	1.970,40
Ireland	30,71	8	58,98	737,26
Lettonia	22,97	8	44,11	551,42
Liechtenstein	0,20	8	0,40	4,99
Luxemburg	11,34	8	21,78	272,23



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