



polytan

POLYTAN
GREEN TECHNOLOGY

HIGH-TECH SPORTS SURFACES MADE
FROM SUSTAINABLE MATERIALS



GREEN
technology

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 on this initiative together with leading companies from around the world such as Braskem, Covestro and the infill specialist Melos who, just like Polytan, is part of the Sport Group GmbH. 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 hockey turf Poligras Tokyo GT, the synthetic football turf LigaTurf Cross GT, the elastic layer PolyBase GT and the infill granulate Fusion Infill GT are four products from our Green Technology line (as of November 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

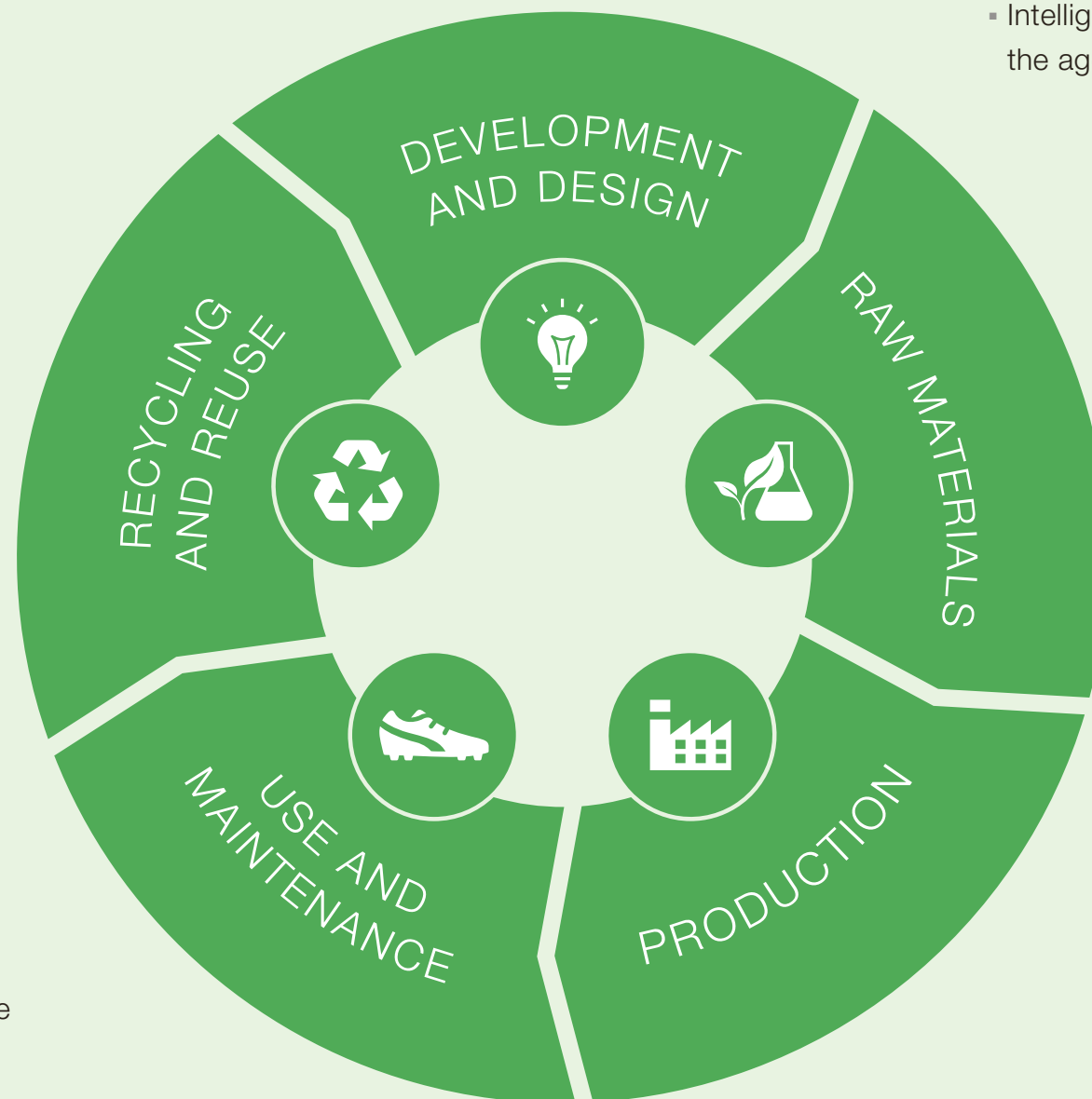
Polytan has always attached great importance to sustainability and a low environmental impact. As a responsible full-service provider, we ensure the appropriate and conscientious use of resources at each step in the life cycle – from the selection of raw materials through production, installation, use and maintenance, to disposal and recycling. Our certified environmental management, in accordance with ISO 140001 since 2015, underlines this claim.

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

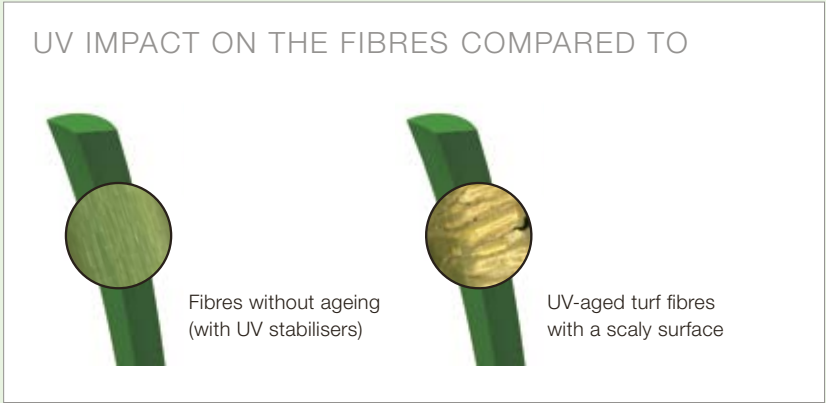
DEVELOPMENT AND DESIGN

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 binders in which CO₂ is used as a material. This allows us to conserve fossil resources such as oil. 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).

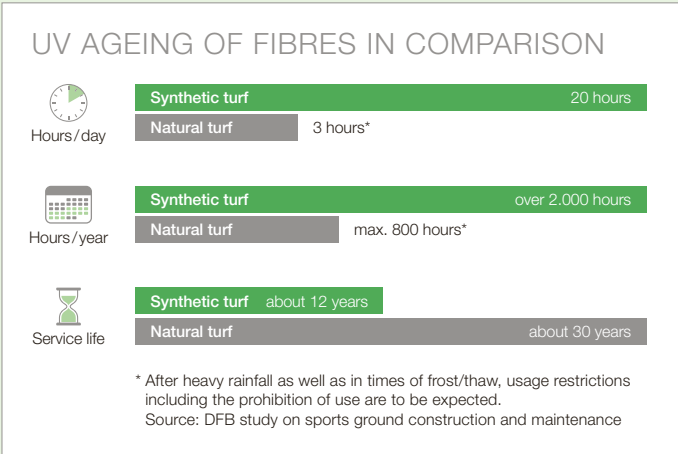
To control this process, in 2014 Polytex implemented an ISO 50001-compliant energy management system that is audited regularly by external inspection organisations. Production sites in Central Europe ensure short energy-efficient distances to our core markets.



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.

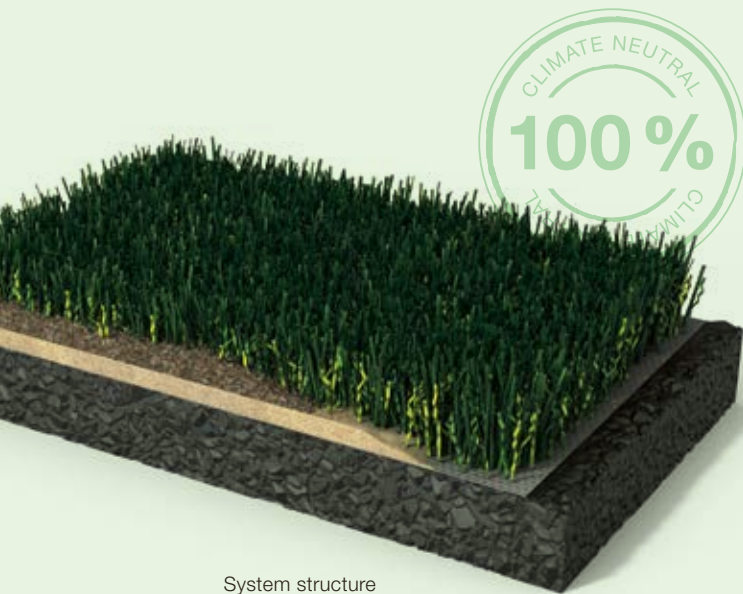
into its components. While the infill granules can be used for the production of rubber flooring or moulded parts, the turf fibres and the substrate can be melted and recycled in the plastics processing industry.

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.



THE WORLD'S FIRST 100 % CO₂-NEUTRAL FOOTBALL TURF



System structure

LIGATURF CROSS GT

With the LigaTurf Cross GT, Polytan is offering the first CO₂-neutral football pitch for professional and amateur sports. Without sacrificing durability and performance characteristics, Polytan has created a product that combines the challenges of environmental sustainability, climate compatibility and player demands.

The LigaTurf Cross GT is derived from the successful LigaTurf Cross product line, whose product launch in 2016 revolutionised the football pitch. For the first time, one turf system has incorporated the needs of municipal and private investors and the requirements of players and users. The combination of crimped LigaGrass Pro filaments with Polytan PreciTex technology and the smooth LigaTurf RS+ filament, which is considered the benchmark for football turf filaments, made it a real bestseller in the Polytan portfolio. This did not escape the notice of our competitors and made the LigaTurf Cross the most copied turf variety after the LigaTurf RS+. The reasons for its success are, in addition to the natural grass-like appearance and the perfect playing characteristics, simplified maintenance, approx. 50 percent lower use of rubber granulate and improved retention of the infill granules in the turf system. Clubs with a LigaTurf Cross football turf therefore have had the best arguments in the current debate about the discharge of rubber granules.

CLIMATE POSITIVE FOR THE FUTURE

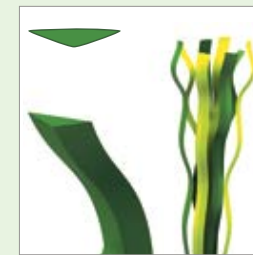
With the LigaTurf Cross GT, Polytan is now taking the next big step. The positive CO₂ balance of the LigaTurf Cross GT 240 22/8 is the result of several measures, because changing just one parameter will not result in a positive CO₂ balance. All contributing factors must mesh with each other. The turf has to achieve positive values in terms of its sustainability as well as be produced and offered at competitive costs.

RAW MATERIAL

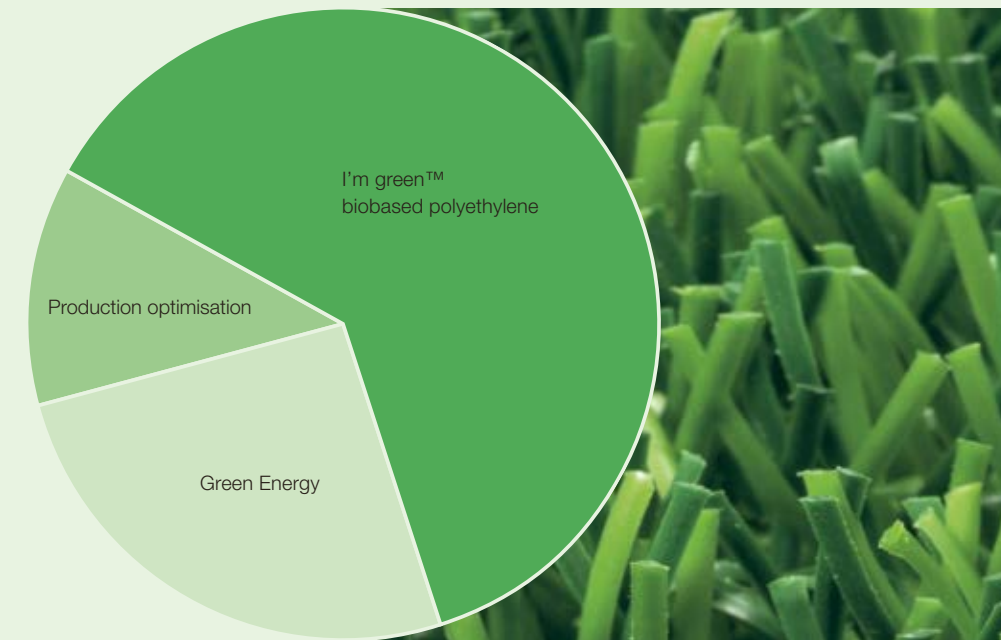
For the LigaTurf Cross GT, Polytan uses the sustainable and bio-based I'm green™ PE material from our partner Braskem. This raw material has been used in the Poligras Tokyo GT turf since 2018 and has become very popular, especially abroad. The LigaTurf Cross GT consists of at least 60 percent bio-based I'm green™ polyethylene derived from sugar cane. This is certified by an independent laboratory for each turf system. This is the basis for its CO₂ neutrality.



Fibre thickness:
approx. 360 µm



Fibre thickness:
approx. 250 µm



100 % CO₂-NEUTRAL

The 100 % climate neutrality of our turf is achieved through an integrated optimisation of product features and technologies.

ENERGY MIX

Polytan's energy management is certified in accordance with DIN EN ISO 50001. Production was converted to green electricity in the summer of 2019. This is a measure that benefits all the products in our portfolio, including the LigaTurf Cross GT. Of course, this positive climate contribution will also be certified and verified.

COATING

The new PolyCoat polyurethane wear coat with Tuft-Guard (see page 34) adds another element to the positive energy balance of the LigaTurf Cross GT. With a lower wear coat weight, lower residual moisture and better heat absorption, the energy consumption in the coating system, the final step in the process to the finished football turf, also decreases.

But the LigaTurf Cross GT offers even more benefits. The new LigaTurf Cross GT system have a higher stitch density than their predecessors and offers even better coverage for protection against falls and tackles. Furthermore, the infill granules are better fixed in the turf, preventing the so-called splash effect. The benefit: less rubber granulate is needed and discharge is significantly reduced. Even for the natural infill granulates such as cork and sand, the additional number of fibres means better stabilisation of the materials.

Polytan already has the ability to control and optimise all of these processes, so there is no compromise when it comes to the performance characteristics of the turf. As a pioneer in the field of bio-based raw materials and as a competent, experienced producer in PU chemistry, we have the necessary expertise to master this challenging combination of functional requirements and sustainability in production and raw materials.

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

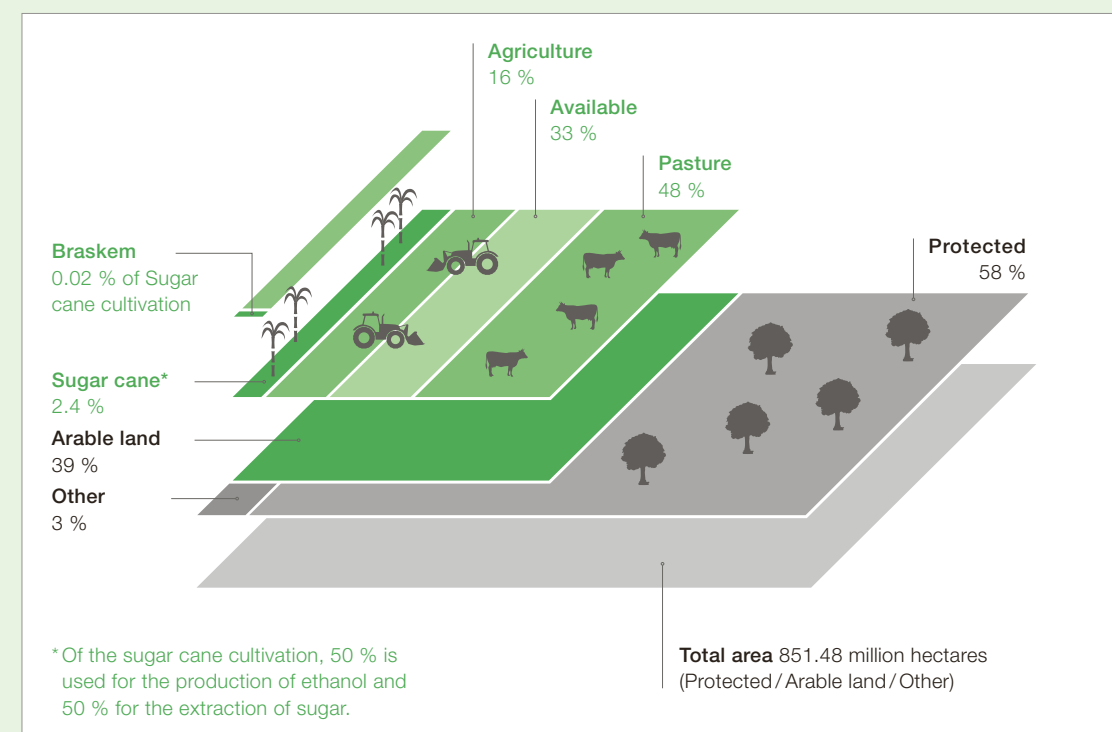


BIO-BASED HOCKEY TURF POLIGRAS TOKYO GT

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 Poligras Tokyo GT is the official turf of the 2020 Olympic Games in Tokyo!

BEST POSSIBLE RAW MATERIAL PRODUCTION

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



GREEN REVOLUTION: BIO-POLYETHYLENE I'M GREEN™

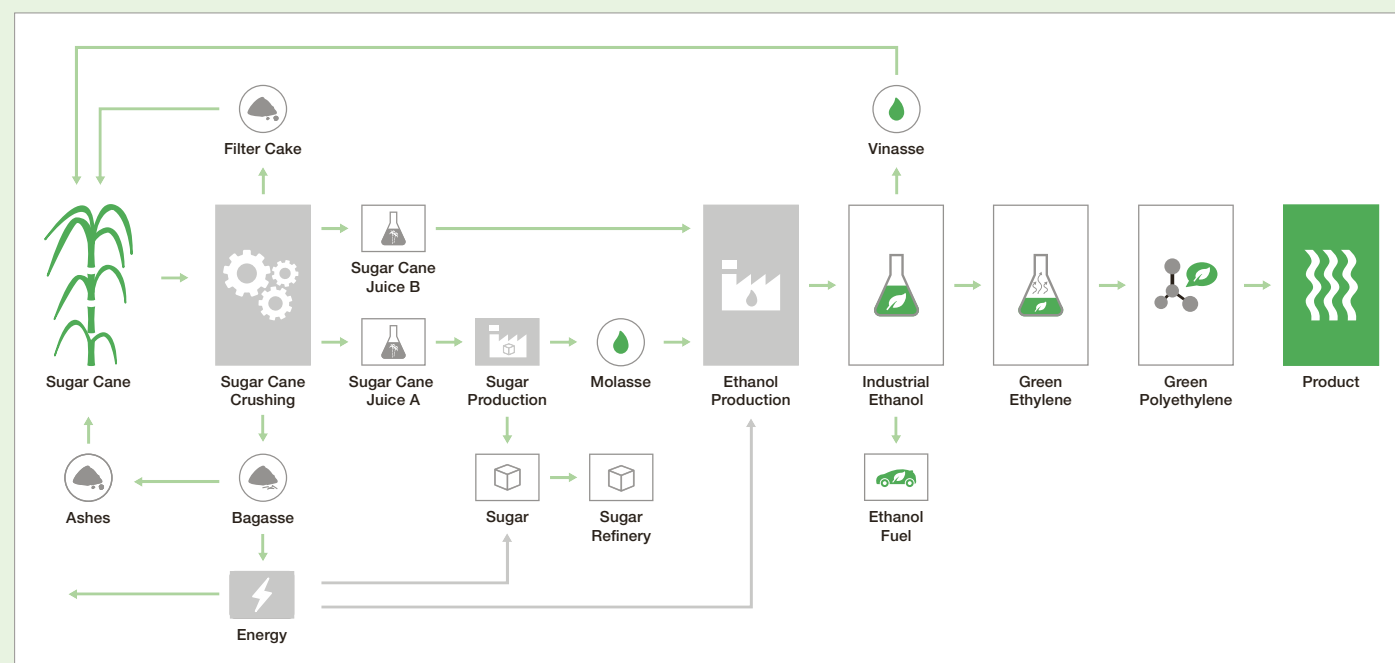
As with all our synthetic turf systems, the filaments (turf fibres) of the Poligras Tokyo GT are made of polyethylene, a non-toxic, highly recyclable plastic that has proven itself over many years for sports surfaces. What is special about the polyethylene used in the Poligras Tokyo GT is that it is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



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>)

DOES NOT COMPETE WITH FOOD PRODUCTION



Source: Braskem

In the production of I'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.

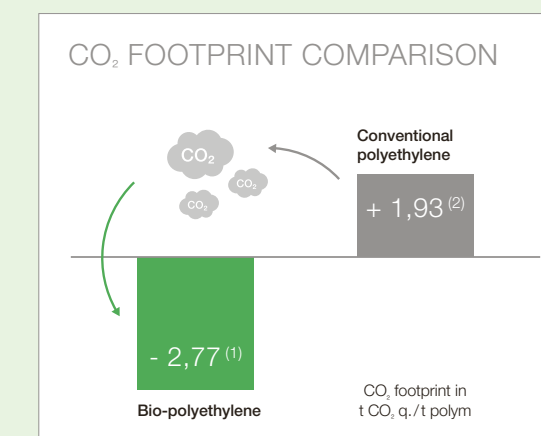
The bagasse, which is also a byproduct of the sugar cane pressing, is used in the bio-power plant for

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 I'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.

CLIMATE POSITIVE – 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 I'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.

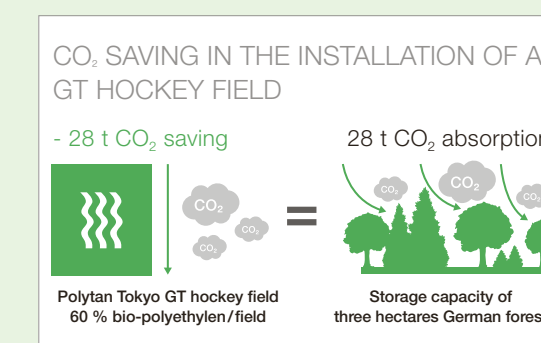


Sources: ⁽¹⁾ Cradle to Gate Life Cycle Assessment for Polytan Bio-polyethylen, ⁽²⁾ Plastics Europe

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 I'm green™ polyethylene is then mixed in a ratio of 60:40 with conventional polyethylene, melted down and extruded into filaments. Using a high proportion of bio-polythelene would be desirable, and using 100 per cent bio-polythelene would complete the transition to a totally CO₂-neutral turf. 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 28 tonnes of CO₂ can be saved. This corresponds to about of CO₂ which is stored in 2.2 hectares of German forest.*

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



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

* 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

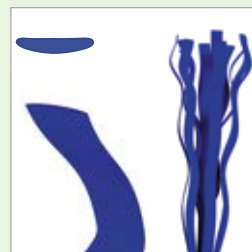
With a turf structure that is specifically adapted to the BioBased PE formula, Poligras Tokyo GT enables incomparably dynamic and precise play. Patented Entanglement technology in the filaments means that the even, multidirectional surface remains stable in the long term, and is protected against premature 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



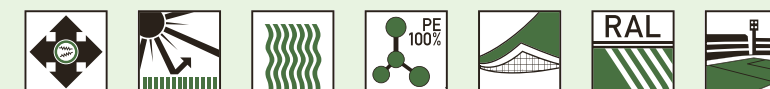
System structure



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



FOR TOKYO. FOR THE PLANET.

Climate
Positive
Hockey.

FOR TOKYO. FOR SPORTS. FOR THE ENVIRONMENT.

When the International Olympic Committee granted the 2020 Games to Tokyo, one of the decisive reasons was certainly that the Japanese want to hold CO₂-neutral Games. This decision was a major challenge, including for the builders of the sports facilities. Polytan took up the challenge and is delivering the turf for the hockey competition, a domain of the company for many years.

The teams will compete on the first sustainable hockey turf in the Olympic Games. The turf is made up of 60 % leftover sugar cane which is no longer usable for the production of syrup. This will guarantee that no food is destroyed or repurposed. A revolutionary bioplastic is made from the natural material. Polytan is also following new paths when it comes to the elastic layer. The CO₂ which is generated during production at the factory will be captured and flows into the production of the plastic layer as a component of the binding agent.

However, Poligras Tokyo GT would not be a real Polytan turf if it didn't also offer the highest requirements in terms of wear-and-tear and weather effects. Through its special composition, the temperature on the field is reduced. Compared to older complexes, the water requirement could also be significantly reduced.

The best hockey players in the world expect the best field in the world. That's why it was clear to Polytan from the beginning that we wanted to build not only the most ecological field, but also the one with the best playing conditions. In the development of Poligras Tokyo GT, Polytan also thought about the entire life cycle of the field and created a recycling concept. Large portions of the field serve as raw material for new products. The thermal utilisation of the turf is climate neutral, as no more CO₂ is generated than is linked to the growth of the plants.

The hockey fields in the Olympic Games in Tokyo are a lighthouse project for Polytan and, at the same time, a flagship for the new GT products.



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. Cardyon® is used in Polytan's PolyBaseGT to achieve permanently elastic binding of the rubber granulates.



Made with
cardyon®

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Climate neutral

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