

NNFCC News Review

Biobased Products



Each month we review the latest news and select key announcements and commentary from across the biobased chemicals and materials sector.

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Foreword

Welcome readers, to our October Biobased Products News Review.

The production of raw material, along with the processing and manufacturing of goods, have truly begun to transition towards sustainable and renewable products and practices. As a result, there is a wider selection of biobased material available for innovation within the services and entertainment sectors, who seem to be pulling resources together and joining the worldwide effort to transition towards a more sustainable way of life.

Following their announcement to become carbon neutral by 2030, the often environmentally controversial Formula 1 community is now taking up the challenge of designing car seats made from textile fibres, leading to a highly significant decrease in CO₂ emissions compared to the currently manufactured products. This adds to their other sustainability projects, aiming to develop greener brake designs and hybrid power. Things are also changing in fashion, which is thought to currently account for 10% of the world's anthropogenic greenhouse gas emissions. The environmental cost, of fast-fashion in particular, is starting to be acknowledged by the fashion world. In response an increasing number of steps are being taken to mitigate the impact that decades of intensive agriculture and textile production have had on the planet. Supported by the ever-increasing public demand for sustainable materials, new projects are aiming to develop biobased fabrics that satisfy the requirements for longevity and the undeniable need for comfort.

The 'jet set' attire of sustainable fast cars and fancy clothes would not be complete without a range of biobased make-up products. This is the mission of the "profoundly alternative and innovative" company Le Rouge Français, who keep pushing the boundaries by creating collections which are recyclable, re-usable and 100% natural. It is thanks to those kinds of projects, and their championship by the wider public, that we are now seeing an increasing number of positive environmental policies being adopted by businesses and industries.

Read on for the latest news.

Policy

Straws, cotton buds and drink stirrers ban: rules for businesses in England



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On 21st September 2020, The Department for Environment, Food and Rural Affairs (Defra) has published guidance for businesses on the ban on plastic straws, cotton buds and drinks stirrers. From 1st October 2020, you must not supply or sell single-use plastic:

- Straws and cotton buds to end-users in England (you can continue to supply single-use plastic straws and cotton buds to other businesses)
- Drink stirrers to end-users and businesses in England

The ban applies to all businesses that supply these products, including manufacturers and retailers. If they do not stop selling or supplying these items, they could be fined, set by the local authority.

Click [here](#) for more information.

Markets

Vegware coffee cup and lid receives Cré certification

Vegware has received certification from the Composting and Anaerobic Digestion Association of Ireland (Cré) assuring that one of its coffee cups and lids are compostable.

Click [here](#) for more information.

Research & Development

Towards smart biomanufacturing: a perspective

The biomanufacturing industry has now the opportunity to upgrade its production processes to be in harmony with the latest industrial revolution. Technology creates capabilities that enable smart manufacturing while still complying with unfolding regulations. However, many biomanufacturing companies, especially in the biopharma sector, still have a long way to go to fully benefit from smart manufacturing as they first need to transition their current operations to an information-driven future. One of the most significant obstacles towards the implementation of smart biomanufacturing is the collection of large sets of relevant data. Therefore, in a recent works, researchers both summarize the advances

that have been made to date with regards to the monitoring and control of bioprocesses, and highlight some of the key technologies that have the potential to contribute to gathering big data. Empowering the current biomanufacturing industry to transition to Industry 4.0 operations allows for improved productivity through information-driven automation, not only by developing infrastructure, but also by introducing more advanced monitoring and control strategies.

Click [here](#) for more information.

Green chemistry and the plastic pollution challenge: towards a circular economy

The linear economy for plastic packaging, which currently leads to excessive carbon dioxide emissions and leakage into the environment, needs to be reformed to a greener circular model which is resource efficient and environmentally benign. This requires a system-wide redesigning of rules and incentives that apply to the plastics value chain, from product design to recycling and end-of-life options. This article identifies areas where green chemistry can contribute. Substituting plastics derived from fossil resources, with bio-based alternatives from renewable resources can reduce emissions of greenhouse gases, produce plastics that are easier to recycle to the virgin polymer and, at the end of their useful life, biodegrade in the environment. The underpinning chemo- and biocatalytic technologies for the production and recycling of plastics are reviewed and priorities suggested for future development.

Click [here](#) for more information.

Production cost of lignocellulose-degrading enzymes



Pixabay

Lignocellulose is the most abundant renewable material on Earth and the primary component of agricultural wastes such as sugarcane bagasse and wheat straw. It consists of a composite material made of cellulose, hemicellulose, and lignin. Cellulose and hemicellulose can be broken down into monomers by a set of appropriate enzymes, and the resulting monomers may be used to produce a variety of fuels or chemicals through either biological or chemical routes. However, the high production cost of these lignocellulose-degrading enzymes remains a major challenge for the use of lignocellulosic biomass as raw material.

A recent article reviews techno-economic analyses concerning the production of cellulases and other lignocellulose-degrading enzymes published over the last two decades. The major characteristics of each enzyme production process are described, underscoring the similarities and differences across the various process designs. Moreover, the enzyme production costs derived from these process designs and their composition in terms of raw materials, capital-related factors, utilities, labor costs, etc., are compared. First, the analysis reveals that most techno-economic evaluations in the literature address either cellulase production by submerged culture with *Trichoderma reesei* or

enzyme production by solid-state culture with filamentous fungi. Second, the analysis shows wide cost variations across process designs but it indicates that raw materials and capital-related costs are generally the main drivers of the enzyme production cost. Furthermore, the assessment corroborates the importance of process parameters, such as product yield, production titer, and volumetric productivity, in the process economics of enzyme production.

Click [here](#) for more information.

Genetic manipulation of non-solvent-producing microbial species for effective butanol production

Butanol is widely used as an important bulk chemical and is a potential biofuel. The depletion of fossil fuels and advances in synthetic biotechnology have led to renewed interest in the biological production of butanol. *Solventogenic Clostridium* was commonly used to produce butanol through traditional acetone-butanol-ethanol (ABE) fermentation. However, its relatively slow growth rate, low butanol tolerance, and poor production efficiency have hindered the further application of this procedure. Recently, other promising industrial hosts, including *Escherichia coli*, *Saccharomyces cerevisiae*, and *Clostridium tyrobutyricum*, have been studied for potential use in the production of butanol.

A recent review comprehensively summarizes the advantages and challenges of different non-solvent strains for butanol production to identify better the ideal non-solvent hosts for butanol production. Strategies to further increase butanol production are also proposed.

Click [here](#) for more information.

Polymers

Biobased home compostable film packaging



PressReleaseFinder

Danimer Scientific, a leading developer and manufacturer of biodegradable materials, and Plastic Suppliers, Inc. (PSI), a global manufacturer of biopolymer EarthFirst® PLA barrier and non-barrier sealant films, have announced they will create bio-based, home compostable films. PSI will use material supplied by Danimer Scientific to produce packaging films that will reliably degrade without leaving behind harmful microplastics.

These films will contain Danimer Scientific's proprietary biopolymer, Nodax™ polyhydroxyalkanoate (PHA). Tested by University of Georgia (UGA) researchers and the UGA New Materials Institute, PHA is a proven biodegradable alternative to petrochemical plastics made from sustainable materials such as canola oil. Danimer Scientific will work with PSI to create customized resins that will offer additional End-of-Life options to PSI's already existing line of compostable films. New PHA-containing films will include home, soil and marine compostable options.

Click [here](#) for more information.

European Bioplastics criticises biased interpretation of EEA study

In response to the new report “Biodegradable and compostable plastics – challenges and opportunities” by the European Environment Agency (EEA), European Bioplastics (EUBP) highlights the need to acknowledge successful precedents in the deployment of these innovative materials in collaboration with a receptive community of consumers. Unfortunately, several media outlets made use of a biased interpretation of the report to draw a distorted picture of biodegradable and compostable plastics.

The report correctly highlights that using compostable plastic bags increases the capture rate of food waste, since consumers find them convenient and practical to use. Many municipalities and waste collectors are, therefore, already recommending or requiring the use of certified compostable plastic bags for collecting bio-waste. In agriculture, biodegradable mulch films, which help by contributing towards sustainable farming practices, are also identified as a key solution in avoiding long-term plastic accumulation in soil.

However, on the consumer side the report also casts doubt around the potential for understanding how and where bioplastics should be dealt with when it comes to end-of-life options. It neglects to reflect that all biodegradable plastics, with the exception of agricultural mulch films which are recycled in situ, are clearly intended for organic recycling.

Click [here](#) for more information.

Pioneering sustainable composites in F1



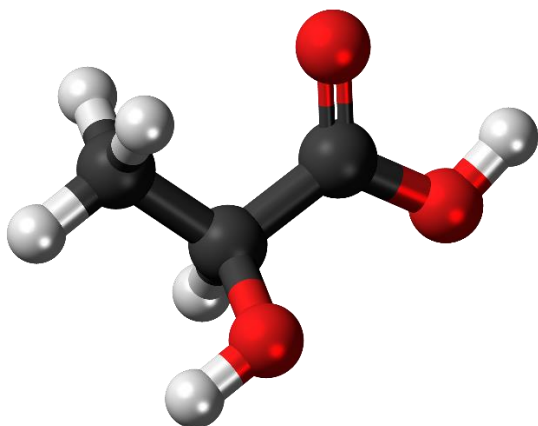
Pxfuel

If there's one breakthrough that has transformed Formula One racing and beyond, it would have to be the introduction of the first car with a carbon fibre monocoque chassis, the MP4/1. Light, strong and a huge leap forward for safety, it has heavily influenced racing car design to this very day. It changed the game but, it's nothing new. Carbon fibre has been around for decades. It still plays a pivotal role in F1 – accounting for around 70% of a modern-day F1 car's structural weight. But what if, in this age of economic uncertainty and environmental responsibility, there was a cheaper and more sustainable alternative?

McLaren have been working with Swiss sustainable lightweighting specialist Bcomp to develop just that, starting with a natural fibre racing seat for Carlos Sainz and Lando Norris – the very first F1 car part to be made of renewable textile fibres. By optimising the mechanical properties of flax fibres through fabric architecture, it's been possible to make a seat with the required strength and stiffness, but with a 75% lower CO₂ footprint compared to its carbon fibre counterpart.

Click [here](#) for more information.

Monomer purification to increase PLA availability



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NatureWorks, the world's leading manufacturer of low-carbon PLA biomaterials, has announced a slate of manufacturing technology projects, including lactide monomer purification efficiency, that will increase the availability of the full Ingeo (PLA) biomaterials portfolio by 10%. Installation is currently underway at NatureWorks' facility in Blair, Nebraska, the world's first and largest commercial-scale PLA manufacturing plant. The projects will be completed by the end of 2021.

The expanded availability will support growth in markets that demand sustainable, low-carbon materials and require the high-performance attributes that Ingeo is uniquely suited to deliver. These markets include 3D printing and nonwoven hygiene masks as well as compostable coffee capsules, teabags, and coated-paper food serveware.

Click [here](#) for more information.

Chemicals

New funding for Zymergen

Science and material innovation company Zymergen have announced \$300 million in new investment to accelerate its delivery of revolutionary, high performance materials. The investment includes initial Series D funding led by Baillie Gifford, joined by Baron Capital Group and one of the world's largest sovereign wealth funds, as well as additional growth financing from Perceptive Advisors. A number of current investors are also returning, and Zymergen expects to raise additional capital in Q4 as part of a Series D round.

This infusion of capital powers Zymergen's charge into the \$3 trillion chemical and materials industries, speeding the manufacture of their ground-breaking Hyaline film, as well as the commercialization of additional breakthrough products across electronics, agriculture, consumer care and healthcare.

Click [here](#) for more information.

Biocarbon plant for silicon supplier Elkem

Elkem has decided to invest in a new biocarbon pilot plant in Canada. The project aims to secure industrial verification of Elkem's technology for renewable biocarbon, with a long-term goal of contributing to climate-neutral metal production. The technology also has potential for application in other industry sectors, contributing to reduced CO₂ emissions.

The total investment for the pilot plant amounts to NOK 180 million. The project has received

financial support from the Canadian government, the Québec government and the city of Saguenay, reducing Elkem's net investment to NOK 60 million. The plant will be constructed near Elkem's production site in Chicoutimi, Quebec, Canada, with start of construction planned for the second half of 2020. Based on conclusions from the pilot, Elkem will evaluate the basis for a full-scale plant.

Click [here](#) for more information.

CO₂ and hydrogen as raw materials for sustainable chemicals



Pxfuel

Evonik and Siemens Energy have commissioned a pilot plant sponsored by the German Federal Ministry of Education and Research (BMBF) that uses carbon dioxide and water to produce chemicals.

The necessary energy is supplied by electricity from renewable sources. The pilot plant is located in Marl, in the northern Ruhr area, and its innovative technology of artificial photosynthesis should contribute to the success of the energy revolution. It is an essential part of the Rheticus I and II research projects, which are sponsored by the Federal Ministry of Education and Research (BMBF) with a total of €6.3 million.

For the idea of artificial photosynthesis, which is behind the Rheticus experimental facility, the researchers took nature as a model. Just as plants use solar energy to produce sugar, for example, from carbon dioxide (CO₂) and water in several steps, artificial photosynthesis uses renewable energies to produce valuable chemicals from CO₂ and water through electrolysis with the help of bacteria. This type of artificial photosynthesis can serve as an energy store and thus help to close the carbon cycle and reduce carbon dioxide pollution in the atmosphere.

Click [here](#) for more information.

New product launch for P2

P2 Science, Inc. has launched a brand new, unique, bioderived and patented alternative to volatile silicones, built on the Citropol platform. In a webinar attended by hundreds of formulators and brand marketing executives from around the world, P2 introduced Citropol V5 and shared some sensorial, physical and performance data. Citropol V5, like all members of the new Citropol platform, is made from wood and is also biodegradable and biocompatible.

Commercial manufacturing of the new product has already started at P2's green chemistry manufacturing facility in Naugatuck, Connecticut.

Click [here](#) for more information.

Consumer Products

Absolut Rolls Out 2,000 Paper Bottle Prototypes

The Absolut Company (TAC) says they are rolling out 2,000 paper bottle prototypes as part of the Paper Bottle Company initiative. The first production run goes into controlled testing this November, according to Absolut.

This latest prototype is constructed from 57% paper and 43% plastic, which is recyclable and itself made of 100% recycled content. The rollout is set to start in Sweden and the United Kingdom. Once the company receives initial feedback from consumers, they plan to launch a second pilot production run next spring.

Absolut Vodka and the sparkling pre-mixed drink line Absolut Mixt will be the first two products tested in the paper bottles, the company said.

Click [here](#) for more information.

New formulation for cleaning brand Persil

Persil, the fabric cleaning brand, has announced the launch of its new liquid formulation, the first Unilever UK & Ireland product to launch with the Clean Future vision. The new product is both tough on stains and kinder to our planet, thanks to changes made to both the packaging and formulation.

The bottles are now made with 50% post-consumer recycled plastic, are 100% recyclable

and the dosing ball previously provided with every bottle has now been removed, all of which reduce the amount of virgin plastic in Persil bottles by more than 1,000 tonnes annually.

The new liquid formulation is made with plant-based stain removers and biodegradable ingredients, which come from renewable or recycled sources. With the formula concentrated by 23%, the bottles are smaller allowing for approximately 19% less trucks on the road each year – both of which lower the carbon footprint of the product further.

Click [here](#) for more information.

Robot lawn mower accessory goes biobased



Pixabay

During the last year Grimsholm Products AB has been intensifying its efforts to expand its sustainable product offering. With more and more products being added to the range each year, Grimsholm realized that a clear focus on sustainability was essential for long-term success. Now the company is ready to launch its first bio-based and fully degradable garden accessory. To the regret of landscapers and kids looking to make a few bucks, robot lawnmowers have come to more or less dominate the modern garden. And while these silent robots run happily on electricity

and not two-stroke petrol engines, there is a dark secret lurking under the grass. When installing these robot mowers, plastic spikes are used to fasten the perimeter wire into the ground. As these spikes are buried underground, the likelihood of installers collecting them for recycling is minimal. It's this problem that Grimsholm has decided to tackle, launching a bio-based and fully degradable spike on the market.

Click [here](#) for more information.

Biobased refillable lipstick cases

The ambitious concept set up by Élodie Carpentier and husband Salem Ghezaili in 2018, continues to disrupt up the make-up industry. After having joined Obratori, L'Occitane's startup studio, and having raised €1 million to develop further, Le Rouge Français adds a bio-based, recyclable, refillable and ultra-transparent case to its collection of 100% natural and vegan lipstick formulas. The brand is now taking a new step forward by offering a luxurious transparent and refillable case for its lipsticks. Entirely made in an exclusive design from bio-sourced castor oil, the case is fully recyclable. However, it is nevertheless intended for a series multiple reuses, thanks to the brand's 15 botanical shades available in aluminium eco-refills that are easy to install and replace.

Click [here](#) for more information.

New sustainable fabric collection



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To meet a growing demand for sustainable fashion options, Eastman and DuPont Biomaterials have announced the launch of a fabric collection made with sustainable, biobased materials. The collaboration blends Naia from Eastman and DuPont Sorona fibers to create garments with exceptional stretch and recovery, luxurious drape and a smooth, soft hand feel. The new collection will expand the future of sustainable textiles for designers to use for comfortable everyday casual wear.

Click [here](#) for more information.

Unilever to eliminate fossil fuels in cleaning products by 2030

Unilever, a leading manufacturer of cleaning and laundry products, has announced it will source 100% of the carbon derived from fossil fuels in its cleaning and laundry product formulations with renewable or recycled carbon. This move is set to transform the sustainability of global cleaning and laundry brands including Omo (Persil), Sunlight, Cif and Domestos.

The chemicals used in Unilever's cleaning and laundry products make up the greatest proportion of their carbon footprint (46%) across their

lifecycle. Therefore, by transitioning away from fossil fuel-derived chemicals in product formulations, the company will unlock novel ways of reducing the carbon footprint of some of the world's biggest cleaning and laundry brands. Unilever expects this initiative alone to reduce the carbon footprint of the product formulations by up to 20%.

Patents

Peptide-containing antimicrobial coating compositions

The peptide-containing anti-microbial coating compositions can comprise an acrylic latex coating composition, an anti-microbial enzyme dispersed within the acrylic coating composition and an anti-microbial peptide dispersed within the acrylic coating composition. The anti-microbial enzyme and the anti-microbial peptide are jointly selected to synergistically enhance lysis efficacy of the coating composition in comparison to lysis efficacy of the coating composition with the anti-microbial enzyme alone. The acrylic coating can be an acrylic latex coating composition is an acrylic latex paint.

Click [here](#) for more information.

Fibrous water-soluble unit articles comprising water-soluble fibrous structures

This new patent describes a household care composition, which delivers active agents onto fabric, in the form of a fibrous water-soluble unit dose article comprising a water-soluble fibrous structure and one or more particles, as well as methods for making the same.

Click [here](#) for more information.

Events

Global Bioeconomy Summit *Online, 16th-20th November 2020*

The third Global Bioeconomy Summit #GBS2020 will take place virtually from 16 to 20 November 2020 with the support of the German government. Since the first summit in Berlin in 2015, the summits have established themselves as a unique format for global exchange on bioeconomy policy, governance and sustainable development.

Click [here](#) for more information.

PHA Platform World Congress Köln, 30th-31st March 2021

This PHA-platform is made up of a large variety of bioplastics raw materials made from many different renewable resources. Depending on the type of PHA, they can be used for applications in films and rigid packaging, biomedical applications, automotive, consumer electronics, appliances, toys, glues, adhesives, paints, coatings, fibers for

woven and non-woven and PHA products inks. So PHAs cover a broad range of properties and applications.

Click [here](#) for more information.

Plant Based Summit Reims, 2nd-4th April 2021

The focus of the PBS 2021 Conference is to stimulate biobased products development through a market driven approach. The conference program intends to demonstrate how a higher uptake of biobased solutions in everyday products will benefit to consumers and meet their expectations. The 2021 edition will focus on the biobased products' markets, and will keep a strong emphasis on the sector's innovations and challenges.

Click [here](#) for more information.

RRB 2021 Aveiro, 6th-8th September 2021

Delegates from university, industry, governmental and non-governmental organizations and venture capital providers will present their views on industrial biotechnology, sustainable chemistry and agricultural policy related to the use of renewable raw materials for non-food applications and energy supply. The conference further aims at providing an overview of the scientific, technical, economic, environmental and social issues of renewable resources and biorefineries in order to give an impetus to the biobased economy and to present new developments in this area.

Click [here](#) for more information.

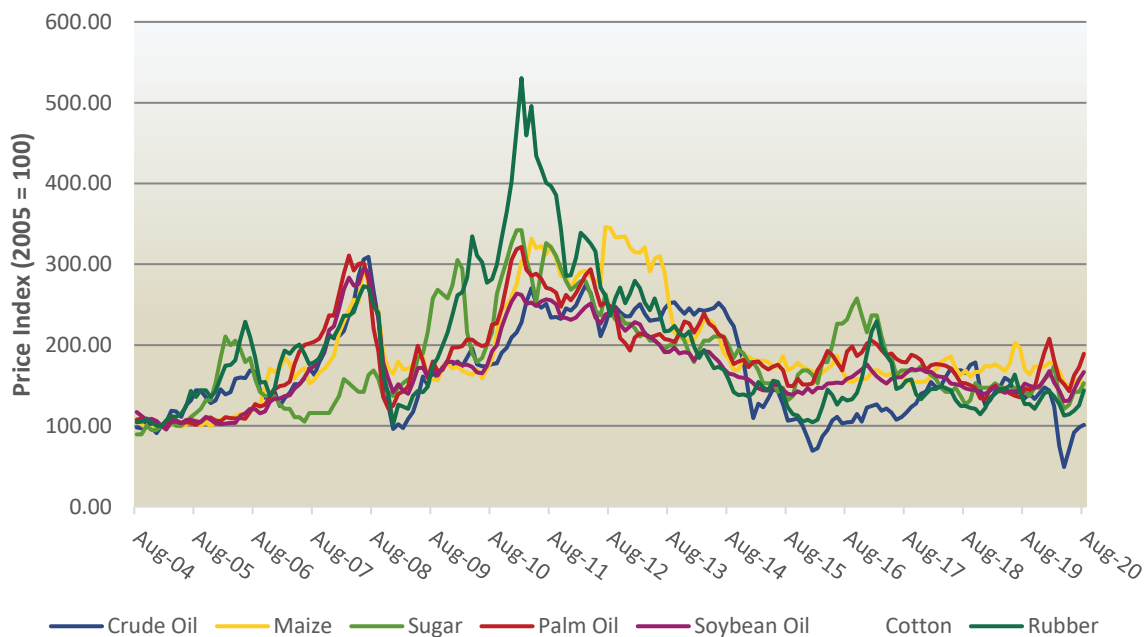
Price Information

Spot Prices of feedstocks as of today and five years ago, and percentile price change. Arrows indicate rise (↑), constant (–) or fall (↓) from previous month.

Item	Price, US\$ (Aug 20)	Price, US\$ (Aug 15)	Price Change
Crude oil (petroleum, barrel)	43.44 (↑)	45.96 (↓)	-5%
Maize (corn, metric ton)	143.71 (↓)	162.59 (↓)	-12%
Sugar (pound)	0.29 (↑)	0.25 (↓)	16%
Palm oil (metric ton)	760.3 (↑)	601.38 (↓)	26%
Soybean oil (metric ton)	866.94 (↑)	728.33 (↓)	19%
Cotton (kilogram)	1.54 (↑)	1.58 (↓)	-3%
Rubber (kilogram)	1.70 (↑)	1.45 (↓)	17%

For details on indexes please see www.indexmundi.com/commodities

Raw materials 16-year Price Indices



For details on the nature of these commodities please see www.indexmundi.com/commodities

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