



# ROOFING ENABLER OF SUSTAINABLE CONSTRUCTION





# RESPONSIBLE FOR THE FUTURE SIKA ROOFING SOLUTIONS

Climate change and a growing population require cleaner energy and better-functioning cities. These forces are driving the demand for intelligent construction materials and smart mobility systems to ease congestion and reduce CO<sub>2</sub> emissions.

Sustainability is an important component of Sika's growth strategy and a clear focus in product development. The ambition of Sika product engineers: To extend the service life of buildings and industrial applications in order to reduce maintenance effort, to improve energy and material efficiency, and to further enhance user-friendliness and health and safety profiles. Sika strives to create more value for all its stakeholders with its products, systems and solutions along the entire value chain and throughout the life span of its products. Performance is the foundation of sustainability. Sika roofing solutions take less from the environment and offer more in durability and longevity, which results in a smaller overall environmental footprint.



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# ENABLER OF SUSTAINABLE CONSTRUCTION



Green roof on Manchester Town Hall, UK.

## HOW CAN SIKA ROOFING SYSTEMS CONTRIBUTE TO SUSTAINABLE CONSTRUCTION?

Long-lasting, high-performance roofing systems can make a major contribution to sustainable construction. Raw materials, production, application, the use phase and maintenance have significant influence on the overall sustainability performance of roofing applications. The contribution of roofing systems to sustainable construction is evaluated from a life-cycle perspective and evidenced through the various reference projects presented in this brochure.

### RAW MATERIALS AND PRODUCTION:

**Energy and resource efficiency:** Sika provides roofing systems that use less energy and resources in comparison with competitive technologies.

**Climate protection:** Sika provides roofing systems with low global warming potential. This means a reduced carbon footprint.

### APPLICATION:

**Air quality:** Sika provides low-VOC and VOC-free roofing solutions that help reduce summer smog and improve health and safety conditions during the roof installation process. The low-odor performance of Sika products has been externally tested and certified.

### DURABILITY:

The durability of building materials is a key to sustainable building construction. Internal and external studies document the outstanding service life of Sarnafil® and Sikaplan® roofing systems. A flat roof, using the proper materials and installed by professionals, is tight for the lifetime. However, if unpredictable mechanical influence occurs, for example subsequent application of ballast such as Green Roof, it can lead to unintended leaks in the waterproofing layer. As a solution Sika® Roof Control System provides security for investors and building owners.

### USE AND MAINTENANCE:

**Saving energy:** Sika solar reflective membranes help save energy by increasing the reflectivity and as a consequence reducing the cooling energy demand of buildings.

**Saving energy:** Sika roofing systems can save energy by incorporating high-performance thermal insulation.

**Generating energy:** Sika SolaRoof® systems allow the production of energy, while Sika solar reflective membranes improve photovoltaic panel efficiency.

**Improving the microclimate:** Sika green roofing systems help improve the microclimate and mitigate the development of urban heat islands as well as help manage water runoff from roofs.

**Extending service life:** Sika refurbishment solutions allow extending the service life of existing roofs by using the existing buildup as a base for the new system.

# THE SIKA LIFE CYCLE APPROACH

## WHAT IS LIFE CYCLE ASSESSMENT (LCA) AND WHY IS IT RELEVANT?

Life Cycle Assessment (LCA) is a standardized method to assess and compare the inputs, outputs and potential environmental impacts of products and services over their life cycle. LCAs are increasingly recognized as the best way to evaluate the sustainability performance of construction products and systems.

## WHAT IMPACT CATEGORIES AND RESOURCES INDICATORS ARE INCLUDED IN AN LCA?

There are several impact categories and resource indicators which can be assessed according to Standard EN 15804 "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products." For roofing the most relevant impact categories and resource indicators are the following:

### Global Warming Potential

Global warming potential (GWP) [kg CO<sub>2</sub>-eq.] ("carbon footprint") is the potential contribution to climate change due to greenhouse gas emissions.

### Cumulative Energy Demand

Cumulative energy demand (CED) [MJ] ("energy footprint") is the total amount of primary energy from renewable and non-renewable resources.

### Photochemical Ozone Creation Potential

Photochemical ozone creation potential (POCP) [kg C<sub>2</sub>H<sub>4</sub>-eq.] ("summer smog") is the formation of reactive chemical compounds, e.g. ozone, from direct sunlight on certain primary air pollutants, which may be harmful to human health, ecosystems and crops.

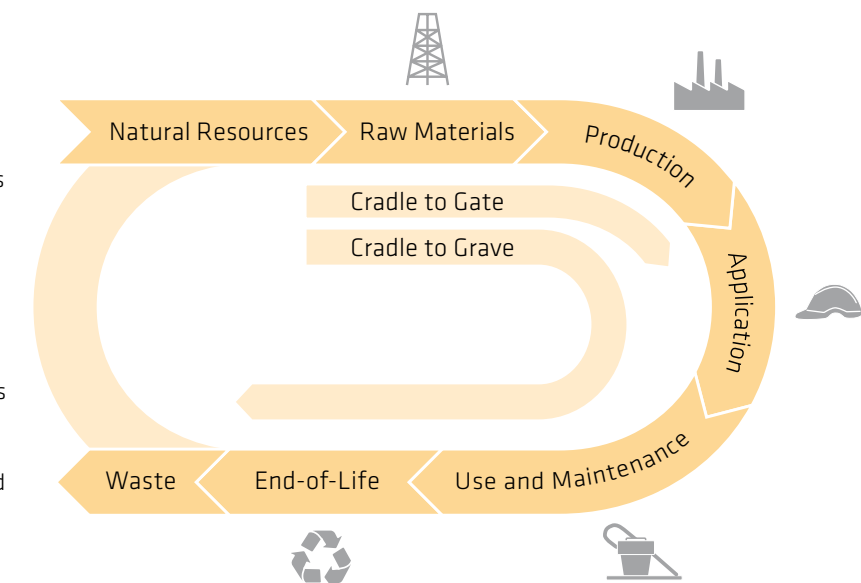
### ON WHAT STANDARDS ARE SIKA LCAs BASED?

Sika carries out LCAs according to the ISO 14040 series and the Standard EN 15804. The impact assessment methodology used is CML 2001.

### WHERE DOES THE SIKA LCA DATA COME FROM?

The data for Sika LCAs is based on public databases, such as those from ecoinvent, the European Reference Life Cycle Database (ELCD) and thinkstep-GaBi, plus specific data from Sika plants and products.

## WHICH LIFE CYCLE PHASES ARE INCLUDED IN THE SIKA LCAs?



### "CRADLE TO GATE"

In the "cradle to gate" approach, the LCA investigates the potential environmental impact of a product from raw material extraction to finished production.

### "CRADLE TO GRAVE"

In the "cradle to grave" approach, the LCA investigates the potential environmental impact of a product from raw material extraction, production, application and use to final disposal at the end of life.

# THE SIKA LIFE CYCLE APPROACH



Mountain Restaurant Stanserhorn, Switzerland.

## WHAT IS INCLUDED IN Sika roofing LCAs?

The LCA results given in this brochure refer to 1 m<sup>2</sup> of the roofing system and are based on either the cradle to gate or the cradle to grave approach<sup>1)</sup>.

## WHICH LIFE CYCLE PHASES ARE MOST RELEVANT FOR ROOFING?

From a **cradle to gate** perspective, the majority of the potential impacts are related to the raw materials **(A)** used to produce **(B)** the roof waterproofing layer and the other roofing system components.

From a **cradle to grave** perspective, the use phase **(D)** and the end-of-life phase **(E)** have the most significant influence on the overall sustainability performance of roofing applications, due to their contributions to save and/or create energy, to avoid carbon emissions and to save resources at the end of life. Impacts during the construction stage **(C)** are also

considered and contain energy consumption and treatment of waste during the application among others. The leverage of all of these potential benefits is long-lasting functionality and durability.

## WHO PREPARES AND REVIEWS SIKA ROOFING LCAs?

Sika roofing LCAs are created internally by the Sika Corporate Product Sustainability Group, using state-of-the-art GaBi software from thinkstep. The LCA model used has been reviewed by the leading independent research institute Swiss Federal Laboratories for Materials Science and Technology (EMPA).

## HOW DO SIKA ROOFING SOLUTIONS ENABLE SUSTAINABLE CONSTRUCTION?

Sika evaluates its roofing products and systems systematically with regard to environmental impact and contributions to sustainable construction, based on regular and fully comprehensive Life Cycle Assessments.

### Air quality and emissions

Roofing products that promote good air quality and minimize emissions.

### Energy

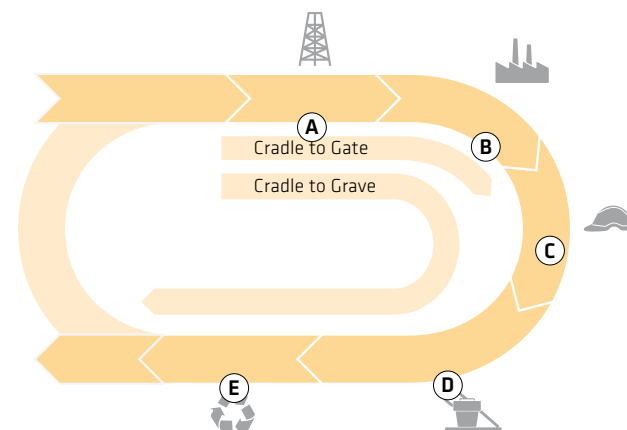
Roofing products that promote energy efficiency principles.

### Climate

Roofing products that minimize the impact on the climate.

### Resources

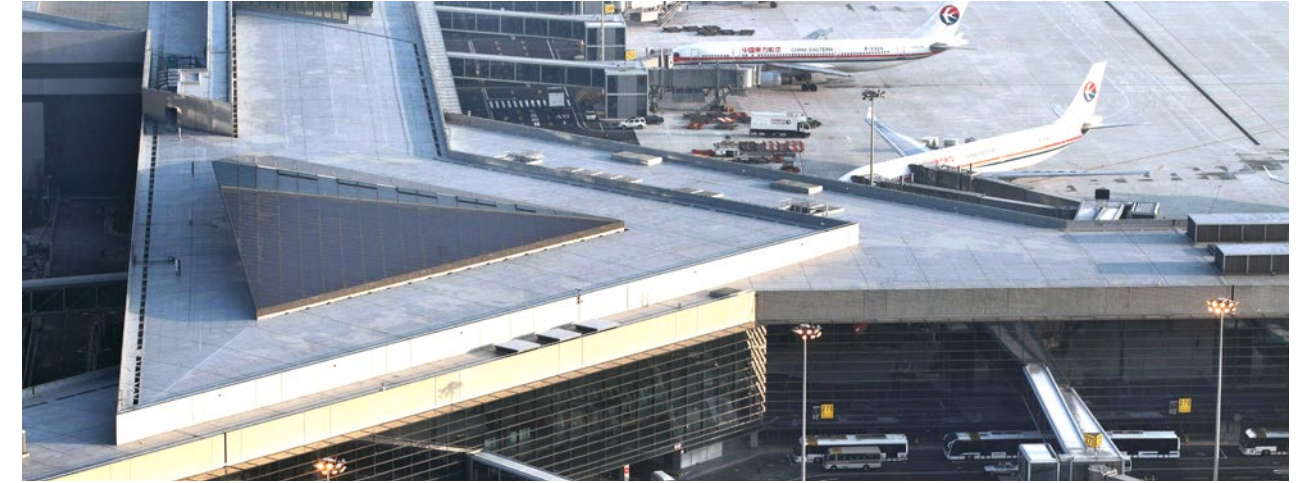
Efficient use of precious resources.



1) In the LCAs, neither the roof construction (steel deck, concrete deck, soil, plants, etc.) nor capital goods (e.g. machinery) are considered.

# ROOFING SYSTEMS EVALUATED

Mechanically fastened roofs



Shanghai Hongqiao International Airport, China.

The most important Sika roofing solutions for mechanically fastened roofs, adhered roofs and green roofs are described herein and compared with the most relevant similar-performing competitive solutions in Europe. Subsequently, the Life Cycle Assessment (LCA) results are displayed for the different roofing systems.

## LCA comparison of roofing systems and technologies:

In order to allow correct comparison, the example roofing systems are based on the same thermal insulation type (PIR/ PUR boards), with the same thermal resistance ( $R_0 = 5 \text{ (m}^2\cdot\text{K) / W}$ )<sup>1)</sup>.

The only exception is the Sikalastic®-851 R green roof system, which includes extruded polystyrene (XPS) thermal insulation for technical reasons.

1) Corresponds to U-value of 0.2 W/(m<sup>2</sup>·K). Typical value for Central Europe.

## MECHANICALLY FASTENED ROOFS

Thermoplastic membrane/PIR	Thermoplastic membrane/PIR	Thermoplastic membrane/PIR
<ul style="list-style-type: none"> <li>■ FPO membrane: Sarnafil® TS 77-15 mechanically fastened with Sarnafast® SF 4.8 mm and Sarnafast® Washer KT</li> <li>■ PIR insulation: 135 mm</li> <li>■ Vapor control layer: Sarnavap® 2000E</li> <li>■ Steel deck</li> </ul>	<ul style="list-style-type: none"> <li>■ PVC membrane: Sikaplan® G-15 mechanically fastened with Sarnafast® SF 4.8 mm and Sarnafast® Washer KT</li> <li>■ PIR insulation: 135 mm</li> <li>■ Vapor control layer: Sarnavap® 2000E</li> <li>■ Steel deck</li> </ul>	<ul style="list-style-type: none"> <li>■ PVC membrane: Sarnafil® S 327-15 EL mechanically fastened with Sarnafast® SF 4.8 mm and Sarnafast® Washer KT</li> <li>■ PIR insulation: 135 mm</li> <li>■ Vapor control layer: Sarnavap® 2000E</li> <li>■ Steel deck</li> </ul>

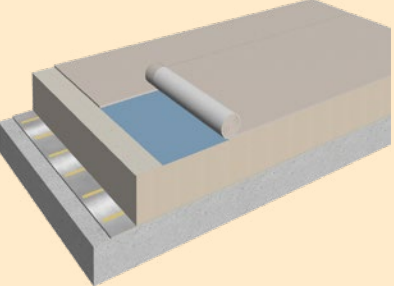


# ROOFING SYSTEMS EVALUATED

Adhered roofs

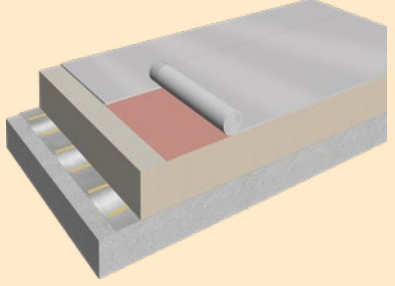
## ADHERED ROOFS

Thermoplastic membrane/PIR



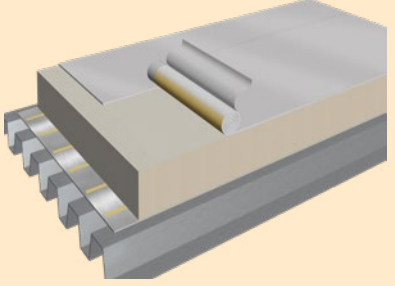
- FPO membrane: Sarnafil® TG 76-15 Felt adhered to the insulation with Sarnacol® 2142 V
- PIR insulation: 135 mm bonded to the vapor barrier with SikaRoof® Board Adhesive
- Self-adhesive vapor barrier: Sarnavap® 5000E SA
- Primer 600
- Concrete deck

Thermoplastic membrane/PIR



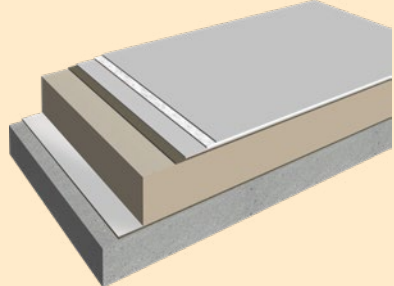
- PVC membrane: Sarnafil® G 410-15 EL Felt adhered to the insulation with Sarnacol® 2142 V
- PIR insulation: 135 mm bonded to the vapor barrier with SikaRoof® Board Adhesive
- Self-adhesive vapor barrier: Sarnavap® 5000E SA
- Primer 600
- Concrete deck

Thermoplastic membrane/PIR



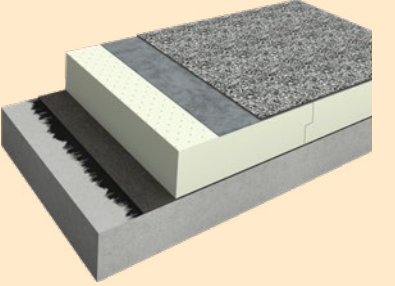
- FPO self-adhered membrane: Sarnafil® TG 76-15 FSA
- Primer 600
- PIR insulation: 135 mm bonded to the vapor barrier with SikaRoof® Board Adhesive
- Self-adhesive vapor barrier: Sarnavap® 5000E SA
- Primer 600
- Steel deck

Polyurethane liquid-applied membrane (LAM)/PIR



- Top coat: Sikalastic®-641
- Reinforcement with Sikalastic® Reemat Premium
- Base coat: Sikalastic®-641 Sikalastic® Carrier SA
- PIR insulation 135 mm bonded to the vapor barrier with SikaRoof® Board Adhesive
- Self-adhesive vapor barrier: Sarnavap® 5000E SA
- Primer 600
- Concrete deck

Bituminous membrane/PIR



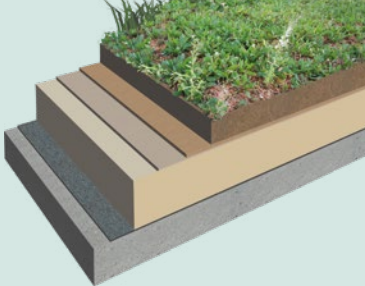
- Bitumen self-adhered mineral cap sheet: SikaShield® E79 MG SA 4 mm
- Bitumen self-adhered underlay: SikaShield® E74 PE SA 3 mm
- PIR insulation 135 mm bonded to the vapor barrier with SikaRoof® Board Adhesive
- Self-adhesive vapor barrier: SikaShield® VB E71 PE SA 3 kg/m²
- Primer: Sika® Igoflex® P-10 EL
- Concrete deck

# ROOFING SYSTEMS EVALUATED

Green roofs

## GREEN ROOFS

Thermoplastic membrane/PIR

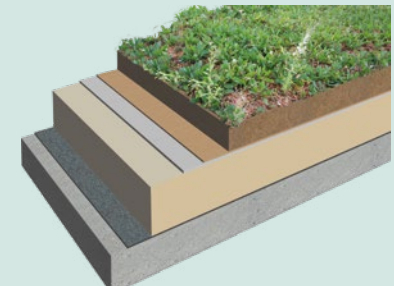


- Soil with plants
- Drainage layer: Aquadrain 550
- FPO membrane: Sarnafil® TG 66-15
- PIR insulation: 135 mm
- Vapor control layer: SikaShield® VB P41 S 3 mm
- Concrete deck



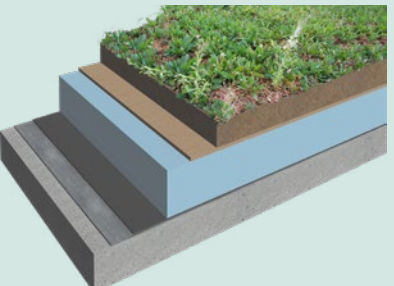
Sarnafil® Green Roof 2 for HDP Multi-Storey Carpark (public housing).

Thermoplastic membrane/PIR




- Soil with plants
- Drainage layer: Aquadrain 550
- PVC membrane: Sarnafil® G410-15EL
- PIR insulation: 135 mm
- Vapor control layer: SikaShield® VB P41 S 3 mm
- Concrete deck

Polyurethane liquid-applied membrane (LAM)/XPS



- Soil with plants
- Drainage layer: Aquadrain 550
- XPS insulation: 185 mm
- Sikalastic®-851 R
- Vapor control layer: SikaShield® VB P41 S 3 mm
- Concrete deck

Bituminous membrane/PIR



- Soil with plants
- Drainage layer: Aquadrain 550
- Bitumen Anti root: SikaShield® P55 PE RT 4 mm
- Bitumen underlay: SikaShield® P55/E55 4 mm
- PIR insulation: 135 mm
- Vapor control layer: SikaShield® VB P41 S 3 mm
- Primer: Sika® Igoflex® P-10 EL
- Concrete deck

# RESULTS FOR GLOBAL WARMING POTENTIAL (GWP)

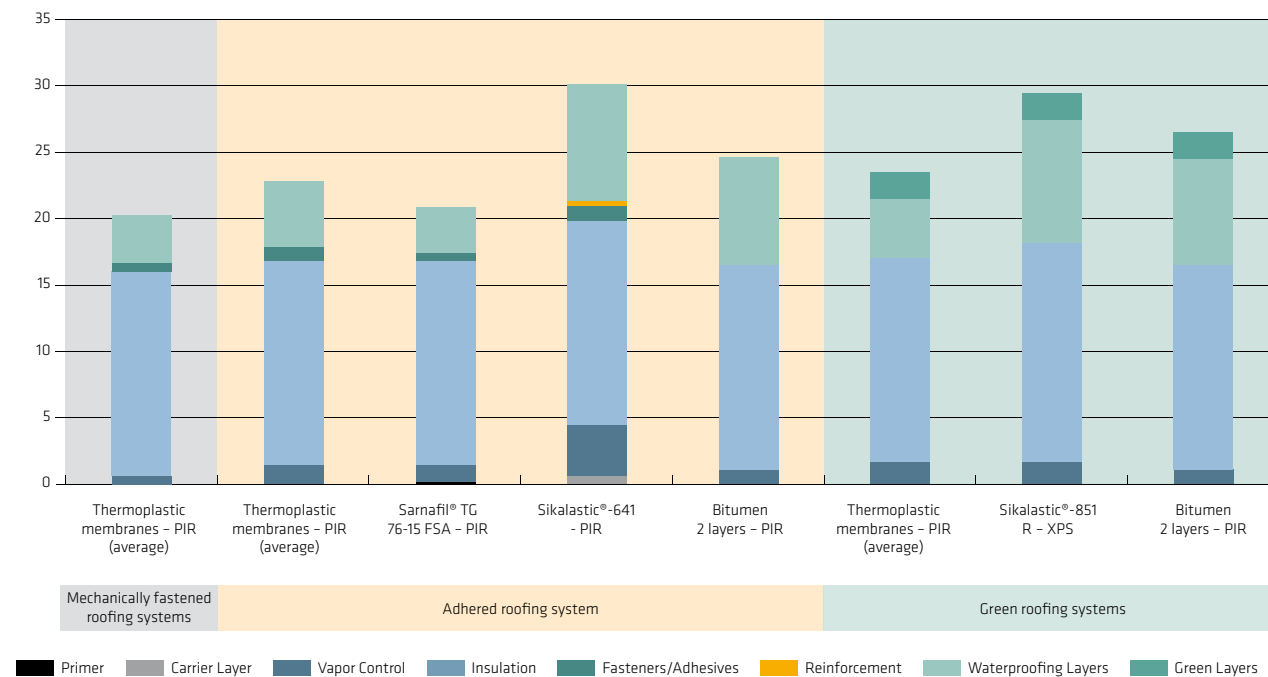
## THE CHALLENGE

### The climate is changing faster than ever before.

The earth's climate is changing faster than ever before. The consequences are manifold and affect us all. Climate protection is one of the most important tasks for the future. In order to mitigate the effects of climate change, by 2050 the world will have to reduce its greenhouse gas emissions by 80%. Acting now is crucial, because a complete overhaul of the currently used energy systems needs to be financed and realized within less than two generations. Decisive action is needed urgently.

## LCA RESULTS FOR POPULAR ROOFING SYSTEMS<sup>1)</sup>

Global Warming Potential (GWP) for 1 m<sup>2</sup> roofing system (kg CO<sub>2</sub>-eq./m<sup>2</sup>): Cradle to Gate



## ENABLER OF SUSTAINABLE CONSTRUCTION

You can contribute to climate protection by choosing low-carbon footprint Sika roofing solutions:

### More Value

- Sika roofing solutions include a wide range of cost-effective roofing systems to meet specific requirements.
- They provide superior durability and additional benefits in the use phase.
- Project-specific green building program (LEED, BREEAM, etc.) packages and custom carbon footprint calculations are available on request.

### Less Impact

- Sika roofing solutions have a lower carbon footprint than most of the other roofing systems analyzed (Climate Protection Solutions).

<sup>1)</sup> LCA values vary depending on the product formulations (e.g. due to local fire regulations), production sites and the datasets provided by the available LCA databases. The values for the thermoplastic roof buildups are based on the average of the two systems described for the corresponding application.

# RESULTS FOR CUMULATIVE ENERGY DEMAND (CED)

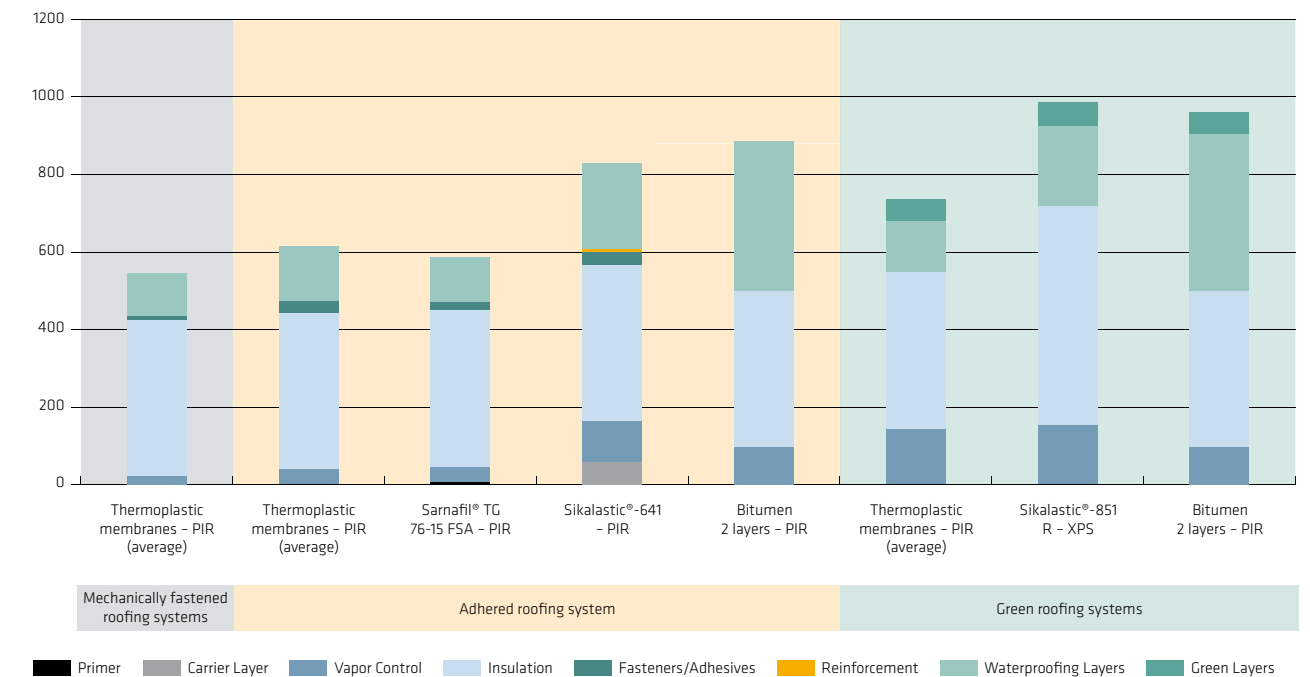
## THE CHALLENGE

### The demand for limited natural resources is increasing.

The worldwide demand for our finite natural resources including oil, coal, natural gas, iron ore and copper is increasing, driven by a growing population and higher spending and purchasing power. But these resources are limited, and their extraction is becoming costlier. Efficient and intelligent use of our limited natural resources is one of the main challenges of future growth.

## LCA RESULTS FOR POPULAR ROOFING SYSTEMS<sup>1)</sup>

Cumulative Energy Demand (CED) for 1 m<sup>2</sup> roofing system (MJ/m<sup>2</sup>): Cradle to Gate



## ENABLER OF SUSTAINABLE CONSTRUCTION

You can help save energy and natural resources by choosing low-energy footprint Sika roofing solutions:

### More Value

- Sika roofing solutions include a wide range of cost-effective roofing systems to meet specific requirements.
- They provide superior durability and additional benefits in the use phase.
- Project-specific green building program (LEED, BREEAM, etc.) packages and custom energy footprint calculations are available on request.

### Less Impact

- Sika roofing solutions have a lower energy footprint than most of the other roofing systems analyzed (Energy & Resource Efficiency Solutions).

<sup>1)</sup> LCA values vary depending on the product formulations (e.g. due to local fire regulations), production sites and the datasets provided by the available LCA databases. The values for the thermoplastic roof buildups are based on the average of the two systems described for the corresponding application.

# RESULTS FOR SUMMER SMOG POTENTIAL (POCP)

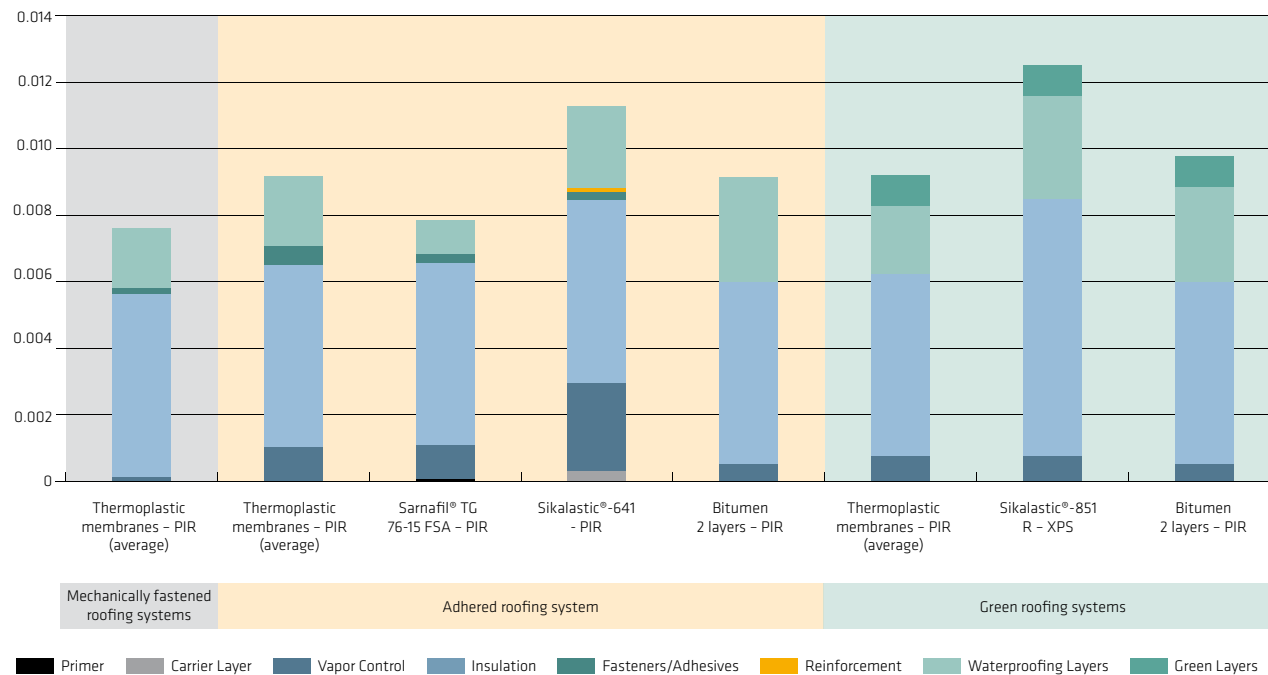
## THE CHALLENGE

### Improve air quality and maintain a safe environment.

Summer smog, or photochemical ozone creation potential (POCP), is the formation of reactive chemical compounds, e.g. ozone, by the action of sunlight on volatile organic compounds (VOCs) and nitrous oxides (NO<sub>x</sub>). It is common in large cities where high amounts of VOC and NO<sub>x</sub> are released (e.g. industrial and automobile emissions), especially during summer when there is more sunlight. Summer smog may be harmful to human health and ecosystems. The wellbeing of humans and ecosystems must be ensured.

## LCA RESULTS FOR POPULAR ROOFING SYSTEMS<sup>1)</sup>

Photochemical Ozone Creation Potential (POCP) for 1 m<sup>2</sup> roofing system [kg C<sub>2</sub>H<sub>4</sub>-eq./m<sup>2</sup>]: Cradle to Gate



## ENABLER OF SUSTAINABLE CONSTRUCTION

You can help reduce summer smog by choosing air-quality Sika roofing solutions:

### More Value

- Sika roofing solutions have a wide range of cost-effective roofing systems to meet specific requirements.
- They provide superior durability and additional benefits in the use phase.
- VOC-free, low-VOC and low-odor options are available (e.g. Sika water-based adhesives, Sikalastic® liquid-applied roof waterproofing membranes).

### Less Impact

- Sika roofing solutions have lower summer smog potential than most of the other roofing systems analyzed (Air Quality Solutions).

<sup>1)</sup> LCA values vary depending on the product formulations (e.g. due to local fire regulations), production sites and the datasets provided by the available LCA databases. The values for the thermoplastic roof buildups are based on the average of the two systems described for the corresponding application.

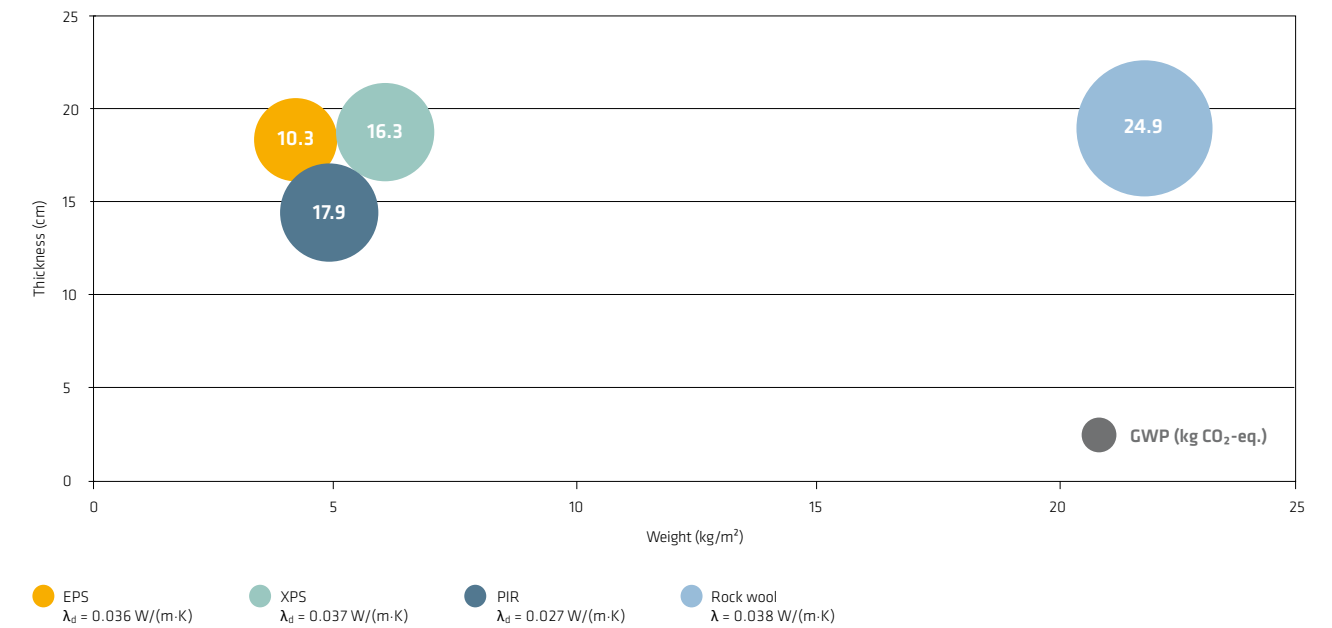
# MINIMISING THE CARBON FOOT-PRINT OF THERMAL INSULATION

## HIGH-PERFORMANCE THERMAL INSULATION

Thermal insulation is a main construction element for creating a comfortable environment inside the building by protecting it from heat and cold, while also saving energy. Sika provides a wide range of thermal insulation solutions specially designed and manufactured for optimal performance as an integral part of Sika roofing systems. The main parameters influencing the selection of thermal insulation are weight and thickness. The global warming potential has been calculated for different insulation materials as a function of these parameters.

## ECO-EFFICIENCY OF POPULAR ROOFING INSULATION SOLUTIONS<sup>1)</sup>

Global Warming Potential (GWP) (kg CO<sub>2</sub>-eq.), thickness and weight of different insulation materials



<sup>1)</sup> Weight and thickness of insulation materials to provide a thermal resistance of R<sub>0</sub> = 5 (m<sup>2</sup>·K)/W, which corresponds to U-value of 0.2 W/(m<sup>2</sup>·K). Typical value for Central Europe.

## ENABLER OF SUSTAINABLE CONSTRUCTION

You can minimize the carbon and energy footprint of your roof by choosing the right Sika insulation solution:

### More Value

- Polyisocyanurate (PIR) materials have the best thermal performance for a given thickness of insulation.
- Extruded polystyrene (XPS) has very high compressive strength and very low water absorption.
- Expanded polystyrene (EPS) is a very cost-efficient insulation material.

### Less Impact

- PIR has a lower GWP than most of the other insulation materials analyzed (Climate Protection Solutions).
- Expanded polystyrene (EPS) materials have the lowest global warming potential (GWP) for a given thermal performance.
- PIR has very low weight compared with other insulation materials with similar insulation properties.
- Sikatherm® PIR boards are easy to carry and transport to roofs due to low weight and low volume – this contributes to CO<sub>2</sub> reduction.





# SAVING ENERGY WITH Sikatherm® PIR THERMAL INSULATION

Case study



Roofing of Reál Shop, Dunaujváros, Hungary.

## SIKA HIGH-PERFORMANCE THERMAL INSULATION

Thermal insulation is a key to creating a comfortable environment inside a building and it is also a key to saving energy. The importance of insulation has increased along with continuously evolving insulation standards worldwide, constantly increasing demands on the thermal resistance of buildings in order to reduce energy demand for heating and cooling. Sika provides a wide range of thermal insulation materials, specially designed and manufactured for optimal performance as part of Sika roofing systems. For example, Sikatherm® PIR thermal insulation board is known for low thermal conductivity, low density and good compressive strength. Most boards are coated with an aluminium, glass tissue or paper facer, which prevents either outgassing effects or allows direct contact with single-ply PVC membranes.

## ENABLER OF SUSTAINABLE CONSTRUCTION

### More Value

**Customer:** Martini Grandnja d.o.o. was the main contractor in Zrenjanin, Serbia. The roofing sub contractor was DMA Koprinc d.o.o. in Belgrade, Serbia.

**Project:** Expansion of an industrial production plant (9,400 m<sup>2</sup>) of the Fulgar textile company in Zrenjanin, Serbia.

**Requirements:** Fulgar sought a cost-effective refurbishment solution, including thermal insulation, which could be installed fast and easily. High resistance to moisture absorption and low humidity absorption of insulation were important criteria.

**Sika Solution:** The customer decided to implement the cost- and time-effective Sikaplan® G-15/Sikatherm® PIR GT T 100 roofing system.

**Sika Sustainability Approach:** Custom project-specific LCA report and energy-saving calculations for heating and cooling.





# SAVING ENERGY WITH SIKA COOL ROOFS

Case study



Saint Louis Art Museum, St. Louis, Missouri, USA.

## SIKA TAKES SOLAR REFLECTIVITY TO A NEW LEVEL

The benefits of solar-reflective materials and colors are well known and understood, especially in warm climates around the world. With urban density increasing, the heat-island effect impacts cities at an ever increasing rate. White highly reflective thermoplastic and liquid-applied membranes (LAM) increase reflectance and reduce both the heat-island effect and the cooling energy consumption of buildings. Sika roofing systems support LEED Green Building certification by providing a very high initial Solar Reflectance Index (SRI) and high 3-year SRI values according to CRRC (Cool Roof Rating Council) and ECRC (European Cool Roof Council) standard procedures.

## ENABLER OF SUSTAINABLE CONSTRUCTION

### More Value

**Customer:** Brunel University London, in cooperation with ECRC, Sika Services AG and the University of Technology in Kingston, evaluated a project in Jamaica to study the influence of white coatings to the thermal comfort of residential buildings in hot climates.

**Project:** Residential building with a flat roof of 36 m<sup>2</sup> and a U-value of 5.68 W/m<sup>2</sup>K.

**Sika Solution:** Sikalastic®-560, diluted with 10% water was applied as a primer. Then, 3 coats of the same product were applied. The total weight of the coating was ~ 1.4 kg/m<sup>2</sup>.

**Result of the intervention:** The indoor air temperature in the living room after the application of Sikalastic®-560 was cooler by a maximum of 5.1°C, and an average of 2.3°C.



# BECOMING ENERGY SELF-SUFFICIENT WITH Sika SolaRoof®

Case study



Photovoltaic plant, Raiffeisen BiascArena, Biasca, Switzerland.

## Sika SolaRoof® SYSTEMS FOR SOLAR ROOFTOP APPLICATIONS

The great opportunity of using flat rooftops for solar applications, was recognized early by Sika. The first photovoltaic (PV) installations on Sarnafil® membranes date back to 2004. Several development steps led to the current Sika® SolarMount-1 (SSM1) system. SSM1 requires no roof penetrations, but is hot-air welded to the Sika membrane, which prevents lateral movement of the PV plant on the roof over time. The PV panels on SSM1 can be oriented south or east-west using the same SSM1 components.

Sika maintains its own solar parks in several locations to:

- Monitor the energy yield of different PV technologies.
- Collect first-hand experience with long-term performance.
- Showcase the flexibility of Sika roofing solutions for PV applications.

## ENABLER OF SUSTAINABLE CONSTRUCTION

### More Value

**Customer:** International retail chain with a predictable energy load progression.

**Projects:** New buildings or stores with a refurbished flat roof.

**Requirements:** The customer expects a high energy self-consumption rate thanks to the PV plant on the rooftop.

**Sika Solution:** Durable roof buildup with thermoplastic reflective Sarnafil® TS-77 RAL 9016 SR/Sikatherm® PIR roofing system and Sika's PV system Sika® SolarMount-1.

**Sika Sustainability Approach:** Custom project-specific LCA report including calculation of carbon emissions savings. A self-consumption rate of 80 - 90% was reached.





# PROVIDING RECREATION FACILITIES WITH SIKA GREEN ROOFS

Case study



Green terraces in the region of Lake Zurich, Switzerland.

## A NATURAL HABITAT ON YOUR ROOF

The addition of a green roof to an otherwise unused area of a building is beneficial for the surrounding environment and can also contribute to your green building certification rating. Green roofs are great insulators and can significantly lower a building's cooling energy consumption and costs. Furthermore, green roofs filter air by absorbing and converting carbon dioxide to oxygen. Sika' green roofing systems help improve the microclimate, mitigate the development of urban heat islands and help manage water runoff from roofs.

## ENABLER OF SUSTAINABLE CONSTRUCTION

### More Value

**Customer:** The European Investment Bank is owned by and representing the interests of the EU member states, which wanted to integrate environmentally friendly measures and at the same time create recreational open space.

**Project:** Development of green recreational space (3,500 m<sup>2</sup>) in Luxemburg.

**Requirements:** The European Investment Bank and its architects requested green roofs that could provide valuable recreational space, as well as being ecological and attractive. Additionally, they wanted to reduce the heat-island effect by improving the microclimate around the building.

**Sika Solution:** The Sika Sarnafil® green roof system was selected for this project because of its proven durable performance in such demanding situations. The result was three levels with different green roofs for the building.

**Sika Sustainability Approach:** Custom project-specific LCA report. This project was named "Green Roof of the Year" by the Professional Green Roof Association of Germany (FBB).



# INVESTING IN A LONG-LASTING AND DURABLE HIGH-PERFORMANCE ROOF

Case study



Hydroelectric power plant in Personico, Switzerland (installed 1976).

## SIKA'S ROOFING SYSTEMS ARE DESIGNED TO LAST

Proven performance over time is perhaps the signature attribute of Sika roofing systems, which are also known for effective watertightness, energy efficiency and minimal environmental impact. This longevity under real-world conditions is proven around the world, for all construction types and in all types of climates.

The roof of the First United Methodist Church in Gilford, NH (USA) has two unique features. The first is obvious – it has a very distinctive, sweeping shape, known as the hyperbolic paraboloid. The second characteristic is not so apparent – installed in 1976, this roof was one of the very first Sika single-ply membrane installations in North America. It replaced a failing roof buildup that was only a few years old. The roof is still in place today, periodically maintained and in good condition.

## ENABLER OF SUSTAINABLE CONSTRUCTION

### More Value

**Customer:** First United Methodist Church in Gilford, New Hampshire (USA).

**Project:** One of the very first Sarnafil® single-ply membrane installations in North America, for a complex-shaped roof in Gilford, USA.

**Requirements:** The customer sought a long-lasting roof solution for a demanding structure.

**Sika Solution:** The 48 mil (1.2 mm) Sarnafil® G410 membrane was adhered to the plywood decking with Sarnacol® 2170 on the sloped roof area. On the flat roofs the 48 mil Sarnafil® G410 membrane was adhered by Sarnacol® 2170 to mechanically fastened 25 mm thick polyisocyanurate (PIR) thermal insulation.

**Sika Sustainability Approach:** The original roofing solution by the competition lasted only 8 years. The alternative Sarnafil® G410 membrane was installed in 1976 (and in 1985 on the other part) and still serves to this day.





# ECO-EFFICIENCY IN ROOF REFURBISHMENT

Case study



Shopping center MetroCentre (20,000 m<sup>2</sup>), Gateshead, UK.

## MINIMIZING SITE WASTE IN ROOF REFURBISHMENT

Upgrading the thermal performance of existing buildings is an ideal way to save energy and comply with UK building regulations. A thermal upgrade can be easily achieved by installing additional insulation over the existing substrate and covering it with a Sika roofing system. By using the existing buildup as a base for the new system, the client benefits from:

- Reduced carbon costs of the roofing system.
- Reduced waste because the existing system remains in situ and need not be removed (stripped out).
- Minimal disruption to the operation of the building during installation.
- A cost-effective method of increasing the design life of the building's roofing system.

## ENABLER OF SUSTAINABLE CONSTRUCTION

### More Value

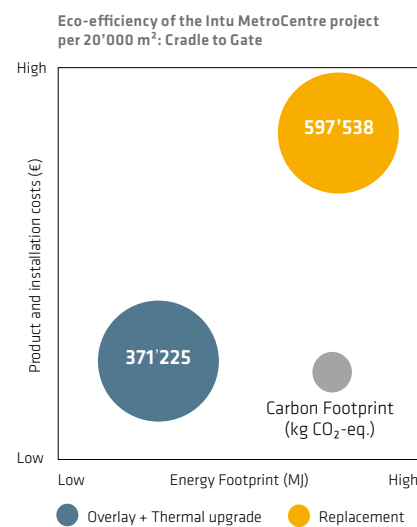
**Customer:** Intu Properties plc. owns some of the very best shopping centers in the most highly frequented locations in the UK. The Intu Environmental Policy states that a responsible and forward-looking approach to environmental issues is an important factor in Intu's continuing success in the UK property industry.

**Project:** Refurbishment of the MetroCentre (20,000 m<sup>2</sup>) in Gateshead, UK.

**Requirements:** Intu MetroCentre sought a cost-effective refurbishment solution, including a thermal insulation upgrade, that could be installed fast and easily.

**Sika Solution:** The customer decided to specify SikaRoof® MTC 18 liquid-applied membrane / Sikatherm® PIR GT 40 mm to overlay and upgrade the existing felt roofing system to increase the thermal efficiency of the building and minimize waste to landfill.

**Sika Sustainability Approach:** Providing a solution that contributes to the customer's eco-efficiency strategy of reducing its energy use and carbon footprint, complying with UK building regulations.



# INITIATIVES FOR HEALTH & SAFETY



Robert Bakewell Primary School, Loughborough, UK.

## THE SIKA RESPONSIBILITY FOR HEALTH & SAFETY

### Sika is a responsible company that takes health & safety seriously

The application method is very important for roof areas requiring torch-free membranes, such as timber roof decks or timber upstands, timber fillets, hanging tiles, thatched roofs, roof light kerbs and upstands, cladding, lantern roof lights, confined spaces, and window sills. Particular attention should be given to concealed flammable materials, where there is the potential for flames to travel and ignite particles in inaccessible areas. For all these cases, Sika Roofing systems specially engineered for "no flame" applications, are available and completely free of such risks.

### Health & safety during application

Sika roofing systems are all designed for outdoor application, and comply with the latest health & safety regulations<sup>1)</sup>. Independent studies confirm that the exposure to solvents during application remains well below allowed workplace exposure levels. The use of Sika solutions containing VOCs (volatile organic compounds) is therefore safe when carried out in accordance with the materials' application guidelines and the product data sheets<sup>2)</sup>.

### Low-VOC and VOC-free roofing solutions

Sika provides intelligent solutions, using the most advanced technologies. Sika has developed low-VOC and VOC-free roofing systems (e.g. Sarnacol® for adhered roofing systems) for markets and customers who want to avoid products containing solvents.

### Low-odor roofing solutions

A main issue regarding the use of liquid-applied membranes in various refurbishment situations is the odor emitted during application and briefly thereafter. Sika has unique solutions to lower, or totally eliminate odor issues specifically for use in highly sensitive areas (hospitals, schools, and buildings for the food and pharma industries). Sikalastic®-641 using patented i-cure PU hardener, or water-based solutions with virtually no odor. The significant odor reduction provided by Sika products compared with conventional one-component PUR systems, has been scientifically tested by an independent specialized laboratory for odor assessments.



<sup>1)</sup> Exceptions may apply. Please contact your local Sika organization.  
<sup>2)</sup> Local health and safety regulations must be followed. For further information, please contact your local Sika organization.



# INNOVATIVE VOC-FREE AND LOW-ODOR ROOFING SOLUTIONS

# SUSTAINABILITY PERFORMANCE CONFIRMED BY EPD AND LCA

## EXAMPLES OF VOC-FREE AND LOW-ODOR SIKA ROOFING SOLUTIONS

Innovative since its foundation more than 100 years ago, Sika offers a number of low-VOC, VOC-free, and low-odor roofing solutions for liquid-applied membranes, for bonding thermal insulation, and membranes to substrates.



Sarnacol® water-based adhesives for thermoplastic Sarnafil® and Sikaplan® PVC membranes<sup>1)</sup>, e.g. Sikalastic®-2142 V.

- VOC-free
- Suitable for most common substrates on roofs
- Efficient and clean application



Sarnacol® VOC-free spray adhesives for upstands with thermoplastic Sarnafil® FPO membranes<sup>1)</sup>

- VOC-free
- Efficient and clean application
- Adhesive can be reactivated



SikaRoof® Tape P for many substrates, such as metals, timber, concrete, thermal insulations (EPS/XPS/PIR) etc.

- Solvent free
- Immediate bond
- No waste (empty pails)



Sikalastic®-641 one-component, high-solids, liquid-applied membrane with Sika patented i-cure hardener technology<sup>1)</sup>

- Low-odor emission scientifically tested
- Easy and safe application
- VOC-compliant as per 2004/42/CE

Water-based acrylic coatings

- Sikalastic®-560



Sikalastic®-851 R two-component spray-liquid-applied membrane<sup>1)</sup>

- VOC-free
- Efficient and safe application



Sarnafil® TG76 FSA/G410 SA self-adhered membrane<sup>1)</sup>

- No application of liquid adhesive on-site
- VOC-free, thanks to self-adhesive backing
- No fire hazard – no open flame (torch) required, thanks to self-adhesive backing

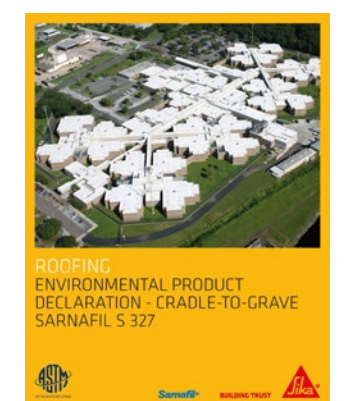
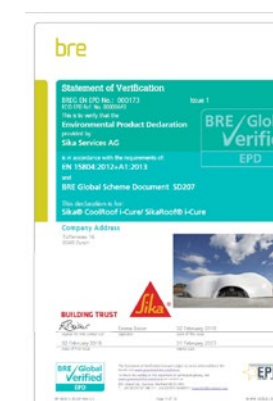
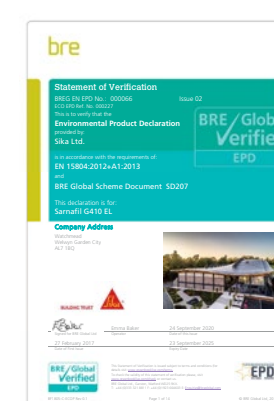
<sup>1)</sup> Please check the availability of the above-mentioned adhesives with your local Sika organization.



Indoor Stadium of Yulin Vocational and Technical College, China.

Interest in Environmental Product Declarations (EPDs) has grown dramatically since recent versions of the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program, and the UK's British Research Establishment Environmental Assessment Method (BREEAM) award, credits for buildings incorporating products with EPD, which provide added value and comprehensive information for assessing buildings and other structures.

Sika provides custom Life Cycle Assessment (LCA) calculations, Environmental Product Declarations (EPD), and project-specific reports developed with internal tools. The EPDs are a standardized way to communicate relevant environmental information of products by quantifying the environmental aspects and potential environmental impacts throughout the product's life cycle, based on quantitative data from LCA.



In Europe and in the USA, Sika has published product-specific EPDs for all its major roofing membrane brands and technologies. The EPDs conform to the EN 15804 and ISO 14025 standards and are externally verified by the IBU (DE), BRE (UK) and ASTM International (USA). For further information on EPDs, please contact your local Sika organization.





# CONTRIBUTING TO GREEN BUILDING CERTIFICATION PROGRAMS



Target Center sports and entertainment arena, Minneapolis, USA.

Over the recent years, several countries and organizations have developed environmental certification programs for buildings. The criteria of the programs are similar, whereas the evaluation may differ substantially. Green building certification programs focus on assessing whole buildings or building products. Sika is actively involved in all major green building programs around the world. Most relevant from the global perspective are LEED, BREEAM and DGNB.

## LEED (Leadership in Energy and Environmental Design)

LEED is the world's best known and largest "green building" certification system. It was developed in 2000 by the U.S. Green Building Council (USGBC) and is most relevant for North America, but is also heavily used in many other regions around the world, such as South America, Europe and Asia. It is based on a set of rating categories, in which specific topics are assessed. The products' environmental impact is determined by using LCAs and EPDs.

## MORE VALUE – GREEN BUILDING CONTRIBUTION

Relevant Sika contributions are as follows:

LEED®	BREEAM®	DGNB
LEED® v4	BREEAM® UK-NC 2018	DGNB 2018
SSc 5: Heat island reduction	Mat01: Life cycle impacts	ENV1.1: Building Life Cycle Assessment
MRc 2: Building disclosure – EPD	Mat03: Responsible sourcing of materials	ENV1.2: Local environmental impact
MRc 3: Building disclosure – sourcing of raw materials	Mat04: Insulation	SOC1.6: Indoor and Outdoor quality
MRc 4: Building disclosure – material ingredients	Wst01: Construction waste management	TEC1.6: Ease of recovery and recycling
MRc 5: Construction and demolition waste management		

## BREEAM (BRE Environmental Assessment Method)

BREEAM is an environmental assessment method and rating system for buildings launched in 1990 by the BRE (UK). Local adaptations are also used in other countries, such as the Netherlands, Sweden and Spain. BREEAM assesses the overall performance of buildings, using factors such as energy and water use, the internal environment (health and wellbeing), pollution, transport, materials etc., awarding credits in each area according to defined performance criteria. The products environmental impact is determined using LCAs and EPDs.

## DGNB (Deutsches Gütesiegel für Nachhaltiges Bauen)

The DGNB certification system was developed by the German Sustainable Building Council and the German government in 2009. The system is used in Germany and internationally. DGNB is based on up to 50 criteria in six quality categories, including Environmental Quality, Economic Quality and Technical Quality. For the Environmental Quality section, LCA data and EPDs are used.

# CRADLE TO CRADLE: Sarnafil® AT

First Cradle to Cradle Certified® Thermoplastic Roofing Membrane in the Market

**CRADLE TO CRADLE CERTIFIED®** is a globally recognized measure of safer, more sustainable products, made for the circular economy. Product developers, manufacturers and brands around the world rely on the Cradle to Cradle Certified® Product Standard as a transformative pathway for designing and making products with a positive impact on people and planet.

To receive certification, products are assessed on environmental and social performance across five critical sustainability categories:

## Material Health

The material health category helps to ensure products are made using chemicals that are as safe as possible for humans and the environment, through a process of inventorying, assessing and optimizing material chemistries.

## Material Reutilization

The material reutilization category aims to eliminate the concept of waste in a product cycle from production through to use and reuse.

## Renewable Energy

The renewable energy category helps to ensure products are manufactured using renewable energy, so that the impact of climate changing greenhouse gases due to the manufacturing of the product is reduced or eliminated.

## Water Stewardship

The water stewardship category helps ensure water is recognized as a valuable resource, watersheds are protected, and clean water is available to people and all other organisms.

## Social Fairness

The social fairness category aims to design business operations, that honor all people and natural systems affected by the manufacturing of a product.

A product is assigned an achievement level (Basic, Bronze, Silver, Gold, Platinum) for each category. The product's lowest category achievement also represents its overall certification level. The standard encourages continuous improvement over time, by awarding certification based on ascending levels of achievement, and requiring certification renewal every two years.

## Sika achieves its first Cradle to Cradle Certified® product

Sarnafil® AT is a new revolutionary thermoplastic roofing membrane technology (sold under the brand name SikaRoof® AT in Switzerland). Through its innovative products, Sika is committed to design, measure and communicate sustainable value creation. Certifications such as the rigorous **Cradle to Cradle Certified®** scheme demonstrate this commitment.

Sika embarked on its first **Cradle to Cradle Certified®** project in autumn 2019 for Sarnafil® AT, and was successful in achieving an overall Silver certification level.

	BASIC	BRONZE	SILVER	GOLD	PLATINUM
MATERIAL HEALTH			●		
MATERIAL REUTILIZATION				●	
RENEWABLE ENERGY			●		
WATER STEWARDSHIP			●		
SOCIAL FAIRNESS				●	

Sarnafil® AT is the first thermoplastic roofing membrane in the market to be **Cradle to Cradle Certified®**. Becoming **Cradle to Cradle Certified®** is an important first step for

Sarnafil® AT, helping Sika to identify key actions for continuous improvement, which will be revisited every two years as part of the recertification process.

For more information about **Cradle to Cradle Certified®**, visit the Cradle to Cradle Products Innovation Institute's website: <https://www.c2ccertified.org/>



# SIKA ROOFING SOLUTIONS

Roofing systems contribute to sustainable construction

## ENERGY SAVING SOLUTIONS



### More Value

- Highly reflective thermoplastic Sarnafil® and liquid-applied Sikalastic® roofing membranes provide significant energy savings during the use phase.
- LAM over bituminous membranes, are a very effective solution to reduce Energy Demand of existing buildings.
- Sikatherm® polyisocyanurate (PIR) insulation materials are one of the most cost-efficient solutions, and have the best thermal performance for a given thickness of insulation.
- Sika thermoplastic roofing systems have the lowest energy footprint of all competitive roofing technologies.
- Choose Sika SolaRoof® with Sika® SolarMount-1 (SSM1) photovoltaic solutions for energy generation.

### Less Impact

- Sika green roofing systems reduce the urban heat island effect and energy consumption during the use phase.
- Expanded polystyrene (EPS) insulation materials have the lowest carbon footprint for a given thermal performance.

For specific information regarding Sika energy saving solutions, please contact your local Sika sales organization.

## DURABLE SOLUTIONS



### More Value

- Sarnafil® and Sikaplan® thermoplastic roofing systems have a proven life expectancy of 50 years.
- All Sikalastic® liquid-applied membranes are an outstanding refurbishment solution, that extend the lifetime of existing roofs.

### Less Impact

- Sika thermoplastic mechanically fastened and adhered roofing systems provide superior durability, which means fewer replacements during the service life of the building, thus saving costs, reducing energy and carbon footprint.
- Upgrading existing roofing systems is a cost-effective method of saving energy, minimizing disruption to operations of the building installation and reducing costs, waste, and carbon emissions.

For specific information regarding long-lasting Sika roofing solutions, please contact your local Sika sales organization.

## GREEN BUILDING SOLUTIONS



### More Value

Sika roofing systems contribute to achieving multiple credits in most relevant green building certification programs, such as LEED, BREEAM and DGNB by:

- Reducing energy consumption and the heat island effect with highly reflective Sika roofing membranes.
- Using high-performance Sika thermal insulation.
- Enhancing the thermal performance of buildings with Sika green roofs.
- Controlling stormwater runoff.
- Using Sika roofing membranes, that include recycled content.
- Sika provides externally verified Environmental Product Declaration (EPD) and Life Cycle Assessment (LCA) tools that can be used as part of the certification process.
- Sika provides customized and project specific Life Cycle Assessment (LCA) calculations and reports (available on request).

For specific information regarding Sika green building solutions, please contact your local Sika sales organization.

## AIR QUALITY SOLUTIONS



### More Value

- Innovative solvent-free Sika adhesives significantly reduce odor emissions, and enable a VOC-free roof buildup. This reduces the summer smog potential, and improves the air quality.
- Self-adhered membranes are the first choice for roofs that resist high uplift forces by strong winds. The application with a factory applied adhesive is easy and fast, and with the benefit that no VOC or odors are involved.
- Sika has published product-specific EPDs for all its major roofing membrane brands and technologies, providing reliable environmental information about its products.

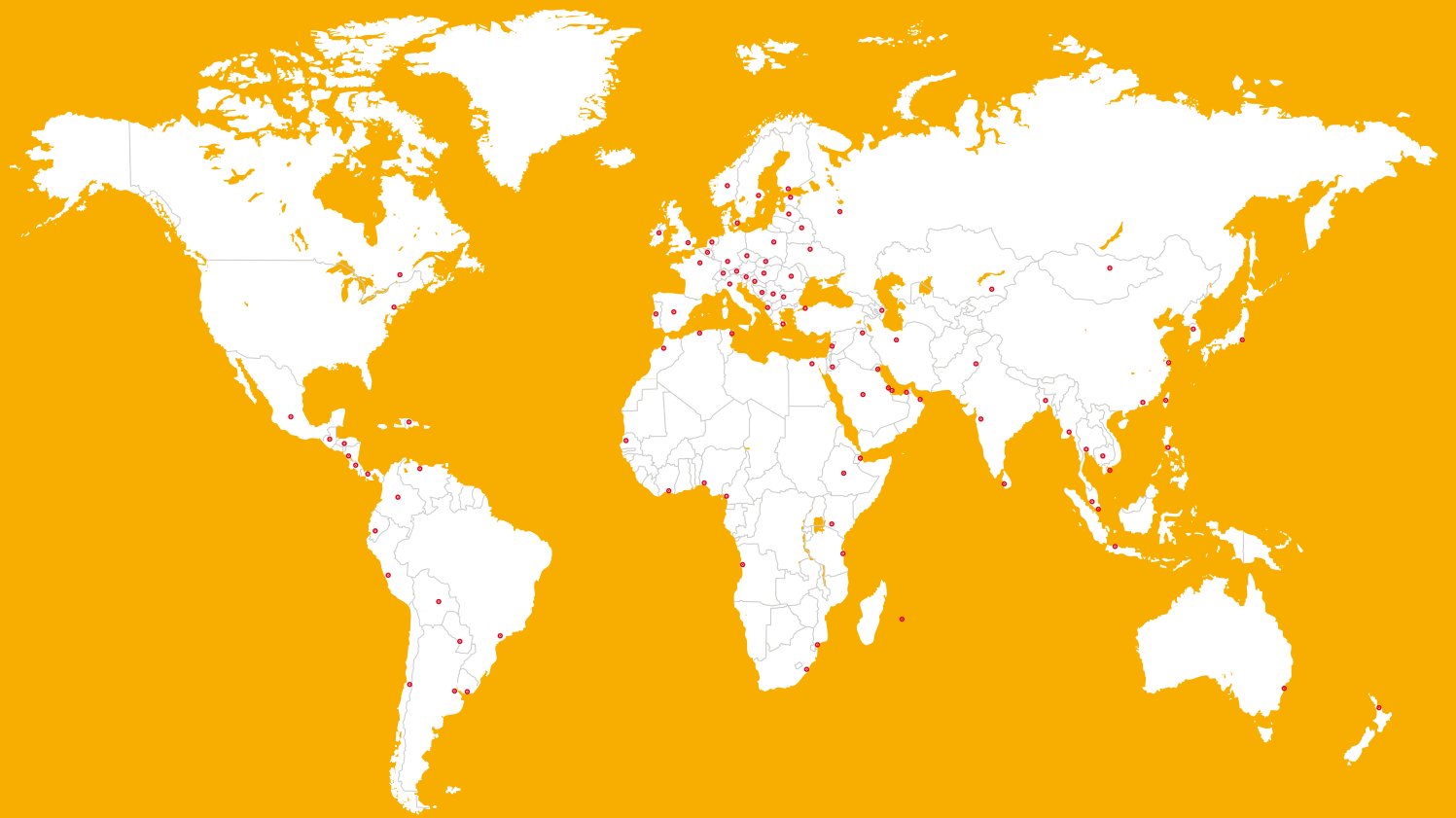
### Less Impact

- Sika offers low-VOC, low-odor and VOC-free solutions, e.g. Sarnacol® water-based adhesives, Sikalastic® liquid-applied roofing waterproofing membranes and Sarnafil® self-adhered membranes.
- Sika thermoplastic roofing systems have the lowest global warming potential, compared to competitive roofing technologies, as shown by LCA calculations.

For specific information regarding Sika air quality solutions, please contact your local Sika sales organization.



# GLOBAL BUT LOCAL PARTNERSHIP



## FOR MORE ROOFING INFORMATION:



### WE ARE SIKA

Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and the motor vehicle industry. Sika's product lines feature concrete admixtures, mortars, sealants and adhesives, structural strengthening systems, flooring as well as roofing and waterproofing systems.

Our most current General Sales Conditions shall apply. Please consult the most current local Product Data Sheet prior to any use.



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