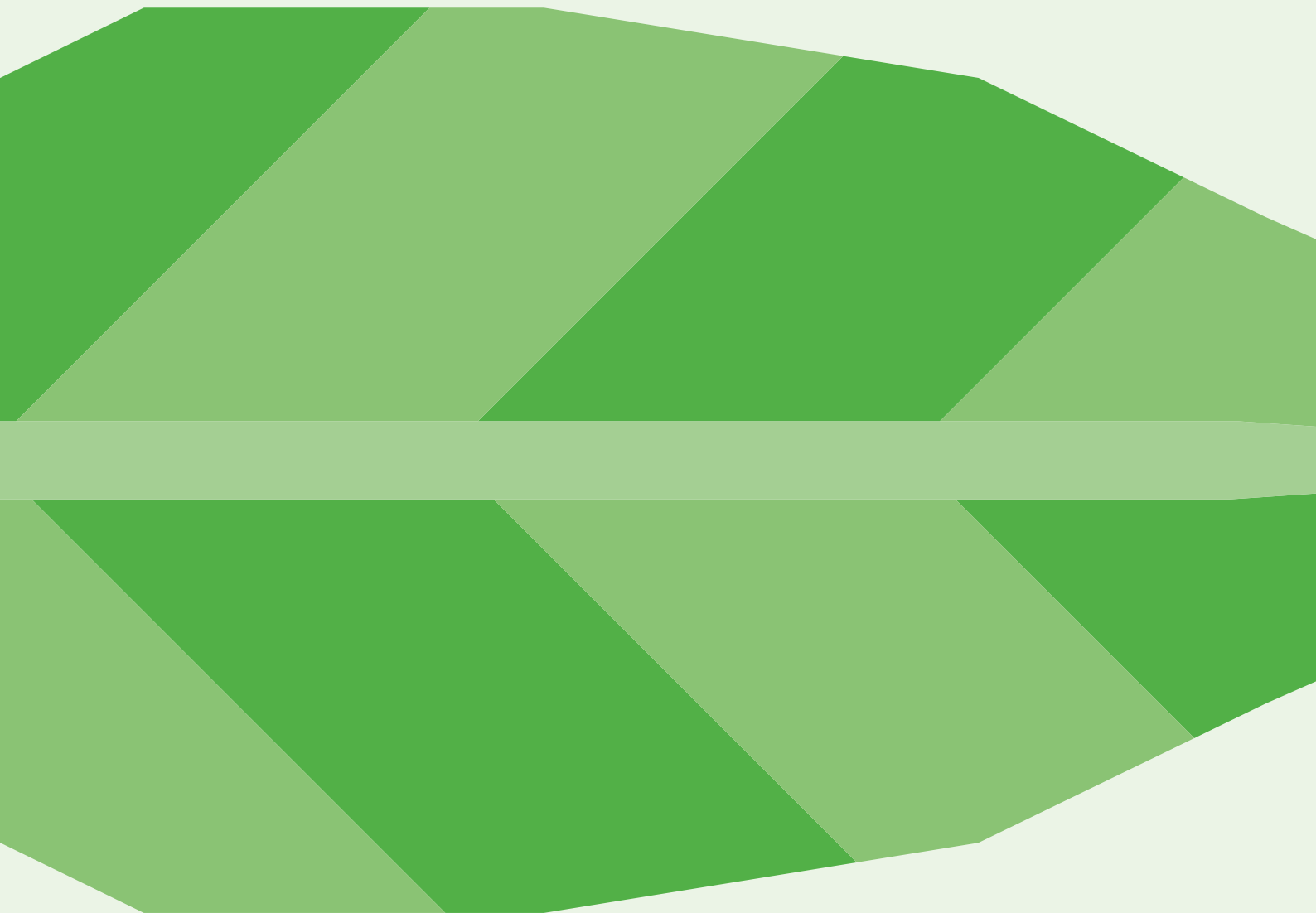


polytan



GREEN
technology

POLYTAN GREEN TECHNOLOGY

HIGH-TECH SPORTS SURFACES MADE
FROM SUSTAINABLE MATERIALS

THE FUTURE OF SPORTS SURFACES IS RENEWABLE



Polytan – since 1969 our name has been synonymous with uncompromising quality and functionality when it comes to synthetic sports surfaces. Our products are used successfully around the world in top international sports, but also for leisure, club and school sports. So we know a thing or two about quality – and we’ve been demonstrating this for 50 years. But how good are we when it comes to sustainability? Climate change, micro-plastics, fine particles and the emission of pollutants – being a company that processes plastic, all of these issues naturally pose greater challenges for us than for other industries. But we are working hard to actively address these challenges and develop solutions that make both our products and their manufacturing more sustainable.

We have introduced energy management in compliance with ISO 50001, and we systematically reuse and recycle production waste. In addition, our sports surfaces are extremely robust, durable and low-maintenance – which means they support intensive use over many years.

In line with the objectives of the EU Commission’s strategy for a plastics and bio-based economy, we are also working hard on researching the use of bioplastics and CO₂-based plastics, which are already usefully supplementing our oil-based product portfolio and, in the long term, may even gradually replace it. We are working jointly on this with leading companies such as Braskem, Covestro and the infill specialist Melos, which is also part of the Sports Group. Resource and climate protection are therefore core goals of our innovation programme, the results of which you will find at Polytan under the umbrella of the “Green Technology” (GT) line: A new generation of highly sophisticated products and methods that combine the latest expertise from the plastics industry with the functional and environmental benefits

of renewable resources and new, resource-conserving technologies. Our services are also an integral part of this innovative programme to ensure sustainable use of synthetic turf throughout its useful life. These services include a comprehensive recycling programme at the end of the turf’s useful life, which includes reusing individual components as well as practical recycling solutions for the entire synthetic turf system.

The Poligras Tokyo GT hockey turf, the PolyBase GT elastic layer and the Fusion Infill GT infill granulate are the three products currently available in our Green Technology line (as of: spring 2019). We are also working hard to ensure that more will follow soon – with the requirement that the products tick all the boxes, not just in terms of sustainability, but also in the areas of player health and safety and performance.

The fact that this has been achieved with our existing Green Technology products is impressively demonstrated by our bio-based hockey turf Poligras Tokyo GT – because it was selected as the official competition turf for the Hockey World Championship 2020 in Tokyo and has already been successfully installed in selected sports facilities!



SUSTAINABILITY AT POLYTAN

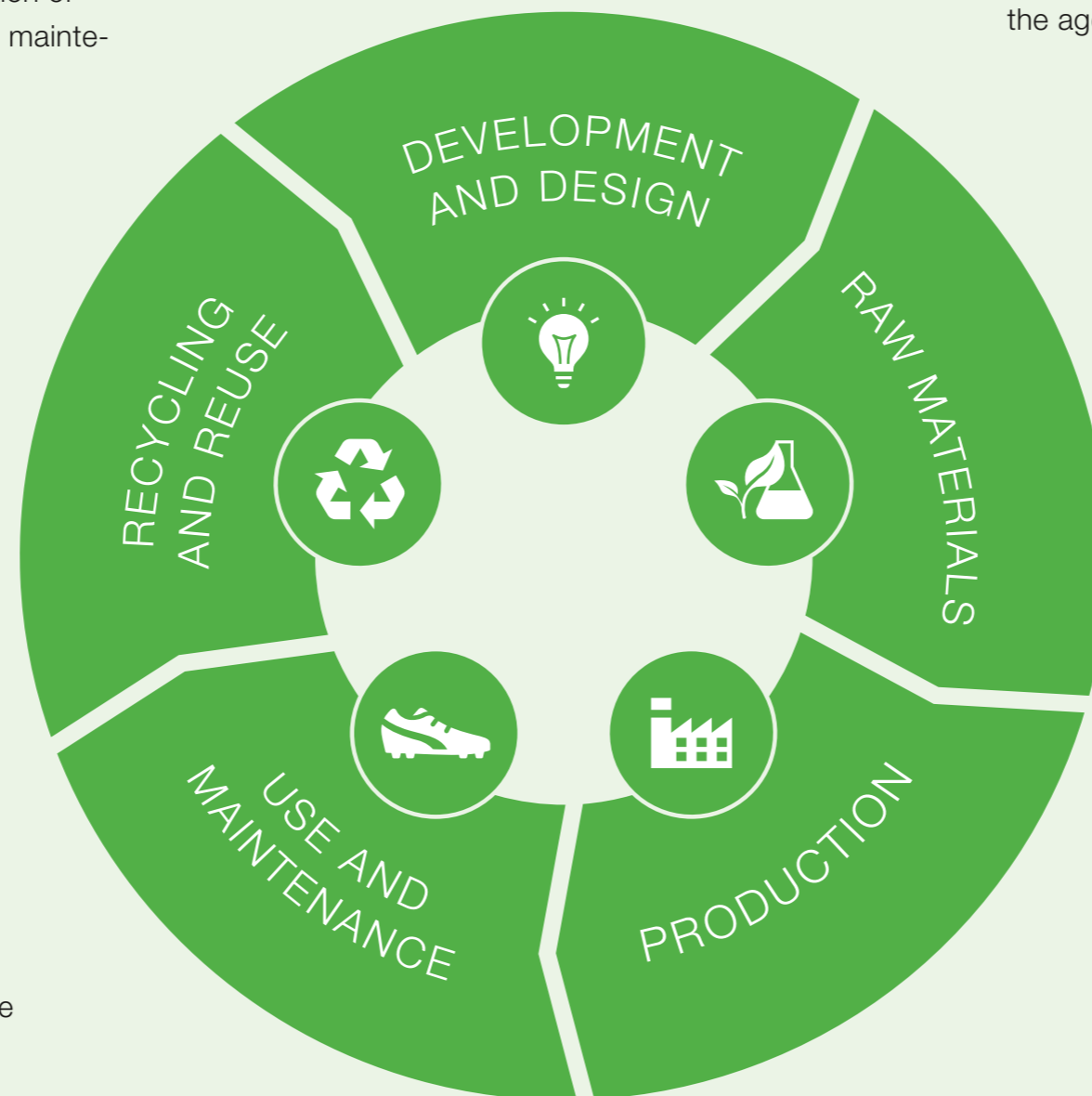
Polytan has always attached great importance to sustainability and a low environmental impact. As a responsible full-service provider, we ensure the appropriate and conscientious use of resources at each step in the life cycle – from the selection of raw materials through production, installation, use and maintenance, to disposal and recycling.

RECYCLING AND REUSE

- Recycling of sorted materials and reuse through special methods
- Reuse of individual components
- Combustion for energy production

USE AND MAINTENANCE

- Minimising the cost of maintenance
- Highly efficient, expert cleaning
- Durable design
- Low water consumption
- Drainage systems with filters
- Central collection points for snow
- Scraping grid for shoes and clothing



DEVELOPMENT AND DESIGN

- Development focusing on high-quality, hard-wearing and long-lasting products
- Product features that go far beyond the requirements of the standards
- Intelligent technologies that combat the ageing process

RAW MATERIALS

- Polyethylene offers conservation of resources and excellent recyclability
- EPDM infill granulate brings clear environmental and health benefits
- All materials comply with strict REACH, EU and DIN regulations and consist of up to 70 % natural materials

PRODUCTION

- Modern, energy-efficient machinery fleet
- ISO 50001-compliant energy management system
- Reuse and recycling of production waste
- European production locations mean short delivery distances

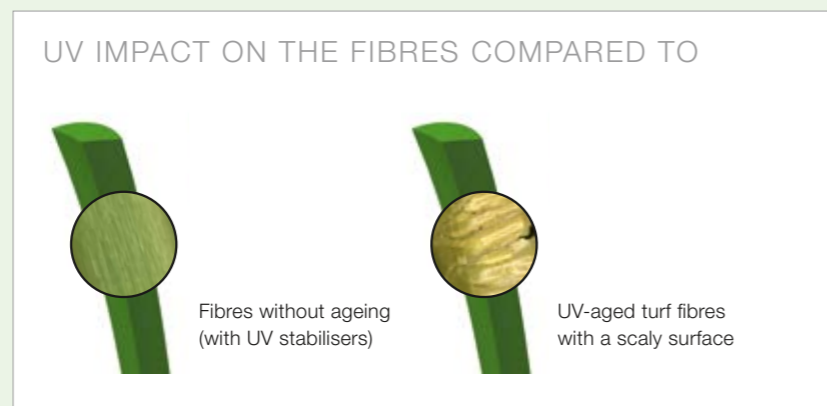
DEVELOPMENT AND DESIGN

We build in sustainability right from the design of our products. Alongside having the optimal functional properties for sports, the issues of durability and a long useful life are particularly important – because no other measures reduce the impact on climate and the environment as much as the lifetime of a product.

We ensure this longevity by selecting high-quality raw materials and special fibre geometries, as well as by using suitable formulas and technologies that, among other things, counteract the ageing process caused by UV radiation, humidity and heat.

All of these measures go far beyond the requirements set by EN, DIN and RAL standards. Our products not only achieve a long service life, but also minimise the creation of micro-plastics thanks to their strong wear protection – no matter whether traditional plastics or bio-based polymers are used as raw materials.

The use of an in-situ elastic layer in the turf system minimises the use of fibre materials and rubber granules. With a service life of over 30 years, this ensures a long service life of the entire system.



The UV stabilisers protect the filament against a rapid ageing process. Over the years, UV light cracks the fibres and makes them brittle (right).



RAW MATERIALS



We also set uncompromising quality standards in the selection of the base raw materials. The filaments (turf fibres) of our synthetic turf systems are made only from 100% polyethylene. Among other things, this plastic leads the way with lower resource consumption and excellent recyclability compared to other polymers. In addition, polyethylene does not contain any plasticisers, and even when it is incinerated, no harmful substances are released. For our infill granules, we prefer to use EPDM (ethylene-propylene-diene rubber), a material which has clear environmental and health benefits compared to the waste tyre granules used in the past. Our EPDM rubber granulates comply not only with the EU REACH(chemicals) regulation but also with the even stricter EN 71-3 regulation for toys.

As part of our Green Technology product line, we already offer products that use bio-polymers, recycled materials and even CO₂-based binders, in which the climate-damaging CO₂ is used as a material. This prevents it from being released into the atmosphere. Our Green Technology products must still meet the same high quality criteria in terms of performance and longevity as all other products.



STANDARD EN 71-3 FOR TOYS, PLAY-SAFE

OUR GREEN TECHNOLOGY PRODUCTS ARE MADE FROM UP TO 70 % NATURAL MATERIALS



Hemp, a natural material



Sugar cane, a natural material

PRODUCTION

Reducing negative environmental influences is also an important production factor for Polytan. Our main focus here is on energy consumption, since Polytan has identified this as having the greatest potential for savings that will reduce our environmental impact.

The energetic improvement of the entire production process and the infrastructure – for example, lighting, compressed air machines and cooling systems – has been implemented systematically and continuously for several years. With the help of new, high-performance technologies, we have thereby improved our environmental protection and minimised energy losses and negative effects on the environment (such as CO₂ emissions).

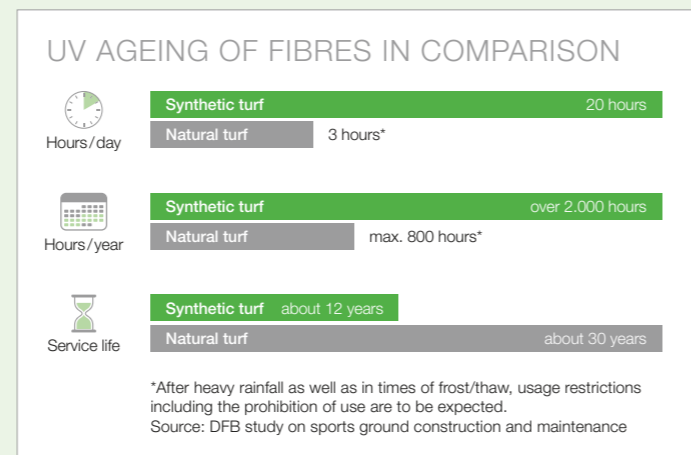
To control this process, in 2014 Polytex implemented an ISO 50001-compliant energy management system that is audited regularly by external inspection organisations. Production sites in Central Europe ensure short energy-efficient distances to our core markets.



USAGE AND MAINTENANCE

For many disciplines of athletics, artificial surfaces have been established as a global standard for decades. But our artificial turf systems are now also a serious alternative to natural turf: especially at high usage levels, high-quality systems such as those from Polytan often offer significant benefits as they are sturdier, longer-lasting and easier to maintain, while offering consistently excellent playing properties. A prerequisite for a positive environmental balance of artificial turf is in particular its useful life and intensity: with an average age of 12 years, Polytan's artificial turf systems reach peak values even with intensive use. High-quality materials as well as special geometries and technologies for improving UV resistance, water storage or abrasion resistance ensure a long service life and low maintenance costs.

Due to the high intensity of use, the artificial turf helps to protect or even preserve valuable natural areas. In temperate climates, a synthetic turf system can replace three natural turf areas or help to keep these areas pristine in the ecosystem. In extreme climates, this ratio can be even higher. Mowing or fertilising is not required with synthetic turf and continuous watering is not necessary. These are product features that contribute positively to the environment and resource conservation.



When it comes to our synthetic turf systems, the comfort and protection of the players are just as important as usage aspects and sustainability. In recent years of system development, significant improvements have been achieved in this respect, which have further reduced the immediate risk of accidents and injuries. In the medium and long term as well,

our synthetic turf systems with their long-lasting and always consistent elasticity make it possible to play sports without long-term damage to the musculo-skeletal system. This has also been confirmed by FIFA studies, which certify that artificial turf poses no greater risk of injury than natural turf.

RECYCLING AND REUSE

Even after their active career, our products are far from finished: for example, through leading recycling partners, we offer a process that allows us to recycle the entire synthetic turf system in a single-origin manner.

into its components. While the infill granules can be used for the production of rubber flooring or moulded parts, the turf fibres and the substrate can be melted and recycled in the plastics processing industry.

In this recycling process, the entire artificial turf is first cut into sheets, then shredded and broken down

Thermal recycling of renewable raw materials releases only as much CO₂ as the plants have absorbed during their growth.

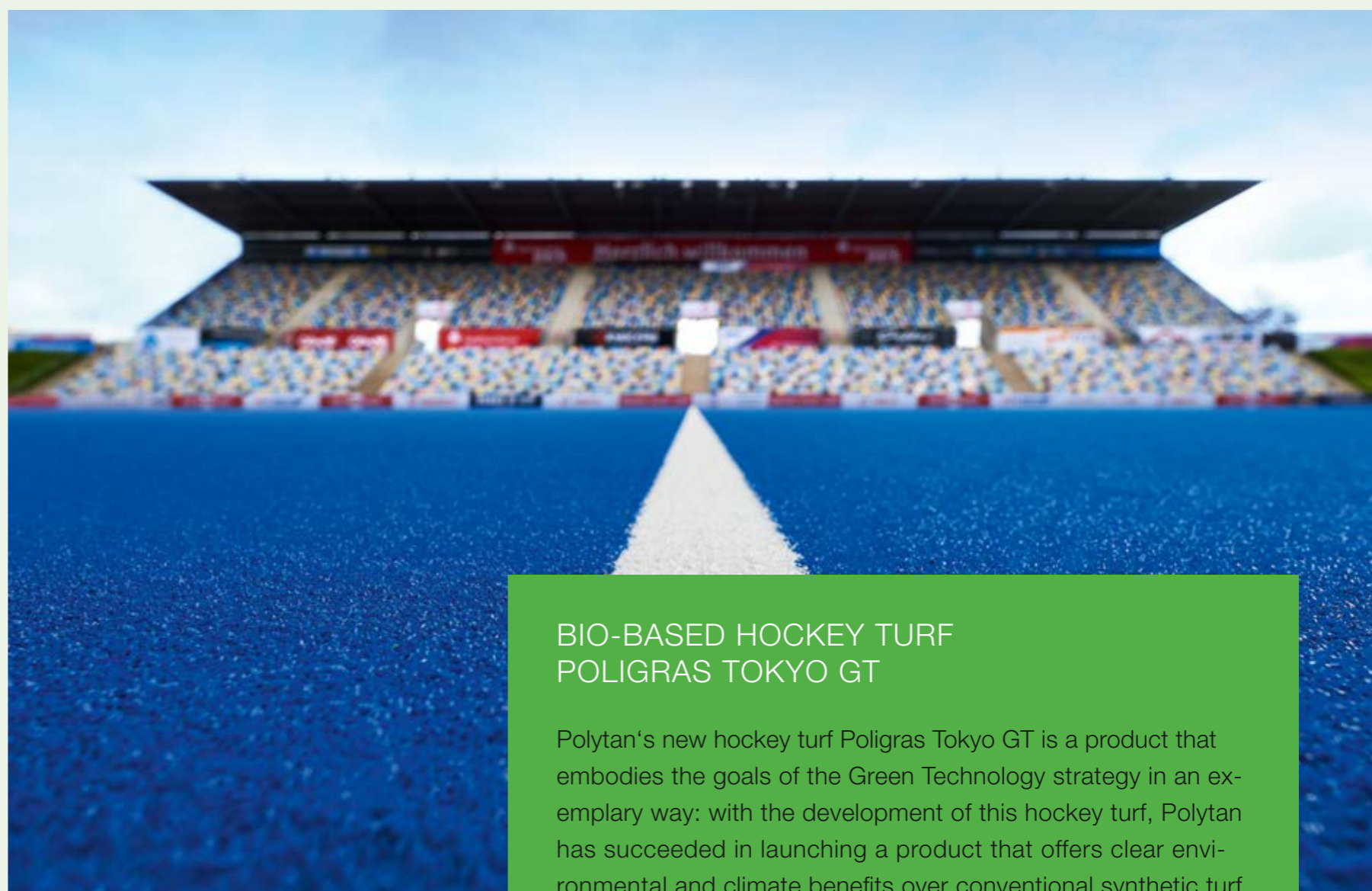


FROM NATURE TO THE SPORTS GROUND

Green Lighthouse Project – Case Study

Poligras Tokyo GT synthetic turf consists of at least 60 % sugar cane, a renewable material.

- Less consumption of oil-based materials
- Does not contribute to the destruction of tropical rainforests
- Does not compete with areas that are reserved for food production
- Made from CO₂-neutral materials

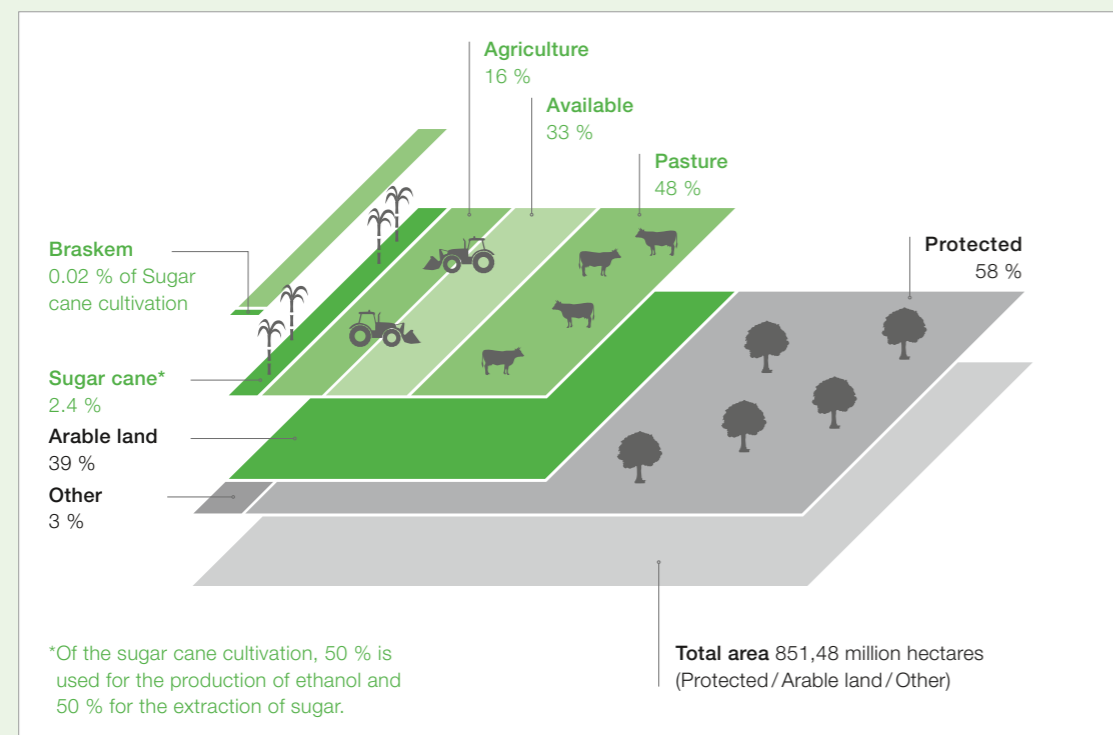


BIO-BASED HOCKEY TURF POLIGRAS TOKYO GT

Polytan's new hockey turf Poligras Tokyo GT is a product that embodies the goals of the Green Technology strategy in an exemplary way: with the development of this hockey turf, Polytan has succeeded in launching a product that offers clear environmental and climate benefits over conventional synthetic turf systems, while offering world-class playing qualities. Polytan's Tokyo GT is the official turf of the Hockey World Championship 2020 in Tokyo!

But what makes Poligras Tokyo GT more sustainable than conventional synthetic turf systems? To find out, it's worth taking a look at the entire value chain that begins in the sugar cane fields in Brazil.

Our partner Braskem uses just 0.02% of available sugar cane for the production of I'm Green™ polyethylene. Braskem does not grow sugar cane itself, but sources the material from sugar cane suppliers.



Source: Braskem

BEST POSSIBLE RAW MATERIAL PRODUCTION



Sugar cane is used to make the bio-based polyethylene from Braskem. In the growing region, this is always partly converted by the sugar mills into bioethanol (fuel), a byproduct of food production (sugar) in Brazil. Food and fuel production are inseparably linked in Brazil. The cultivation area is 2,500 km from the Amazonian rainforest. Cultivation takes

place without artificial irrigation, and with a high proportion of natural fertiliser (ashes and vinasse). To protect workers' rights on sugar cane plantations, Braskem has committed its ethanol suppliers to a "Code of Conduct", part of the "National Commitment to Social Assistance" programme. (<http://english.unica.com.br/files/publications/pag=1>)

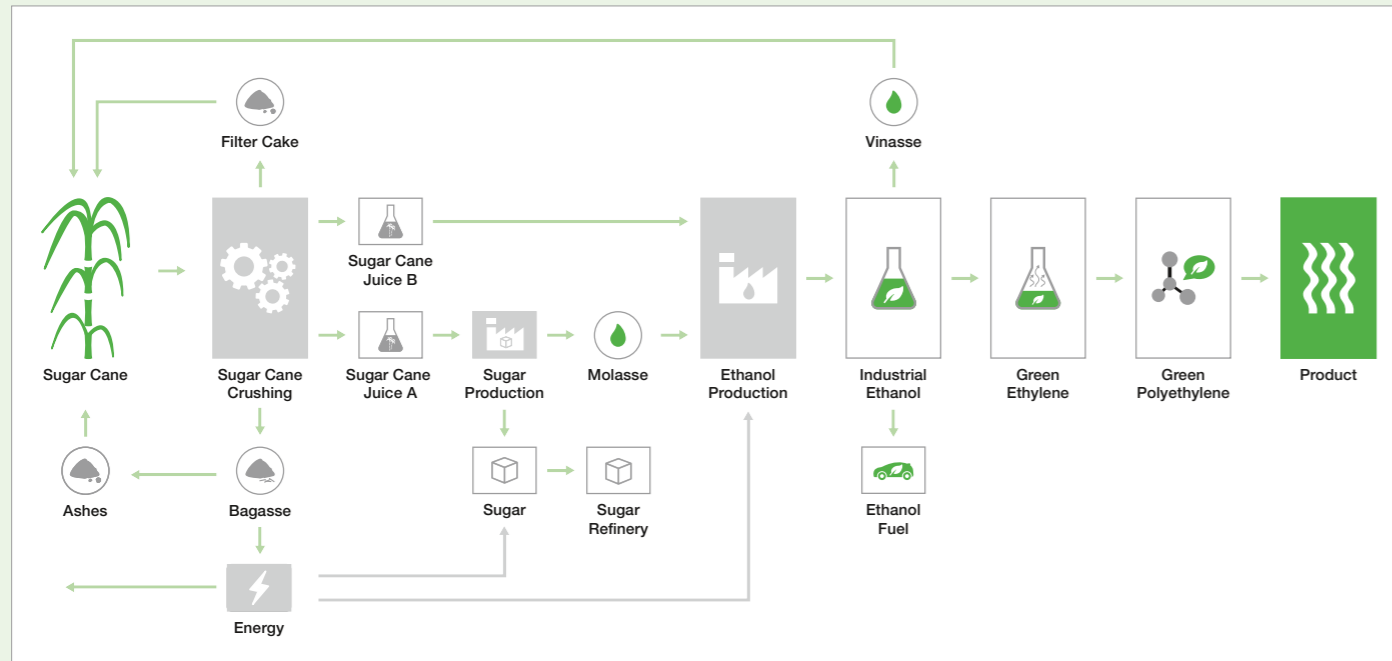


60 % Biobased
Verified by ASTM D6866

GREEN REVOLUTION: BIO-POLYETHYLENE I'M GREEN™

As with all our synthetic turf systems, the filaments (turf fibres) of the Poligras Tokyo GT are made of polyethylene, a non-toxic, highly recyclable plastic that has proven itself over many years for sports surfaces. What is special about the polyethylene used in the Poligras Tokyo GT is that it is made out of 60 % sugar cane. I'm green™ polyethylene – a revolutionary bioplastic from the Brazilian manufacturer Braskem. Renewable resources instead of fossil resources.

DOES NOT COMPETE WITH FOOD PRODUCTION



Source: Braskem

In the production of l'm green™ polyethylene, the first two pressings of the sugar cane are used as food for the production of sugar – only the third pressing (which is not high-quality enough for sugar production) serves together with the molasses as the starting material for bio-polyethylene production.

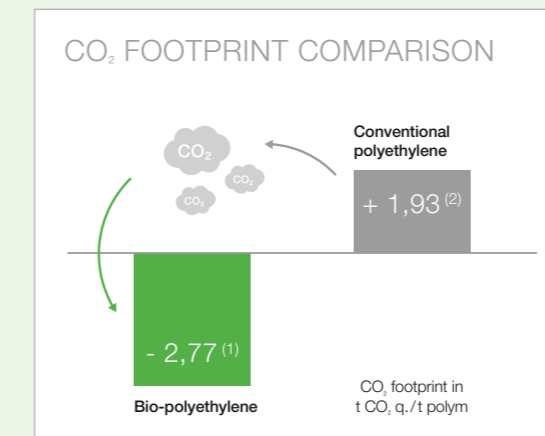
The bagasse, which is also a byproduct of the sugar cane pressing, is used in the bio-power plant for

CO₂-neutral energy production. The bagasse generates energy and steam (heat) for the sugar and ethanol production. This has direct effects on the negative CO₂ footprint from l'm green™. The ashes produced during the incineration of the bagasse are used as organic fertiliser on the sugar cane fields.

This process therefore comes quite close to the ideal of a self-contained, closed-loop economy.

“NEGATIVE” CO₂ BALANCE – REDUCES CLIMATE IMPACT

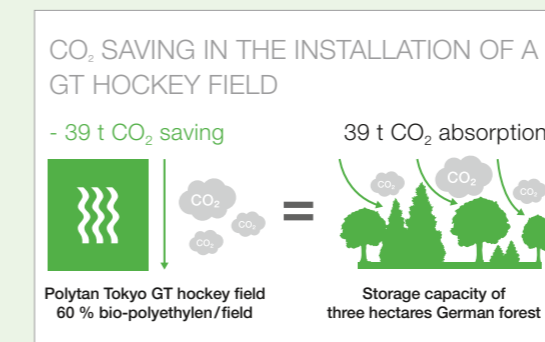
The bio-polyethylene produced from the sugar cane itself is 100 % conventional petroleum-grade polyethylene in all its qualities – with one key difference: while in the production of a tonne of conventional polyethylene, approximately 1.9 tonnes of climate-damaging CO₂ are released, in the case of l'm green™ CO₂ is absorbed from the atmosphere. A “cradle to gate” life cycle assessment (i.e. the life cycle from cultivation to delivery from the factory) has shown that the production of one tonne of Polytan bio-polyethylene relieves the burden on the climate by 2.77 tonnes of CO₂.



Sources: (1) Cradle to Gate Life Cycle Assessment for Polytan Bio-Polyethylen, (2) Plastics Europe

Even after transporting from Brazil to the Polytan production sites in Europe, the negative CO₂ balance remains positive for the climate. When the container ship enters the port of Rotterdam, the CO₂ benefit is still around 2.62 tonnes.

For the production of the Poligras Tokyo GT, the l'm green™ polyethylene is then mixed in a ratio of 60:40 with conventional polyethylene, melted down and extruded into filaments. A higher proportion of bio-polyethylene up to 100 % would certainly be desirable for the climate, but is currently not economically feasible. But even when combined with conventional polyethylene, the Poligras Tokyo GT offers significant potential for reducing the impact on the climate. Thus, with a bio-based raw material content of 60 %, almost 2 tonnes of CO₂ per tonne of material used for the lawn filaments can be saved. For an entire hockey pitch, therefore, around 39 tonnes of CO₂ can be saved. This corresponds to about of CO₂ which is stored in three hectares of German forest.*



Accessed in May 2019
<https://www.wald.de/wie-viel-kohlendioxid-co2-speichert-der-wald-bzw-ein-baum/>

Or to be more precise, one hectare of forest stores about 13 tonnes of CO₂ per year across all age groups.

*German forests currently contain 1.2 billion tonnes of carbon. This corresponds to around 4.4 billion tonnes of CO₂.

POLIGRAS TOKYO GT

A SUSTAINABLE REVOLUTION IN HOCKEY

With the new Poligras Tokyo GT hockey turf, Polytan is bringing to the market the first synthetic turf which features filaments made from over 60 % renewable raw materials. I'm Green™ bio-polyethylene is the plastic that has the same product properties as our conventional polyethylene, but is made from sustainably grown sugar cane.

Polytan adds the dimension of sustainability to the outstanding playing properties of its proven PE monofilament fibres. Implemented in a turf that is at least as effective as our previous premium products.

QUICK AND PRECISE – COOL AND COLOUR-STABLE

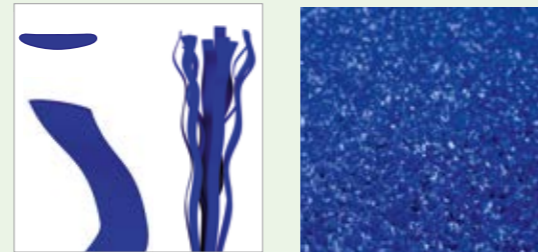
With a turf structure that is specifically adapted to the BioBased PE formula, Poligras Tokyo GT enables incomparably dynamic and precise play. Patented Entanglement technology in the filaments means that the even, multidirectional surface remains stable in the long term, and is protected against premature wear. Polytan's CoolPlus technology ensures that the turf stays pleasantly cool even on hot days; pigments incorporated on the surface of the turf fibres continuously and effectively reflect the infrared part of solar radiation, which is responsible for heating up the turf. PreciTex process engineering guarantees the turf's highly uniform colour.

AREAS OF USE

- Professional hockey facilities and stadiums
- Club spaces
- Multisport facilities



System structure



Fibre thickness: approx. 110 µm

PRODUCT SPECIFICATIONS

- Monofilament turf fibre with a fibre thickness of approx. 110 µm
- Green Technology inside: filaments made from 60% regrowable raw material
- Exclusive Polytan CoolPlus function
- Exclusive Polytan PreciTex texturing technology
- Exclusive Polytan 100% PE composition with ENTANGLEMENT technology
- MultiBack backing construction



FUSION GT



70%
natural
materials

With green technology Infill Fusion GT, Polytan presents the green alternative to infills made of SBR and other plastics. This is a decisive step towards new solutions that could be up to 100% biodegradable in future. Fusion GT – made in Germany – combines carefully selected, high-quality EPDM plastics with sustainable natural materials.

The perfect fusion of nature and engineering – with extraordinary properties: Fusion GT improves the playability of artificial turf pitches in all weather conditions while offering first-class functional qualities that players can get excited about. The innovative infill formula is the result of many years of research and is resistant to UV radiation, all weather conditions and mould. Its particular shape and low bulk weight reduce the quantity needed to fill artificial turf pitches by around 20 %. This makes Fusion GT a particularly economical and green infill solution!



POLYBASE GT



ELASTIC LAYER MADE FROM RECYCLED MATERIAL AND CARDYON®

Polytan PolyBase GT, the next step for the perfect elastic layer: Polytan's latest Green Technology development combines the well-known benefits of in-situ elastic layers with the environmental benefits of a recycled product and a revolutionary new technology for climate-friendly carbon dioxide utilisation. This will further improve the already excellent environmental performance of our elastic layers.

All the familiar benefits of our Polytan elastic layers remain fully intact and make the new PolyBase GT the ideal basis for synthetic turf systems, which should perform at their best both in terms of performance and sustainability.

HIGH PERFORMANCE FOR SPORTS AND THE ENVIRONMENT

- Permanent elasticity over decades
- Absolutely even and seamless surface thanks to in-situ construction
- Binder with revolutionary CO₂ material
- Rubber granules made from 100% recycled material



BINDER WITH REVOLUTIONARY CO₂ MATERIAL

cardyon® is the name of the product from the German polymer manufacturer Covestro, which is the first company in the world to successfully use the greenhouse gas CO₂ as a material for the manufacture of plastics and thus prevent it from entering the atmosphere. The climate-friendly cardyon® is used in Polytan's PolyBase GT as a component of the binder for the permanently elastic binding of the rubber granules.



