BioSTEP

Bioeconomy in everyday life

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What is the bioeconomy?

The bioeconomy comprises those parts of the economy that involve renewable biological resources – such as forests, crops, animals and microorganisms – in the production of food, materials and energy.

In view of diminishing fossil-based resources, climate change and a growing world population, sustainable and resource-efficient strategies are increasingly in demand to guarantee the well-being of societies. The bioeconomy is one response to these challenges and encapsulates various sectors, such as agriculture, environment, aquaculture and industry.

Even though many people are not aware of it, the bioeconomy is already part of our everyday lives. Biological resources and innovative technologies are already being used to replace unsustainable products and processes that are currently produced from fossil ressources. Some bio-based goods may even have novel properties which make them superior to the products we currently depend on.

Motorbike

Raw material:
Almond shells

Masterbatches from almond shells

Plastic toys account for about 90% of the market. Most of these toys are bright and colourful. The most common way of colouring the plastics is by adding concentrates – so-called masterbatches – to the polymer matrix. A masterbatch contains high proportions of dyes, pigments, dispersing waxes and other additives. Until now there are no masterbatches on the market that use biodegradable plastics. The goal of the EU-funded MASTALMOND project is to change this by creating and testing, at the pre-industrial level, new masterbatches – colour concentrates – using almond shell, a natural waste material. About 520 tonnes of this agricultural waste product are produced per year.

Manufacturer:
MASTALMOND project

Baby toy

Raw material:
Wood

Different inside

From the outside, the coloured toy looks no different from a conventional baby toy. From the inside, however, it is much more sustainable. While the main components of the wooden ring are made from maple and beech, the coloured rings are made from 'liquid wood'. The material basis is lignin, a natural component of wood and plants that is produced as a by-product in the pulp industry. Naturally, the wood used for the main components comes from sustainably managed forests. Under high temperatures, lignin is mixed with plant fibres such as flax and natural additives until a homogeneous mass is formed. Lignin is second only to cellulose as the most abundant natural polymer.

Manufacturer:
Haba, Tecnaro

Bucket and spade

Raw material:
Bamboo

Digging with bamboo

Bamboo can grow up to one metre per day – about 10 to 20 times faster than European trees. For this reason, this sweet grass can absorb more CO_2. An advantage for the climate. To create kids` toys, bamboo shavings can be mixed with cellulose, resin and water-soluble mineral colouring pigments. The result is a completely biodegradable toy that can be cleaned in the dishwasher. As regards robustness and endurance, the toys are comparable to their petroleum-based counterparts. Moreover, they are lightweight and non-splintering. This product has been produced by hand, in conformance with fair trade principles.

Manufacturer:
EKOBO

Building blocks

Raw material:
Wood (and others)

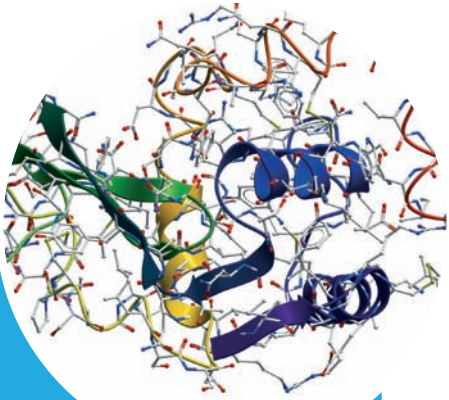
Sustainable building

Sustainable building begins with bio-based bricks in a child's bedroom. The eco-friendly blocks consist mainly of a mixture of wood fibres and a carbohydrate-rich raw material such as potato starch. Large quantities of the fibres accrue as a by-product of the wood industry – up to 40% of the raw material. The majority is processed into paper, while some is used to produce thermoplastic composites, a new product from which the bricks are manufactured. The bricks have a wood-like appearance, are highly sturdy and can be dyed pastel shades using food colouring.

Manufacturer:
Ciddi toys, Bioblo

School uniform

Raw material:
Microorganisms



As good as new

Kids can be rough on their clothes, especially when they wear the same school uniform day in and day out. A British and a Danish company have developed schoolwear that is produced with a special enzyme technology that keeps the kids' uniforms looking like new longer. At the same time, the production process is more sustainable. The enzymes are produced by industrial microorganisms. As the enzymes are added during the textile bleaching and dying process, the whole industrial process saves water and reduces energy. The enzymes work as biocatalysts and help the fibres strengthen from the inside out, helping to eliminate fibre ends that can stick out from the surface. This keeps the surface smooth, reduces pilling and ensures consistent bright colours.

Manufacturer:
Marks & Spencer, Novozymes

Armchair

Raw material:
Olive leaves

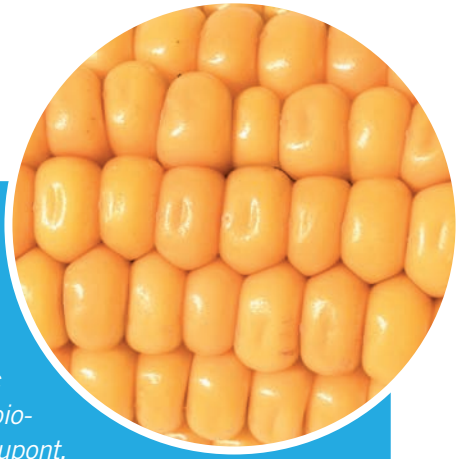
Tanning with olive leaves

Tanning agents based on heavy metal salts such as chromium (III) sulphate are usually used in the industrial production of leather. Olive leaves are a natural and environmentally friendly alternative. They contain secondary compounds which the plants use as a pest defence. This forms the basis for a biodegradable tanning agent. It not only protects the environment but also makes the leather extremely skin-friendly. Tonnes of olive leaves fall every year at harvest time in the Mediterranean, and until now, most of it was burned as green waste. Two companies have developed a process that extracts the tannins from the olive leaves in an aqueous solution. This eliminates the use of toxic acids and salts during the procedure.

Manufacturer:
Wet-green,
N-Zyme Biotec

Carpet

Raw material:
Maize starch



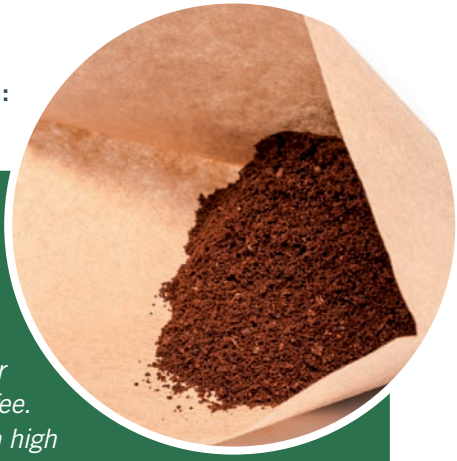
Enzymes at work

Carpets have to be durable, easy to clean and as soft as possible. This is achieved using special synthetic fibres. Nowadays, they are partly bio-based. The chemical company Dupont, for example, uses maize starch as a plant-based raw material. The starch is converted into sugar by enzymes and subsequently serves as a source of food for special microbes that turn it into bio-based polymer building blocks for high-tech fibres. The production of bio-based high-tech fibres for carpets is carried out using the bacterial species Escherichia coli. These have been purposefully reprogrammed into biological mini-factories that produce the basic platform chemical 1,3-propanediol (Bio-PDO). This synthetic building block is linked to the petrochemical-derived monomer TPA and turned into a plastic. Using this plastic, the US firms Dupont and Mohawk produce a carpet that is 37% bio-based.

Manufacturer:
Dupont, Mohawk

Table

Raw materials:
Coffee residues



Love for coffee

According to the European Coffee Federation, Europeans consume 2.5 million tonnes of coffee per year in around 725 million cups of coffee. Coffee is a luxury product and has a high value, but in the end only little of it is used. Nearly 80% of the coffee bean is left behind as residue. Making use of these residues is one of the goals of the venture Re-Worked. The company Greencup provides offices with Fairtrade coffee and collects the residues afterwards and then supplies Re-Worked with the waste coffee grounds. Re-Worked uses these grounds, designing furniture created with a hybrid material that is made up of 60% used coffee. The primary goal of the innovative venture is to promote the idea of a circular economy.

Manufacturer:
Re-Worked

Paper

Raw material:
Elephant dung

Write on waste

Sri Lanka has one of the highest densities of elephants in Asia. However, the number of elephants is declining at an alarming rate. Most of them are killed because they increasingly interfere with agriculture, due to habitat loss and human expansion. Although it shouldn't be like this, much may depend on how humans perceive the economic value of an elephant. Elephant dung may provide an answer to this dilemma. Since an elephant's diet is completely vegetarian, the waste produced is basically raw cellulose. After cleaning and processing, it can be converted into paper and then into notebooks, cards or paper.

Manufacturer:
EcoMaximus,
Mr. Ellie Pooh

Smartphone

Raw Material:
Sugar

Trouble-free display

It is a nuisance: if your cell phone falls to the floor, the display breaks and money is lost. A Japanese manufacturer had a look at this problem and designed the first cell phone with a bio-based touchscreen. But getting there was not easy. A lot of transparent plastics were examined as a possible substitute for glass; however, none of them were robust enough. These plastics were impact and scratch resistant, but not sufficiently transparent or light stable. The solution is a bio-based plastic, an isosorbide that is chemically produced from sugar.

Manufacturer:
Sharp, Mitsubishi Chemical Corporation

Fabric

Raw material:
Citrus by-products

Dressed in citrus

Orange Fiber is an Italian startup with the goal of turning orange and citrus waste into sustainable fabrics. In Italy alone, about 700,000 tonnes of waste materials from citrus production are produced every year. To use this waste, the cellulose is extracted from the fibres that are then – using nanotechnology techniques – enriched with citrus fruit essential oil. The idea was developed by two students from Sicily and has already won several awards at the national and international level. The innovation was also presented at the Expo Gate in Milan in 2015.

Manufacturer:
Orange Fiber

Pictures: Orange Fiber (top), kodochigov/fotolia.com (bottom)

Clothing

Raw material:
Milk

Made of milk

Milk is a popular food product, but not all milk proteins are actually used. Every year, millions of tonnes of milk are accrued, which cannot be used for consumption. Two companies have started to use the milk protein Casein for the production of textile fibres and clothing such as dresses or underwear. These are silky to the touch, naturally antibacterial and can be easily dyed. It has long been known that Casein can be spun into fibres. However, not only a lot of water, but also a lot of chemicals were required for this: now beeswax and zinc have been added. The production of the organic fibre is carried out in line with the Global Organic Textile (GOT) standard: compared to the conventional wet spinning process, significantly fewer resources are consumed.

Manufacturer:
Qmilk, Calida

Beverage cartons

Raw material:
Diverse

Sustainable packaging

Every day, billions of litres of water, milk, juice and other beverages are consumed. Hundreds of billions of beverage cartons are sold every year. Their advantages are their low weight and easy transportability. Most cartons are made from paperboard, polyethylene and aluminium foil. In 2015, a Swedish company introduced a fully renewable package to the market. Its paperboard comes from sources that are certified by the Forest Stewardship Council (FSC); the polyethylene for the laminate film and cap is derived from sugarcane. With the sugarcane grown on degraded pastures, the bio-based packaging brings a 20% to 30% improvement in sustainability compared to the conventional carton. However, the packages are only recyclable, not biodegradable or compostable.

Manufacturer:
Tetra Pak

Palm leaf bowl

Raw material:
Palm leaves

Dining from leaf waste

Companies in Southern India have discovered a new source of revenue: Areca nut palm leaves. After they have naturally fallen from the tree, the leaves are collected, soaked in water, heat pressed into shape and then dried. The created bowls are compostable and contain no additives, coatings or chemicals. When thrown away, they will naturally decompose within 20–40 days. Instead of being burned as waste, they pose an alternative to paper or disposables.

Manufacturer:
Vegware

Beer (gluten-free)

Raw material:
Malted barley

Craft beer without gluten

For many gluten-intolerant people, beer is off the list of consumable products. The main raw material in beer production – malted barley – contains the gluten protein. Gluten can trigger inflammation of the intestinal mucus in people with gluten intolerance. The production of beer is an old bio-based process. Today, brewing takes place in huge fermenters made of steel. The starch in malted barley is converted into sugar by enzymes. This solution is fermented with hops and yeast. For the production of its gluten-free beer, the Scottish company BrewDog uses an engineering trick to remove the gluten using a procedure that they keep secret. For foods to be labelled gluten free, they have to have less than 20 parts per million gluten (ppm). According to BrewDog their products have less than 10ppm gluten. The by-products are utilised by local farmers.

Manufacturer:
BrewDog

Coffee capsules

Raw material:
Plant fibres, maize starch

Sustainable capsules

Coffee capsules have become extremely popular among coffee drinkers who love to brew high-quality coffee in single-serve systems at home. However, the pods produce large amounts of plastics and aluminium waste on a daily basis. Coffee producers such as the Swiss Ethical Coffee Company and Italian Lavazza have developed capsules that are vegetable-based, using corn starch and plant fibres. The capsules are manufactured from a combination of plant fibres, vegetable oil derived from thistles and maize starch, resulting in a bioplastic. There are no metallic properties or substrates in the capsules. The product is biodegradable and compostable and complies with the European EN13432 standard, currently the strictest available in terms of biodegradability for industrial compost. The bio-based capsules are compatible with a range of espresso machines.

Manufacturer:
Lavazza, Novamont, Ethical Coffee Company

Coffee cup

Raw material:
Coffee grounds

From old to new

Transform old coffee into new products! A German company manufactures coffee cups and saucers that consist of used coffee grounds. Up to 40% of the product is made from recycled coffee grounds. Each cup is made of 60 grammes of coffee grounds, which is equivalent to eight espressi. The recycled material, called Kaffeeform, consists not only of coffee grounds, but also of plant fibres, cellulose and a resin made of biopolymers. For the manufacturing process, the company uses an injection moulding procedure. The resulting products are stable, washable and can thus be easily reused.

Manufacturer:
Kaffeeform

Plastic bags

Raw material:
Thistles

Biodegradable and compostable

Packaging materials can be made from bioplastics, which are both biodegradable and compostable. Italian companies Novamont and Ibiplast use vegetable oil derived from thistles as raw material for the production of such polymers. Cellulose, maize starch and their combinations are also included during the manufacturing of this sustainable polymer. The starch blend material is traded by Novamont under the name Mater-Bi. This bioplastic is suitable for processing by all common conversion technologies. It is biodegradable and compostable and can therefore be used to make cling film and plastic bags that can be utilised in organic waste management. The bioplastic is in accordance with the main European and international standards.

Manufacturer:
Novamont,
Ibiplast

Packaging

Raw material:
Plants

Sustainable packaging

Plants grow by absorbing CO_2 from the air, minerals and water from the soil and energy from the sun. In a fermentation process, microorganisms convert the plant material, such as starch and sugar content, into lactic acid. The lactic acid is then polymerised and becomes poly-lactid acid, also called PLA, which can be extruded into film. This flexible packaging is – under certain conditions – composted into CO_2, water and biomass. The film is both bio-based – coming from renewable resources – and industrially compostable – disintegrating in less than 6 months under controlled conditions. In contrast to traditional plastic, no fossil fuel is required and fewer greenhouse gases are emitted.

Manufacturer:
Taghleef Industries

Ice cream

Raw material:
Lupines

Sweet lupine ice-cream

Plant based ice-cream with lupine proteins! Lupines are green multi-talents. As nitrogen fixers they are great fertilisers for German soil. In addition, their seeds are rich in protein, which is why they have come to the attention of food manufacturers as an alternative source of protein. Lupine seeds are usually very bitter-tasting due to their high alkaloid content, which is why blue sweet lupines came into play. In contrast to other types of lupine, they have a low content of bitter-tasting alkaloids. First, the lupine seeds are peeled and processed into paper-thin flakes. The flakes are then de-oiled and unwanted aromas are extracted. Only then do the experts isolate the proteins. The dairy-free product contains neither lactose nor gluten and is suitable for allergy sufferers.

Manufacturer:
Vegavita

Dishes

Raw material:
Bamboo

Fast-growing bamboo

Fast-growing plants such as bamboo are easily cultivated and are therefore increasingly used by tableware manufacturers as a renewable resource. Companies like the German Magu or the Dutch company Capventure offer, for example, bamboo tableware, consisting of up to 60% shredded bamboo fibres. The plants come from plantations which are regularly cut and replanted. So that colourful cups, plates and bowls can be made from renewable raw materials, the bamboo fibres are first ground and mixed with dyes and other raw materials, such as corn. For durability, a synthetic resin is often added to the bamboo, which makes the products food safe, odour and taste neutral, durable and dishwasher safe. Some companies use natural resin as a binding agent.

Manufacturer:
Magu

Washing-up liquid

Raw material:
Rapeseed oil

With the help of bumblebees

The active chemical components in washing-up liquids and household cleaners are called surfactants and tensides. Conventionally, they are produced on the basis of oil chemistry. The Belgian company Ecover, which is known for its ecologically sound cleaning products, uses several natural resources as a basis for their tensides. Among others, these are plant-based ingredients such as rapeseed oil. The company has developed a bio-based manufacturing process, in which the yeast Candida bombicula plays a key role as mini-factory. The fungus was once isolated from bumblebees. In combination with glucose, it produces the desired biosurfactant product from the sustainable raw materials.

Manufacturer:
Ecover

Toilet paper

Raw material:
Bacteria

Bacteria in action

The cleaning power of natural bacteria that live on the skin can be used in domestic toilets: they can break down the most diverse organic matter. The Italian company Sofidel has launched a bioactive toilet paper that uses this technology. When it comes into contact with water, the spores germinate, multiply and clean deposits from the sewage pipes. Sofidel's bioactive toilet paper is coated with spores from the bacterial species Bacillus subtilis. The bacteria are sprayed onto the inner sides of adjacent layers of paper and only release their special cleaning effect in the sewage pipes when the toilet paper comes into contact with water. Because the pulp structures are loosened from the paper, the bioactive toilet paper protects the sewage system at the same time.

Manufacturer:
Sofidel

Potty

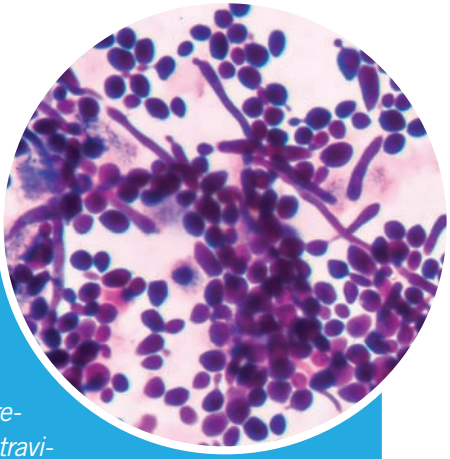
Raw material:
Rice husks

Residue meets residue

This potty started life as rice husks or bamboo waste. Worldwide, approximately 1.5 million tonnes of rice husks are produced annually. Rice husks are by-products that farmers usually burn after the harvest – and in doing so they produce greenhouse gas emissions. However, the residues can be used as a raw material instead! The British company BecoThings has shown how to create sustainable products made from natural plant fibres that are completely biodegradable. The natural plant fibres are ground into a fine powder. Together with a biodegradable resin, the powders are pressed into a hot mould and the potty is born. After the potty is no longer needed it can be taken into the garden and disposed of in the compost. It is an environmentally friendly alternative to the traditional plastic version.

Manufacturer:
BecoThings

Face cream



Raw material:
Microorganisms

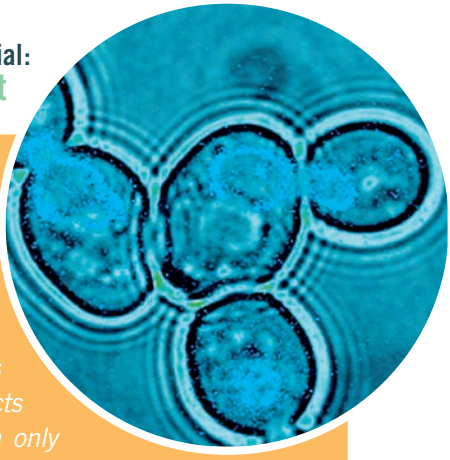
Yeast cells as factories

It's been known for decades that yeast extracts aid in wound healing. Researchers observed that, as a response to stress factors such as ultraviolet light, ozone or heat, yeast cells start to produce a set of protective molecules. Some of these natural agents have skin-firming properties, making them interesting candidates as components in face and body creams. Greek cosmetics firm Korres uses yeast cells as mini-factories. The microorganisms are cultivated using fermentation biotechnology. They are fed with a special diet of amino acids. When the yeast cells are irradiated with UV light or treated with ozone, they start to produce short biomolecules, known as hexapeptides. These agents can be isolated and used as bioactive ingredients in anti-aging creams or lotions.

Manufacturer:
Korres

Lotion & Shower gel

Raw material:
Yeast



Smells like citrus

Substances from tropical citrus fruits are popular ingredients for shower and bath gels and creams: for example, grapefruit. Grapefruit contains nootkaton, which gives cosmetic products a fresh scent. However, plants contain only a little nootkaton. In the past, fragrance manufacturers laboriously extracted this ingredient from the plant. As natural sources didn't suffice to satisfy the need, a chemical synthesis method was established. Now there is an environmentally friendly alternative that uses yeasts as biological mini-factories. In order to achieve this, microbes have been reprogrammed to produce large quantities of the scent in fermenters.

Manufacturer:
Diverse

Toothpaste

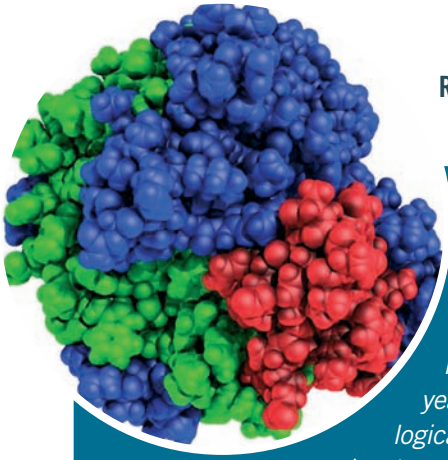
Raw material:
Bacteria

Bacteria vs bacteria

Bacteria are one of the pathogens that cause caries by producing acids that damage tooth enamel. Now, there is a probiotic toothpaste that sends targeted lactic acid bacteria to fight the pathogens. The microbes are the natural enemies of caries. After cleaning, they accumulate in the mouth around the pathogens and clump together with them. These aggregates can then be easily removed. Whilst looking for effective weapons against caries, the German company Organobalance made a find in their own culture collection. Thousands of food organisms with interesting features are stored here. Before they can be used as an additive for toothpaste, BASF cultivates the bacteria in huge bioreactors, which conform to the standards of the food industry. The toothpaste is already available for sale in Croatia from Neva Cosmetics.

Manufacturer:
BASF, Neva Cosmetics

Detergent



Raw material:
Enzymes

Efficient enzymes

Manufacturers of cleaning products such as detergents have been using the power of enzymes for many years. The biocatalysts accelerate biological processes and are active even at low temperatures. There are several classes of enzymes. Some remove dirt particles, while others work by preventing the fabrics from pilling. The use of enzymes means that less detergent and energy are required. Industrial enzymes for cleaning products and detergents have the biggest market share. A variety of biotech companies have developed special procedures to enable the production of vast quantities of these bioactive ingredients in steel bioreactors.

Manufacturer:
Persil, Ecover

Wall plugs and cable ties

Raw material:
Ricinus communis

Bio-based building

Wall plugs and cable ties are made from highly robust and resistant plastics such as nylon. A German construction company relies on a polymer that is partly based on castor oil as a raw material. The oil is extracted from the seeds of the castor oil plant Ricinus communis, which belongs to the spurge plant genus. The plant grows especially well in India, Brazil and China. Its fruit is inedible. US chemical company Dupont extracts a chemical synthetic building block from castor oil called sebacic acid. The synthetic polymer polyamide is produced together with other petroleum-derived building blocks. This polymer is 58% biobased. The company Fischer then processes the plastic granules into plugs. The bio-based wall plugs and cable ties may be slightly more expensive; however, they are as robust as traditional nylon plugs.

Manufacturer:
Fischer/
HellermannTyton

Floorboard

Raw material:
Pasture

Terrace from pasture

You wouldn't expect it when looking at the delicate stalks, but meadow grass contains a number of nutrients and is held upright by its robust fibres. A Hessian company uses these features for an innovative production cycle. The procedure is that of a 'green biorefinery', in which wet, fibrous biomass is separated into a liquid phase and a solid phase. Subsequently, the fibres are mixed with bio or recycled plastic at a ratio of 3 to 1. What emerges: a robust and lightweight material that can be processed into – among things – floorboards for terraces. The residues are used for the production of biogas or plant fertilizer. In this way, all parts of the plant are utilised in the best way and the cycle can start again.

Manufacturer:
Biowert

Brick

Raw material:
Sand, bacteria

Growing a brick

What about saving CO_2 emissions by 'growing' a brick instead of firing it! After all, more than a trillion bricks are produced worldwide every year – releasing 800 million tonnes of CO_2 into the atmosphere annually. bioMASON employs bacteria to 'grow' a durable cement. At the start of the procedure, sand is packed into rectangular moulds. Afterwards, bacteria (Sporosarcina pasteurii) are added, which wrap themselves around the grains of sand. Calcium carbonate crystals begin to form around the grains while an irrigation system feeds nutrient-rich water. The crystals grow larger and after three to five days, they are ready for use. This process was inspired by corals, which grow in all kind of formations and can withstand water and erosion.

Manufacturer:
bioMASON

Paint

Raw material:
Root vegetables

Material change from Scotland

Curran – which is Gaelic for carrot – is a material made from nano-cellulose fibres of root vegetables. It can be used for different applications such as paints, coatings or even cosmetics. Its raw material base is waste streams produced by the food industry. Because the discarded products such as carrots or sugar beets would otherwise be thrown away, there is no direct competition with food crops for scarce land. The manufacturing of Curran leads to a lower carbon footprint, as it uses vegetable waste and less water, requires fewer chemicals and does not emit toxic gases. While the exact method of production is secret, nano fibres are extracted from the vegetables and then combined with high-tech resins. The paste can be moulded into different shapes.

Manufacturer:
CelluComp

Pictures: CelluComp

Car tyre

Raw material:
Dandelion

Car tyres rethought

Because natural rubber is elastic even at low temperatures, car manufacturers use rubber to produce car tyres. Traditionally, latex from the subtropical rubber tree is used as the raw material. However, the tree plantations are increasingly threatened by a fungus, which causes the global market price to fluctuate. The Russian dandelion is an environmentally friendly alternative. It thrives in Central Europe – even on soil unsuitable for farming. With the help of modern plant breeding techniques, researchers have turned a wild plant into a useful plant, which is robust and high-yielding. In cooperation with a German tyre manufacturer, a pilot plant for the production of dandelion-based rubber has been set up in Germany.

Manufacturer:
Continental, Fraunhofer

Rust remover

Raw material:
Bacteria

Iron for lunch

In nature, there is a mechanism to eliminate rust. Rust is simply atoms of iron which have reacted with oxygen. And then there are some microorganisms, such as bacteria, that eat iron. In order to obtain this important element, the bacteria produce siderophores, protein molecules that can trap iron atoms and incorporate them into their structure. Which is why siderophores are used as biodegradable rust removers. In order to use siderophores to remove rust, a company has developed a procedure that uses the bacteria of the species Streptomyces olivaceus.

Manufacturer:
ASA Spezialenzyme

Bioethanol

Raw material:
Straw

Energy made from straw

Biofuels such as bioethanol are derived from renewable raw materials. Until now, sugars from arable crops have been used. To avoid competition with food production, residual materials such as straw have come to the attention of several biofuel manufacturers. This is because straw or wood is largely composed of lignocellulose fibres, which have a high potential for energy conversion. A Swiss chemical company has established a biorefinery demonstration plant, in which wheat straw bioethanol is produced. With the help of enzymes, the lignocellulose is decomposed and recovered from the plant fibre into its individual components. The resulting sugar molecules serve as food for yeast and are fermented by fungi into alcohol. This can then be added to premium petrol for petrol engines.

Manufacturer:
Clariant

Trainers

Raw material:
Rice husks

Using the waste

The waste which accumulates during food production is usually thrown away. This is also true for rice husks. German sportswear manufacturer Puma uses this waste material for its eco-friendly trainers 'Re-suede'. The rice husks replace a portion of the rubber content used for the outsoles, thereby decreasing the quantity of petroleum-based rubber used. This reduces energy consumption and increases the environmental balance. The remake of Puma's classic trainer 'Suede' was designed as an eco-product based mainly on recycling. Compared to conventional products, it reduces CO_2 emissions by 80%. But it's not just the outsole that's made from waste materials. The synthetic Ultrasuede upper material is also comprised of recycled polyester fibres.

Manufacturer:
Puma

Bike

Raw material:
Wood

Sustainable cycling

Unlike materials such as aluminium, iron or carbon, wood is a renewable resource, for which you only need water, sunlight and CO_2 for photosynthesis. Meanwhile, engineered wood has caught up in terms of strength and processability. A company in Dresden uses real wood veneer as the basis for lightweight tubes for bicycles. The thin-walled tubes are lightweight and robust and their production uses a minimal amount of real wood. The individual layers of veneer are glued crosswise. The first product is a designer bicycle built using a Lignotubes frame.

Manufacturer:
LignoTUBE Technologies

Pictures: abet/fotolia.com (top), LignoTUBE (bottom)

T-Shirt

Raw material:
Coffee grounds

Coffee clothes

At best, after brewing a cup of coffee, the average consumer will dispose of the coffee grounds in the compost bin. However, there's more to coffee grounds than meets the eye. They absorb unpleasant odours, dry quickly and protect from UV light. Which makes them an ideal resource in the development of sustainable textiles for professional and recreational athletes. Taiwanese company Singtex has been using coffee grounds from Starbucks for their clothing range, 'S.Café', since 2006. The biggest challenge in the production of this clothing range was the neutralisation of the coffee aroma. First, the coffee grounds are crushed into microscopic pieces and then mixed with polyester fibres.

Manufacturer:
Singtex, Nike, Hugo Boss

Tennis racket

Raw material:
Flax fibres

Plant-based racket

Tennis players choose rackets that enable them to maximise their performance and lower the risk of muscular injury. Together with French Lineo, sporting goods retailer Decathlon has developed a racket made from a plant-based material: flax fibres. Flax plants are also the source for linen used in the textile industry. The flax fibres in the tennis rackets are an important structural component of a hybrid material. The flax and a resin are combined to create a bio-based composite material. The flax fibres are incorporated into the frame as drape-formed layers of flax/epoxy and carbon/epoxy prepregs. Thanks to the vibration-damping properties of flax fibre, a flax content of 8% to 25% gives effective results that reduce the risk of tennis elbow.

Manufacturer:
Lineo, Decathlon

Get involved!

Questions? Concerns? Ideas? Let us know about them – we would love to hear what you think! With BioSTEP you have the opportunity to actively take part in the bioeconomy: visit our workshops, innovative living labs and our exhibition "Bioeconomy in everyday life" where you can see various bio-based products.

For more information visit our website:
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Or contact us via social media:

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The logos of Unioncamere del Veneto and Eurosportello Veneto belong to the same partner

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