

The Bioeconomy Consultants

NNFCC 



News Review

Issue Sixty-Eight

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



Contents

Contents.....	2
Foreword.....	3
Policy.....	4
Markets.....	5
Research & Development.....	5
Polymers	8
Chemicals	10
Consumer Products.....	11
Events.....	14
Price Information.....	19

Foreword

Welcome to 2017's penultimate Biobased Products News Review.

Where renewables concerned, this year has been a controversial one over in the USA, with the Trump administration not shy about their lack of support for climate change mitigation, and for renewables. As such, it perhaps comes as a surprise, but a welcome one nonetheless, that the US Senate has tabled legislation to award tax credits to those who produce biobased chemicals. The level of tax credit is 15 cents per pound of chemical produced, which is not insignificant. The definition used to determine qualification is "those produced in the U.S. from renewable biomass and used as or for the production of chemical products, polymers, plastics or formulated products."

Another promising sign has emerged from European Bioplastics' research, which has found that global bioplastic production would be able to more than quadruple in production whilst only doubling its current effect on land use. This is important, as land use continues to be one of the biggest stumbling blocks in getting the bioeconomy into general acceptance. It should, however, be noted that bioplastics accounts for less than 0.02% of global land use even after this doubling in land use, and so the problem is not a huge one for this particular industry, when compared to ones such as biofuels.

Meanwhile, in the "Products" section of this news review there appears to be a theme: glasses, with two stories regarding glasses frames. Fashion brand Esprit have announced a new line of glasses for which the frames are derived from castor oil, while Bio-On are in the process of developing biobased materials based on polyhydroxyalkanoates (PHAs) for manufacturers to use in frames. Both of these are positive stories, as they lend themselves to high publicity for biobased plastics, due to glasses being a commonly used product, but also a product that requires great durability and longevity, and the increased spread of biobased glasses frames could add weight to the evidence that biobased plastics are able to perform on a level with petroleum-based ones,

Lastly, we reported earlier in the year on chitin-based plastic packaging being developed from waste shrimp shells. This plastic had the curious additional property of absorbing oxygen, increasing the shelf-life of food that was packaged in it. This is not the only case of biobased products having curious additional properties: this month, paint company PPG have released a biobased paint, that they claim has an "air purifying" property. Apparently, the paint's resin absorbs formaldehydes from the air in a room, "enhancing the air climate". Although evidence suggests the formaldehyde levels emitted are not harmful, this may provide peace of mind to those who own furniture where formaldehyde is used in manufacture, as the chemical does emit from such items over time.

Read on for the latest news.

Policy

US to establish tax credit for biobased chemicals

US Senator Debbie Stabenow recently introduced legislation that aims to establish a short-term tax credit to support the production of renewable chemicals or investments in renewable chemical production facilities.

The bill would allow taxpayers to claim a production tax credit of 15 cents per pound of biobased content of each renewable chemical produced during the taxable year. Renewable chemicals are defined as those produced in the U.S. from renewable biomass and used as or for the production of chemical products, polymers, plastics or formulated products. Qualified chemicals must have a biobased content of at least 95 percent and be the product of biological conversion, thermal conversion or a combination of the two. Qualifying renewable chemicals cannot be sold or used for the production of any food, feed or fuel product.

The legislation also allows for taxpayers to claim an investment tax credit in lieu of the production tax credit. The production tax credit for any taxable year would be an amount equal to 30 percent of the basis of any eligible property that is a part of a renewable chemical production facility placed in service by the taxpayer during the taxable year.

Click [here](#) for more information.

EU parliament backs biodegradable mulch films

The Plenary of the European Parliament has voted in favour of supporting biodegradable mulch films in the revision of the EU Fertilizers Regulation. European Bioplastics (EUBP), the association for the bioplastics industry in Europe, welcomes the outcome.

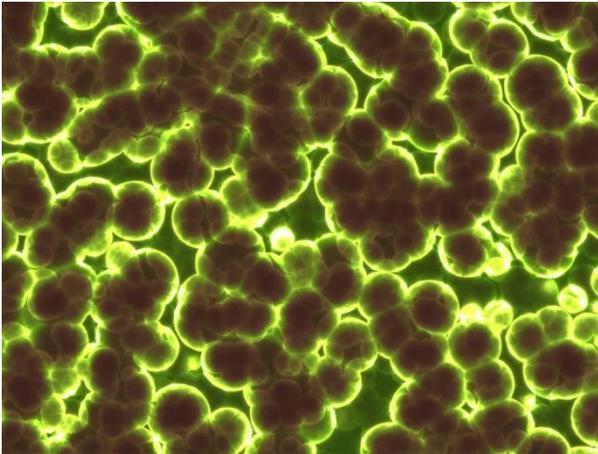
The amendments, which have already been approved by the Parliament's Committees on Internal Market and Consumer Protection (IMCO), on Agriculture and Rural Development (AGRI), and on the Environment, Public Health and Food Safety (ENVI) in July earlier this year, acknowledge the innovative potential of biodegradable mulch films to provide positive agronomical effects and to help avoid the accumulation of microplastics on fields. Biodegradable mulch films have been available on the EU market for many years, meeting a high level of acceptance among European farmers. They play an essential role in modern agriculture as help to increase yield, improve the quality of crops, enhance weed control, and reduce water irrigation and pesticides. Additionally, they offer distinctive advantages at the end of the crop cycle as they can be left on the field and ploughed under.

The approved amendments on biodegradable mulch films are linked to the criteria of the upcoming European standard CEN FprEN 17033 on biodegradation of plastic mulch films in soil developed by CEN-Technical Committee 249 on Plastics. The standard is expected to be published at the beginning of 2018.

Click [here](#) for more information.

Markets

Microbial fibre company begins trading



Pixabay

Nanollose Ltd, an innovative Plant-Free Cellulose technology company, has launched on the Australian stock exchange.

Nanollose plans to initially target the \$500 billion global textile industry as brands, retailers and manufacturers increasingly seek alternative and more environmentally sustainable materials. The Company plans to continue its development in fibre production over the next 8-12 months, whereby Nanollose will work towards a Plant-Free fibre that could become a more environmentally sustainable alternative to currently used fibres.

The current procurement of raw materials like cotton and wood to make fibres is highly resource intensive, and challenges continue to increase as crops like cotton require large amounts of water, land and pesticides. By contrast, Nanollose uses microbes that ferment biomass waste products from industries such as the food and beverage industries into cellulose fibres, in a process that requires very little land, water or energy.

Due to these significant issues with current fibre sources, Nanollose plans to initially target the

\$500 billion global textile industry as urgency from brands, retailers and manufacturers to seek and cultivate alternative fibre resources are increasing. The Nanollose technology also shows promise in other markets such as seed germination, medical products, personal hygiene and food. The Company has already developed a soil-less seed germinating technology that is intended to be launched in 2018.

Click [here](#) for more information.

Research & Development

Biobased succinate production from sucrose

Succinic acid is a platform chemical of recognized industrial value and accordingly faces a continuous challenge to enable manufacturing from the most attractive raw materials. It is mainly produced from glucose, using microbial fermentation. Here, the authors explore and optimize succinate production from sucrose, a globally applied substrate in biotechnology, using the rumen bacterium *Basfia succiniciproducens* DD1. As basis of the strain optimization, the yet unknown sucrose metabolism of the microbe was studied, using ¹³C metabolic flux analyses. When grown in batch culture on sucrose, the bacterium exhibited a high succinate yield of 1 mol mol⁻¹ and a by-product spectrum, which did not match the expected PTS-mediated sucrose catabolism. This led to the discovery of a fructokinase, involved in sucrose catabolism. The flux approach unravelled that the fructokinase and the fructose PTS both contribute to phosphorylation of the fructose part of sucrose. The contribution of the fructokinase reduces the undesired loss of the

succinate precursor PEP into pyruvate and into pyruvate-derived by-products and enables increased succinate production, exclusively via the reductive TCA cycle branch. These findings were used to design superior producers. Mutants, which (i) overexpress the beneficial fructokinase, (II) lack the competing fructose PTS, and (iii) combine both traits, produce significantly more succinate. In a fed-batch process, *B. succiniciproducens* Δ fruA achieved a titre of 71 g L⁻¹ succinate and a yield of 2.5 mol mol⁻¹ from sucrose.

Click [here](#) for more information.

Study investigates Asian attitudes to paper and packaging



Pixabay

What do consumers really want and expect from companies and brands when it comes to paper and packaging products? The Asia Pulp and Paper 2017 Paper & Packaging Consumer Trends Report explored just this to gain insight into consumers' thoughts and preferences when it comes to paper and packaging products. The research specifically looked at the importance of sustainability for paper, food packaging and delivery packaging, and how it influences consumer purchasing behaviour.

Click [here](#) for more information.

German research aims to boost bio-based procurement through cooperation

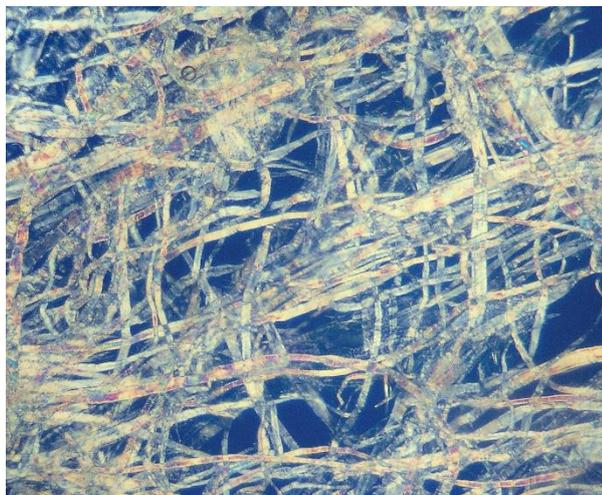
A new national research and communication project dealing with bio-based products in public procurement is being carried out by the University of Würzburg, Germany. The project's aim is to bring together and intensify information exchange between public contracting entities and vendors of bio-based products. As a result, more bio-based products should be purchased by public contracting entities so that the vendors will be put into a better market position. The intensified procuring of bio-based products by public contracting entities will give positive signals to private companies and consumers to do the same.

In order to bring together public contracting entities and vendors of bio-based products, scientifically sound knowledge of procurement- as well sales-related processes and issues is needed. Empirical studies are to be conducted periodically in order to analyse developments in time and the effects of measures taken during the project.

In the first empirical study more than 1000 public entities answered a questionnaire to determine their knowledge of procuring bio-based products. Based on the results a web-based communication platform that brings together public contracting entities and vendors of bio-based products was developed and implemented.

Click [here](#) for more information.

Obtaining biobased products from lignocellulosic biomass



Wikimedia Commons

Obtaining chemicals and materials in sustainable ways is of growing importance. A potential source of sustainable chemicals and materials is lignocellulosic biomass residues generated as waste from agriculture. Hemicellulose which is a large component in lignocellulosic biomass residues, provides many potential applications such as the generation of chemicals, packaging materials, drug delivery and biomedical applications. This review deals with the various techniques which can be used for the extraction of hemicellulose from biomass residues, purification and some potential applications of the extracted hemicellulose. The methods that have been used to further produce chemicals from extracted hemicellulose as well as their applications are discussed.

Click [here](#) for more information.

Review of possible options for biobased amine production

The production of amines from biomass is a growing field of interest. Particularly the amination of bio-based alcohols receives a lot of attention. This review discusses recent progress in the development of efficient heterogeneous catalysts. The substrate scope for the production of bio-based amines is not limited to (hemi)cellulosic alcohols. Other platform chemicals that originate from different biomass fractions, such as lignin, oils, chitin and protein, are also suitable feedstock for the production of amines. This comprehensive review first provides an overview of the available bio-based feedstock candidates. The following section is devoted to the sustainable reaction routes that are available to carry out the desired amination reactions. Next, state-of-the-art technologies are summarized for each substrate class, focussing on heterogeneous catalysis. Special attention is dedicated to the sustainability of the discussed reaction routes. Finally, a critical discussion is provided, together with current challenges and future perspectives regarding the industrial production of bio-based amine chemicals.

Click [here](#) for more information.

Paper analyses degradability of bioplastics

Future plastic materials will be very different from those that are used today. The increasing importance of sustainability promotes the development of bio-based and biodegradable polymers, sometimes misleadingly referred to as 'bioplastics'. Because both terms imply "green" sources and "clean" removal, this paper aims at critically discussing the sometimes-conflicting terminology as well as renewable sources with a special focus on the degradation of these polymers in natural environments. With regard to

the former, the authors of this report review innovations in feedstock development (e.g. microalgae and food wastes). In terms of the latter, they highlight the effects that polymer structure, additives, and environmental variables have on plastic biodegradability. They argue that the 'biodegradable' end-product does not necessarily degrade once emitted to the environment because chemical additives used to make them fit for purpose will increase the longevity. In the future, this trend may continue as the plastics industry also is expected to be a major user of nanocomposites. Overall, there is a need to assess the performance of polymer innovations in terms of their biodegradability especially under realistic waste management and environmental conditions, to avoid the unwanted release of plastic degradation products in receiving environments.

Click [here](#) for more information.

Project looks to develop "wood to food" value chain

The SYLFEED project brings together key industry and research players to assemble the new "wood to food" value chain.

Arbiom announced the launch of the SYLFEED project, which will demonstrate a new integrated "wood to food" value chain, providing both a sustainable solution to the global challenge of feed production and new economic development opportunities for biomass rich regions. Using Arbiom's biomass fractionation technology, poorly valorised local hardwood material will be converted into sustainable, protein rich material to be used in aquaculture feed. The €10.9M EU in funding from the European union BBI-JU will support the building of a demonstration plant that will be co-located with Norske Skog Golbey's pulp and paper site in the east of France.

As the European protein deficit is growing and presenting an increasing challenge (Europe is more than 70% dependent on imports for its animal feed proteins requirements), the SYLFEED project will demonstrate a novel "wood to food" solution to this challenge. The project will effectively convert non-food biomass into feed ingredients by growing protein rich microorganisms on pre-processed woody biomass. Already demonstrated by the SYLFEED partners at pilot scale, the SYLFEED project will allow for the improvement of the overall process and its operation in a 5kt/year capacity demonstration plant. Following a thorough evaluation, the SYLFEED project was selected by the Bio-Based Industries Joint Undertaking (BBI-JU) to receive 10.9M€ support, 8.5M€ of which being awarded to ARBIOM.

Click [here](#) for more information.

Polymers

Bioplastics production could more than treble and maintain low land-use

European Bioplastics figures show that bioplastic production is set to grow by 350% by 2019 to reach 7.8m tonnes per annum of biodegradable and biobased non-biodegradable bioplastics, with the latter dominating production.

Production capacities are growing fastest outside Europe, with significant global production capacity locating in Asia which will come to dominate global production (anticipate 81% of global production capacity by 2019).

Bioplastics currently account for production on 0.68mha compared to 53mha for biofuels and 106mha for conventional non-food use (e.g. natural fibres). Use for bioplastics currently

accounts for around 0.01% of the global arable area, a figure that at best might double to 0.02% by 2019. Increasing yields of agricultural production and process fermentation yields could temper the impacts of increasing demand on land use for bioplastics.

Click [here](#) for more information.

Bio-On announces new plant for producing biobased PHAs



Bio-On

Bio-on, listed on the AIM segment of Borsa Italiana and a leading player in the new eco-sustainable chemical industry, has announced the start of the construction of a new plant that will produce special PHAs biopolymers, 100% natural and biodegradable, for advanced and fast-growing niche markets, particularly the cosmetics sector.

The new plant, which will be located in Castel San Pietro Terme near Bologna over an area of 30,000 m², 3,700 of which is covered and 6,000 is land for development. When it becomes operational, in the first half of 2018, it will have a production capacity of 1,000 tons per year, rapidly expandable to 2,000. The plant will be equipped with the very latest technologies and the most advanced research and development laboratories. New carbon sources from agricultural waste will be continuously tested to produce new types of biodegradable bioplastic and increase the range of technologies offered by Bio-on. Over the next few weeks, the company will begin to recruit the

40 people who will work at the new facility. The company confirms its 15 million Euro investment and today announces a further 5 million will be invested to boost its research and development laboratories. This decision brings the total investment for the production hub to 20 million Euro.

The revolutionary PHAs bioplastics (polyhydroxyalkanoates) developed by Bio-on are made from renewable plant sources with no competition with food supply chains. They guarantee the same thermo-mechanical properties as conventional plastics with the advantage of being 100% eco-sustainable and naturally biodegradable. The direct presence of Bio-on in the high-performing biopolymer production sector is an important milestone in creating a global platform for 100% natural and biodegradable bioplastic production of the future.

Click [here](#) for more information.

UPM Raflatac launches biobased polyethylene films

UPM Raflatac is extending its range of film face materials for the European market with a new plant-based material that provides a sustainable alternative to fossil-based films for a wide variety of end uses. RafBio PE performs just like standard PE film, and its excellent flexibility makes it ideal for the squeezable bottles and contoured containers that are widely used in home and personal care applications.

Part of the RafBio family of bio-based labelling solutions, RafBio PE is the ideal choice for customers who are looking for a sustainable film face material that will reduce greenhouse gas emissions during its life cycle, compared to conventional PE, while still keeping products looking their very best. Made from sugarcane ethanol, the film contains more than 80% renewable plant-based raw material and is

recyclable within the same recycling streams as fossil-based PE.

RafBio PE is combined with our RP37 adhesive for multi-purpose labelling applications. Furthermore, UPM Raflatac's RafCycle programme offers significant benefits to label printers and end users by turning waste into valuable resources.

Click [here](#) for more information.



Wikimedia Commons

Novel method for biobased FDCA polyester production

In this study, the authors propose a novel strategy for the preparation of furandicarboxylic acid (FDCA) based polyesters through the melt polycondensation of asymmetric monomers with terminal methyl ester and hydroxyl groups. A series of bio-based polyesters were prepared from dimethyl 2,5-furandicarboxylate and diols containing long alkyl chains. In this strategy, volatile methanol rather than diols with high boiling points was removed as a by-product. The effects of the catalyst concentration, reaction temperature and reaction time on the molecular weight and PDI were investigated. Polyesters with high molecular weights and without coloration were obtained at a lower polycondensation temperature and in less time in comparison with previous methods. The thermal and mechanical properties of the as-prepared polyesters were

investigated by DSC, TGA, DMA and tensile testing. The results revealed that the thermal and mechanical properties of the polyesters including T_m , T_c , T_g , Young's modulus, tensile strength and elongation at break, not only depended on the number of methylene groups but also were related to the odd-even effect.

Click [here](#) for more information.

Chemicals

Dupont, Tate & Lyle's biobased propanediol used in food refrigeration

Bio-based, sustainable heat transfer fluids using DuPont Tate & Lyle Susterra® propanediol reduces energy consumption and environmental impact at the Danone Blédina, Brive site, the leading food manufacturer's largest factory for infant foods in Europe. Climalife, Europe's specialist in cooling fluids and refrigeration uses Susterra® propanediol as the primary ingredient in their range of Greenway® Neo heat-transfer fluids, which is helping Danone reduce its carbon footprint.

A key aspect of Climalife's heat transfer fluid that played a significant role in its selection was its performance. Greenway® Neo fluid's low viscosity profile allowed the site to opt for smaller KSB pumps, enabling significant energy savings.

Greenway® Neo heat transfer fluid also adds to the energy savings by enabling smaller pumps and contributes to the carbon-free story. Susterra® propanediol, the glycol used, is manufactured through a proprietary process that uses glucose from natural raw materials instead of petroleum-based feedstocks. The basic materials can be derived from renewable, farm-grown sources including corn — making the promise of

carbon neutrality and independence from petroleum a real possibility. From "cradle-to-gate," the production of DuPont Tate & Lyle Bio Products' bio-based 1,3-propanediol consumes 40 percent less energy and reduces greenhouse gas emissions by more than 40 percent versus petroleum-based 1,3-propanediol and propylene glycol.

Click [here](#) for more information.

Genomatica seeks to market own biobased butylene glycol



Genomatica

Genomatica was declared the winner of the 2017 ICIS Innovation Award in the Small and Medium Enterprise (SME) category. Genomatica won for its new GENO BG process technology to make naturally sourced 1,3-butylene glycol. An article by ICIS Chemical Business shares details on the ICIS award selection process, Genomatica's technology, and potential market impact. The award recognizes innovation in products and processes with better use of energy and raw materials, improved economics, safer performance, and lower environmental impact. Genomatica also disclosed they will market their biobased butylene glycol directly, as a branded ingredient to the cosmetics industry. Genomatica's selection of this strategy for biobased butylene glycol is anchored and based on the market characteristics and potential for this specialty chemical; this complements its licensing-focused approach for intermediates such as bio-1,4-butanediol and polyamides. Genomatica will also consider working with partners to address specific markets for its biobased butylene glycol.

Genomatica will highlight the natural, sustainable and high-performance attributes of its biobased butylene glycol. Additional details, including the brand name, will be disclosed at a later date. A product sample of Genomatica's naturally sourced butylene glycol. Genomatica has been providing samples of its biobased butylene glycol since mid-2017 and has already received commercial product purchase orders. Genomatica continues to produce tons of product in large-scale 85,000 litre production fermenters at EW Biotech in Germany.

Click [here](#) for more information.

Consumer Products

PPG biobased paint has air-purifying effect

Global paint maker PPG launches a new bio-based wall paint for the professional and consumer market: Sigma Air Pure. The new paint is based on DSM's revolutionary Decovery® bio-based technology.

Sigma Air Pure is a bio-based wall paint with an air purification effect. The paint enhances the indoor air climate of homes, offices and schools by removing up to 70% of the harmful formaldehyde from the indoor air. The paint filters the formaldehyde molecules out of the indoor air and neutralizes them.

The resin is one of the key components that determine the characteristics of a paint. By using the Decovery resin technology platform DSM and PPG developed a resin which met the specific needs that PPG had envisioned for Sigma Air Pure.

With the Decovery bio-based resin technology platform, DSM enables paint manufacturers to develop high performance sustainable paints. By using a variety of renewable ingredients, DSM can tailor each solution to specific customer and market needs. With Sigma Air Pure paint, the professional - and consumer market embraces renewable bio-based resins for indoor paints.

The Decovery resins are made from renewable resources such as sugars, natural oils, and starch from corn and agricultural waste. These natural materials replace for a large part the fossil ingredients that traditionally constitute the binder resin of both solventborne and waterborne paints. DSM's Decovery platform offers sustainable alternatives for conventional paint resins without compromising on quality and performance. In addition, since Decovery resins are low in VOCs* and use innocuous ingredients, paint made with such resins provide a safer and healthier environment.

Click [here](#) for more information.



PPG

Esprit releases biobased glasses frames



Free Stock Photos

Esprit's new eco-friendly optical collection is made of bio-based plastic material, resulting in lightweight, flexible and durable frames.

The key ingredient of the frames is castor oil, which is extracted from the beans of the highly environmentally-friendly castor oil plant: It absorbs carbon dioxide; grows on poor soil in Mediterranean and tropical regions; and doesn't compete for land with food crops.

Click [here](#) for more information.

DuPont and Unifi to create biobased clothes insulation

DuPont Industrial Biosciences has announced a collaboration with Unifi, Inc. to create high-performance, renewably sourced garment insulation, offering leading apparel brands a new sustainable choice for cold-weather products. This partnership brings together two leaders in the materials space with unique product offerings, combining DuPont™ Sorona® polymer and Unifi REPREVE® to produce cold-weather apparel insulation that is uniquely soft and extremely durable, with excellent shape retention.

DuPont™ Sorona® is made from 37 percent renewable plant-based ingredients, using 30 percent less energy with 63 percent fewer greenhouse gas (GHG) emissions as compared to Nylon 6. The exceptional softness, inherent stain resistance and uncompromising durability of Sorona® offers customers in a wide range of

industries a more sustainable, high-performance materials option. The polymer has been used in everything from carpeting to Indian sarees.

REPREVE® is a high-quality fibre containing recycled materials, including plastic water bottles. Unifi's proprietary process turns plastic bottles into certified fibre, which is then used in thousands of different fabrics and products available globally.

Unifi has a 45-year heritage as a textile solution provider driven by manufacturing innovation and creating differentiation for its customers. The company continues to build on its success by expanding its offering of branded recycled performance fibres that provide functional benefits, added comfort and aesthetic advantages. Unifi spent more than three years developing REPREVE with quality and performance as the primary goal – and recycled as the added benefit.

Click [here](#) for more information.

Natureworks develops biobased absorbent fibres

NatureWorks announces the development of a durable hydrophilic formulation that can promote skin health through improved fluid management and increased breathability for absorbent hygiene applications such as diapers, adult incontinence, and feminine hygiene products. In diapers, the combination of custom surface treatments with Ingeo-based nonwoven fabric for the topsheet can reduce the use of super absorbent polymer (SAP) or pulp by up to 30 percent for thinner, more comfortable, and cost-effective products.

With this durable hydrophilic technology, Ingeo nonwovens surpass polypropylene in key measures of fluid management. The passage of fluid through the new Ingeo nonwoven system is faster and more sustained as measured by both strike-through and run-off. These nonwovens

resist re-wet two times better than polypropylene. Significantly less surface finish is needed on the fabric compared to polypropylene, which decreases the potential for skin irritation. Durability in the new formulation is also higher compared to polypropylene as less surface finish is washed off and surface tension remains high.

The hydrophilic formulation delivers improved aging characteristics that prolong hygiene product shelf life. Additionally, melt spinning and calendering optimization studies showed that a range of fabric improvements are possible to improve softness, tensile strength, and elongation in Ingeo nonwovens.

Click [here](#) for more information.

Bio-On to develop biobased materials for glasses

Bio-on, listed in the AIM segment of the Borsa Italiana, announced a partnership with Kering Eyewear to develop new materials based on Minerv PHAs, the revolutionary bioplastic which is 100% natural and biodegradable.

Kering Eyewear's aim is to make an active contribution to the development of an innovative and sustainable business model, providing its team of designers with a series of cutting-edge materials to broaden their creative possibilities, setting new trends in the luxury and sport & lifestyle segments. Researchers from the two companies will collaborate to design, certify and put on the market new eco-sustainable materials to be integrated with the use of cellulose acetate, one of the most common materials used in the majority of the eyewear products on the market to date. All PHAs bioplastics (polyhydroxyalkanoates) developed by Bio-on are made from renewable plant sources with no competition with food supply chains. They guarantee the same thermo-mechanical properties as conventional plastics

with the advantage of being 100% eco-sustainable and naturally biodegradable.

Click [here](#) for more information.

Bike tyres from dandelion rubber



Max Pixel

Apollo Vredestein showcased a prototype of its Vredestein Fortezza Flower Power at the Eurobike exhibition in Friedrichshafen, Germany. This innovative road tyre is made of rubber extracted from the roots of dandelions, the result of a joint initiative with Wageningen University and Research (WUR) called DRIVE4EU, co-financed by the European Union. Vredestein's involvement illustrates the importance that the company attaches to sustainability and innovation.

This unique product is the first bicycle tyre in the world produced with natural rubber extracted from the roots of the Russian dandelion (*Taraxacum kok-saghyz* or TKS). This is why it was named Flower Power (Fortezza is the successful line of Vredestein road bicycle tyres). This particular series of prototype tyres are made with rubber extracted from flowers grown and harvested in the Netherlands.

Apollo Vredestein has worked closely together with WUR to develop this special natural rubber, make production viable and test various compounds. Each improvement in the process of rubber extraction has also led to a direct

enhancement of the quality of the rubber. As a result, the special compound now used as a test on the Fortezza Flower Power prototype provides better grip than traditional compounds. This is directly related to the higher concentration of natural resin in this particular variant of natural rubber. Studies are currently exploring whether this tyre can be mass produced in the future.

Click [here](#) for more information.

Events

European Biosolids & Organic Resources Conference Leeds, 20th - 21st November

Now in its third decade this event provides practitioners with an annual update on legislative changes; new technologies; best practice and site-experiences with existing technologies and an insight into relevant research in the science and engineering of biosolids and organic resources. The conference is attended by recognised experts from around the world both, as speakers and delegates.

The programme covers the latest innovations and updates of existing technologies. Presentations from respected industry experts and newcomers follow the development of technologies and legislation from inception to full-scale installations.

Click [here](#) for more information.

European Bioplastics Conference Berlin, 28th - 29th November

Today, there is a bioplastic alternative to almost every conventional plastic material and corresponding application. While offering the same qualities and functionalities as their conventional counterparts, bioplastics strive to be even better by providing innovative solutions with improved properties and performances as well as the unique ability to reduce emissions and our dependency on fossil resources. The 12th edition of the annual European Bioplastics Conference will showcase just how biopolymers are Making the Difference in driving innovations forward for more sustainability, resource efficiency, and functionality.

Every year the European Bioplastics Conference features a well-researched conference programme and impressive speaker line-up attracting more than 300 senior bioplastics decision makers from across the bioplastics value chain, policy bodies, NGOs, and brand owners.

Click [here](#) for more information.

Biocomposites Conference Köln, 6th - 7th December 2017

The wide range of successful new technologies and applications of biocomposites in consumer goods, automotive industries and construction will be presented at the Biocomposites Conference Cologne, 6-7 December 2017 in Cologne, Germany. It represents the wide spectrum of innovative applications and material choices of WPC and NFC.

Click [here](#) for more information.

BBI JU Stakeholder Forum Brussels, 7th December 2017

The inaugural Stakeholder Forum is a one-day public event dedicated to engaging directly in dialogue with BBI JU's stakeholders. Save the date and make sure you are part of the day. The event will include plenary keynote speeches, high-level discussions with expert panels, thematic breakout sessions, with plenty of networking possibilities.

You can also find out about our work through meeting all 65 of our ongoing projects who will be presenting their work in the permanent exhibition, accessible throughout the event.

The agenda includes opening and closing keynote speeches from champions of the bio-based economy. In the plenary sessions key contributors will present their views on defining the roadmap for a bio-based Europe, the strategic context of the BBI initiative & achievements, lessons learned & sector development and rapporteur feedback.

Click [here](#) for more information.

Bioeconomy Investment Summit Helsinki, 14th-15th December 2017

Join us on 14-15 December 2017 in Helsinki, Finland for the 2017 Bioeconomy Investment Summit.

Over 30 speakers from across the globe will share their views on how we can bring together the economy and the environment.

New advances in technology mean that everything that can be made out of oil can be made from renewable, biological resources. There are huge environmental and business opportunities for a wide range of industries: construction, chemicals, textiles, energy, plastics.

The bioeconomy gives us a unique opportunity for building a sustainable future. Our speakers will focus on what investment steps we need to take to make it happen.

Click [here](#) for more information.

CLIB International Conference Düsseldorf, 17th-18th January 2018

Since 2010, the CLIB International Conference is the meeting place for the industrial biotechnology community. Being the first symposium of the year, it brings together international experts from all over the world in Düsseldorf, Germany. The conference

discusses technical, commercial and political implications of novel value chains based on innovative biotechnological processes and alternative feedstocks.

Click [here](#) for more information.

IBioIC's 4th Annual Conference Glasgow, 25th-26th January 2018

Now in its fourth year, IBioIC's annual conference has established itself as the 'go to' event for the biotech industry in Scotland. This two-day event attracted over 400 biobased professionals, academics and students from across the UK and Europe in 2017, and 2018's event is set to be even bigger.

The conference will celebrate the success of the biotechnology industry in Scotland to date, look ahead to the future and the challenges still to be overcome, and provide delegates with the networking opportunities needed to drive new collaborations.

Click [here](#) for more information.

ECO-BIO 2018 4th-7th March 2017

ECO-BIO 2018 will highlight the latest research and innovation towards developing industrially viable, safe and ecologically friendly biobased solutions to build a sustainable society.

A topical and comprehensive programme will include plenary and invited speakers, forum discussions, contributed oral presentations, a large poster session and exhibition.

The conference will bring together all concerned with the biobased economy to review industrial, academic, environment and societal approaches, discuss the latest research and progress, and encourage new research partnerships to enable new cascaded biobased value chains.

Click [here](#) for more information.

World Bio Markets Amsterdam, 20th-22nd March 2018

With governments committed to reducing emissions and consumers becoming more educated about where their products come from, there are opportunities for the bio-based sector to become a true contender to fossil oil. Yet long development times, lack of investment, and challenges in attaining a secure and sustainable supply chain have made it difficult for the bio-economy to achieve commercial success.

This event provides a platform for the entire global value chain, from feedstock producers to consumer brands, to work together to overcome these challenges.

Click [here](#) for more information.

Global Bioeconomy Summit 2018

The first Global Bioeconomy Summit was held in 2015 and brought together more than 700 bioeconomy stakeholders from over 80 countries. Since then, Bioeconomy has taken a steep and exciting way forward. Many notable initiatives and collaborative efforts have been initiated by the bioeconomy community in order to drive the development of sustainable bioeconomies in their countries and regions.

We are pleased that with support of the German Ministry of Education and Research, the GBS2018 will take place in Berlin on April 19 - 20, 2018.

The 2nd GBS will focus on emerging concepts and future trends in bioeconomy, the latest on challenges and opportunities related to ecosystems, climate action and sustainable development along with the bioeconomy innovation agendas and global governance initiatives to manage them.

Click [here](#) for more information.

EUBCE

Copenhagen, 14th-18th May 2018

We look forward to the 26th EUBCE in 2018 in Denmark and to the many vibrant topics that will be included in the agenda. The core of the traditional EUBCE conference will be held over 4 days.

There will however be an extension to the core conference and exhibition in order to showcase the many achievements in the field of full scale biomass utilisation in Denmark that are an integral and major part of the country becoming fossil-free by 2050. Members of the national organising committee will organise special technical visits to sites in the centre of the country where biomass is the key renewable feedstock into processes producing renewable energy, biofuels, biochemicals and biomaterials as well as integrating bioproducts into traditional established fossil-based systems.

Click [here](#) for more information.

RRB 14

Ghent, 30th May - 1st June 2018

The 14th edition of the International Conference on Renewable Resources & Biorefineries will take place in Ghent, Belgium from Wednesday 30 May until Friday 1 June 2018. Based on the previous RRB conferences, this conference is expected to welcome about 350 international participants from over 30 countries.

Delegates from university, industry, governmental and non-governmental organizations and venture capital providers will present their views on industrial biotechnology, sustainable (green) 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.

The conference will provide a forum for leading political, corporate, academic and financial people to discuss recent developments and set up collaborations.

The three-day international conference will consist of plenary lectures, oral presentations, poster sessions and an exhibition. Companies and research organizations are offered the opportunity to organize a satellite symposium.

Click [here](#) for more information.

1st PHA Platform World Congress Köln, 4th-5th September 2018

Bioplastics MAGAZINE and Jan Ravenstijn are now organizing the 1st PHA-platform World Congress on 4-5 September 2018 in Cologne, Germany.

This congress will address the progress, challenges and market opportunities for the formation of this new polymer platform in the world. Every step in the value chain will be addressed. Raw materials, polymer manufacturing, compounding, polymer processing, applications, opportunities and after-use or end-of-life options will be discussed by parties active in each of these areas. Progress in underlying technology challenges will also be addressed.

When there is sufficient interest there will be a workshop on the basics of the PHA-platform in the afternoon of September 3rd, preceding the conference.

Click [here](#) for more information.

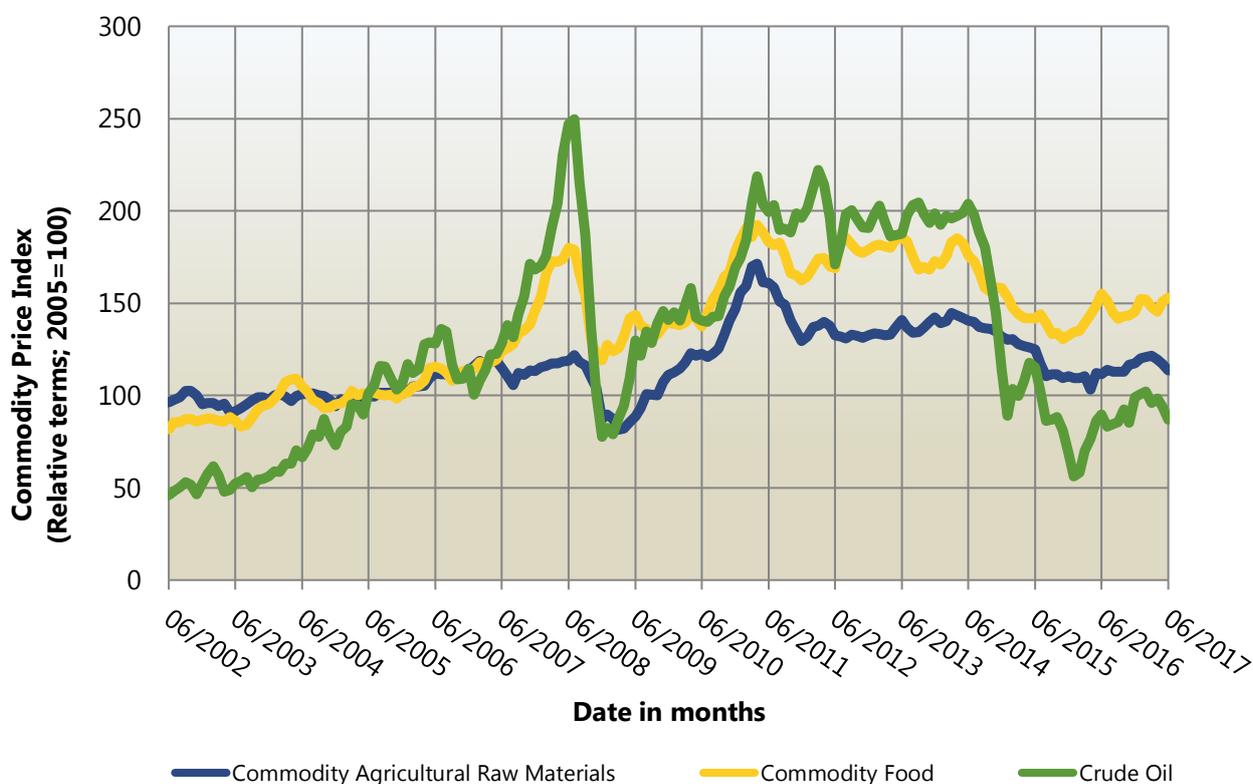
Price Information

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\$ (Jun 12)	Price, US\$ (Jun 17)	Price Change
Crude oil (petroleum, barrel)	105.28 (↑)	46.13 (↓)	-56
Maize (corn, metric ton)	332.17 (↑)	157.96 (↓)	-52
Sugar (pound)	0.2056 (↑)	0.1375 (↓)	-33
Rapeseed oil (metric ton)	1,221.67 (↑)	830.44 (↓)	-32
Soybean oil (metric ton)	1,188.51 (↑)	704.83 (↓)	-41
Ethanol (gallon)	2.72 (↑)	1.6 (↓)	-41

For details on indexes please see www.indexmundi.com/commodities; Ethanol prices from Govt of Nebraska at www.neo.ne.gov/

Raw materials 15-year Price Indices



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

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