

The Bioeconomy Consultants



## News Review

Issue Sixty-Six

September 2017

**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 to August's Biobased Products News Review.

Spain is the world's largest exporter of oranges, and itself has a large orange juice industry. This naturally creates a large amount of waste peel – waste that (being organic) can already be processed in many different ways, such as fed into anaerobic digestion to produce biogas for energy. However, the MIPLASCOE project is aiming to do something a little different: by fermenting the orange peel they aim to produce ester monomers that can then be polymerised into polyester plastics. The intention is that these plastics will be blow-moulded into bottles for the orange juice, thus reducing the petroleum input into the industry and producing more sustainable packaging. This is a significant improvement on sending the waste to landfill, which is current procedure, although some is compressed and used as animal feed.

This month also sees plenty of news from the biobased chemicals sector, particularly where solvents are concerned. The task of finding a biobased alternative to most solvents is more complicated than a simple "like for like" process: one has to find a chemical with similar properties, and equal or better performance. Solvents are becoming a fertile area for manufacturers to develop, with many established solvents under investigation for being too dangerous for use, and biobased alternatives have been shown to be less dangerous. One such example is the recently launched Cyrene solvent from Circa Group, designed to be a biobased and non-toxic alternative to solvents such as NMP, DCM, and DMF, also having unique properties such as viscosity and surface tension, as well as being dipolar, as opposed to the monopolar solvents it intends to replace.

As with any chemicals manufactured in the EU, they must conform to the strict REACH regulations. This is seen by many SMEs as a barrier to their chemistry developments, as they often lack the information on obtaining exemptions to the regulations, and what their responsibilities as manufacturers and developers are. The Dutch National Institute for Public Health and the Environment has investigated how this can be ameliorated, by providing clarification in the above issues, but they also believe that REACH should cater more to biobased chemicals by applying more consideration for feedstock, rather than the current "a chemical is a chemical" approach. When taking a naturally occurring and safe chemical and making a benign change, this is not going to produce something dangerous, and yet under current ruling the full REACH process must be undergone, serving as a source of frustration for biobased chemical manufacturers.

Read on for the latest news.

# Policy

## Dutch RIVM investigates bioeconomy's relationship with REACH regulation



*Kingdom of the Netherlands*

The Dutch National Institute for Public Health and the Environment (RIVM) recently investigated how the bio-based economy, more specifically the bio-based chemistry sector, relates to the EU REACH Regulation on chemicals. From this investigation, RIVM learnt that REACH may actually be an opportunity rather than the administrative hurdle that it is often perceived to be. To conduct their analysis, RIVM provided an overview of the daily practice issues encountered by bio-based companies with respect to their roles and obligations under REACH. The majority of questions submitted focused on registration and exemption opportunities. It is well known that smaller companies, in particular, perceive REACH as a hurdle and often do not have enough knowledge about the consequences that this legislation can have on their own business situation. For aspects like the scope and applicability of REACH exemptions, what is most important is that better clarifications are provided which give companies insight into their duties and show what possibilities there are for them to use

exemption clauses. The more complex issues, such as those concerning substance identity and resource recovery from waste, require attention from policy makers. Details about the borderlines between waste, which is covered by specific legislation, and the substances and products which fall under the remit of REACH, need to be more clearly elaborated. From a legal and safety perspective it is useful, and understandable, that 'a chemical is a chemical' under the REACH regulation, irrespective of the source feedstock. However, from a practical point of view, it is noted that some registration exemptions may be specifically applicable to bio-based manufacturers. This means that if certain conditions are met, the REACH registration obligations will be less of a burden to some of the bio-based manufacturers. REACH also offers all bio-based manufacturers the opportunity to develop safe bio-based alternatives to substances which are currently of very high concern.

Click [here](#) for more information.

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## Identifying barriers to SMEs entering the bioeconomy

There is increasing interest in the development of a bio-based economy in Europe with decreased profitability and sustainability of materials as driving forces. This research is a study of SMEs in South-East Finland. The objective of this paper is to analyse the main factors challenging new SME companies to find or develop new business opportunities in the bio-based economy. As Finland has a well-established forest industry in the midst of structural change, the results of this study are likely to be implemented in other countries and innovation environments as well. The study consisted of a Webpropol-based enquiry sent to South-East Finland SMEs active in the bio-economy and of the analysis of their answers obtained from 66 companies. The

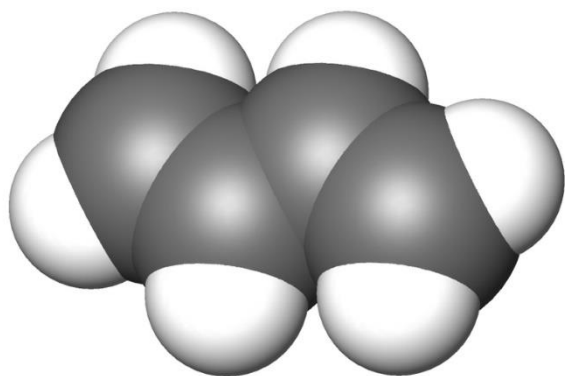
important role of SMEs as creating new sustainable businesses and jobs has been identified. The results show that key factors influencing the successfulness of SME companies are: Customer value-added, collaboration in R&D and supply chain. Knowledge of markets, products and processes are very important for SMEs entering into the new bio-based market, either as actors within the value chain, or as suppliers of raw materials or intermediary products to larger companies.

Click [here](#) for more information.

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## Markets

### Transparency Market Research Bio-Based Butadiene outlook



*Wikimedia Commons*

The global synthetic and bio-based butadiene market is prophesied to gain momentum from the common usage of butadiene as a monomer in the manufacture of several chemicals. One of the prominent usages of the key petrochemical product could be the manufacture of polymers such as synthetic rubbers, resins, and plastics. In multiple industrial applications, a vital butadiene isomer, 1, 3-butadiene could showcase an enormous scope. In the current scenario, bio-

based butadiene is engaged as a means to curb the worldwide reliance on fossil fuels. Consequently, there could be a whole lot of room for success in the market for the coming years.

Between 2015 and 2023, the global synthetic and bio-based butadiene market could rise a 4.9% CAGR on the revenue front. By the end of 2023, the market is prognosticated to achieve a valuation of nearly US\$23.44 bn. In 2016, the market had attained a valuation of around US\$16.66 bn.

Click [here](#) for more information.

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### Macquarie completes UK Green Investment Bank acquisition

New owner Macquarie has committed to the GIB's target of leading £3 billion of investment in green energy projects over next 3 years.

The Climate Change and Industry Minister, Claire Perry, confirmed on 18th August 2017 that the sale of the Green Investment Bank (GIB) to Macquarie Group Limited had been completed.

The £2.3 billion deal ensures that all the taxpayer funding invested in GIB since its creation, including set-up costs, has been returned with a gain of approximately £186 million.

As well as fully meeting the government's objectives, the deal secures the future of the GIB with an ambitious new owner committed to growing the business. The Edinburgh office will be home to a new revenue-generating business as well as providing services to the green energy portfolios of both Macquarie and GIB in the UK.

The government decided that moving it into the private sector now would free it from the constraints of public sector ownership allowing it to increase investment in the UK's green infrastructure as it transitions to a green economy.

GIB's independent Board supported the government's decision to sell the business to Macquarie.

In order to build on the company's success within the private sector, Macquarie and GIB have announced that the company will now be known as the Green Investment Group (GIG) so that it will be able to make overseas investments.

Click [here](#) for more information.

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## Research & Development

### **Intelligently choosing safer biobased solvents**

With the increasing restriction and control of hazardous solvents, safer alternatives need to be identified. Here a contemporary approach to solvent selection and substitution is presented that offers a more scientific alternative to the simple "like-for-like" exchange. A new family of levoglucosenone-derived compounds is proposed, modelled to determine their solvent properties, synthesized, and tested. These new molecules show promise as replacements for polar aprotic solvents that have chronic toxicity issues, such as dichloromethane, nitrobenzene, and N-methylpyrrolidinone. The success of this approach makes it possible for academia and industry to make calculated, intelligent choices for solvent substitution in the future.

Click [here](#) for more information.

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### **Kraig Biocraft to continue developing spider silk materials for the US Army**



*Max Pixel*

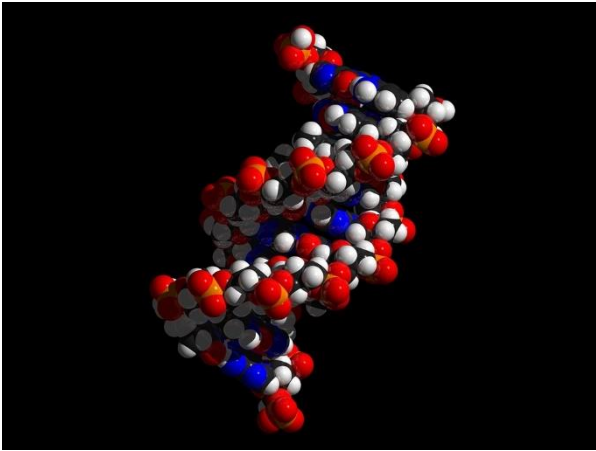
Kraig Biocraft Laboratories, Inc., the leading developer of spider silk based fibres, has announced that the U.S. Army awarded the optional phase of its contract with the Company valued at more than \$900,000. Under this exercised option, the Company will work to design, produce, and deliver additional recombinant spider silk materials tailored for the protective needs of Soldiers. With this additional award the total contract is now valued at more than \$1.0 million.

This additional work on the contract is scheduled to last roughly 12 months and is the Company's second US Department of Defence award.

Click [here](#) for more information.

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## Twist partners with Synbio for DNA synthesis



*Pixabay*

Twist Bioscience, a company accelerating science and innovation through rapid, high-quality DNA synthesis, announced that it signed a non-exclusive agreement with Synbio Technologies. The companies will partner their respective capabilities to provide customers with access to long-length genes up to 70 kilobases.

Under the terms of the agreement, Twist Bioscience will manufacture synthetic DNA up to 3.2 kilobases in length to Synbio Technologies, who will then create genes up to 70 kilobases in length. Financial terms of the agreement were not disclosed.

Click [here](#) for more information.

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## New partnership aims to produce enzymes at industrial scale

Ginkgo Bioworks, the organism company, and Swissaustral, a leader in the development of novel enzymatic products and processes from extremophiles, announced a new partnership to design strains of microorganisms that will produce industrial enzymes at scale. These enzymes will be used as a safe, low-energy replacement for traditional chemical reaction processes in industries such as pharmaceuticals, textiles, foods and household goods.

Swissaustral brings deep expertise in identifying enzymes from microbes that live in extreme environments, such as high or low temperatures, pH levels and salt concentrations, also called extremophilic enzymes, which are traditionally difficult to work with at industrial scale. Ginkgo's platform for automated organism engineering enables rapid design of industrial microbes that effectively produce enzymes. In partnership with Swissaustral, Ginkgo's organism engineers will use its in-house foundries to improve the production of extremophilic enzymes for industrial applications.

Enzymes – the biological machines that power living cells – can be used to perform high temperature synthesis of pharmaceuticals or active ingredients, alkaline fibre modifications and low-temperature, energy-saving break down of protein or fat stains, among other everyday applications. For example, one of Swissaustral's enzymes, Catalase, breaks down hydrogen peroxide for textiles wastewater bio-remediation, food preservation, and personal care applications. Swissaustral's extremophilic Catalase functions at a wide range of temperatures and pHs, making it an ideal and reliable enzyme across many applications.

Click [here](#) for more information.

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# Polymers

## Corbion's PLA now from sustainably sourced sugar

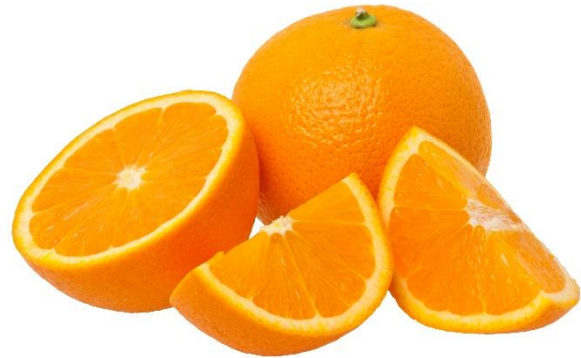
Total Corbion PLA, global technology leader and producer of PLA (Poly Lactic Acid) bioplastics and lactide monomers, has announced that PLA resins from Bonsucro certified sugarcane are now available for commercial order. The company is committed to sustainable sourcing of raw materials, and works closely with Bonsucro and suppliers for continuous development, support and improvement of the Thai sugarcane industry. This latest achievement allows converters and brand owners to use a certified PLA bioplastic that has been produced from sugarcane grown supporting the principles of sustainable agriculture.

Renewable feedstocks like sugarcane are used to produce lactic acid, which in turn is converted into PLA bioplastics. These bioplastic resins can then be used for a broad range of applications, such as packaging, consumer goods and automotive components. Mitr Phol, a local Thai sugar supplier, has been the first sugar producer in Thailand to achieve Bonsucro certification in July 2016. Following this milestone, Total Corbion PLA is now Bonsucro Chain of Custody certified and will offer a range of PLA resins in accordance with the certification scheme. These resins will be promoted within the existing, commercial Luminy® PLA resin portfolio.

Click [here](#) for more information.

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## Plastics from Orange Peel



*Wikimedia Commons*

Spanish plastics research centre AIMPLAS is leading a project to convert the vast amounts of orange peel waste left by the country's citrus juice industry into a biopolyester suitable for blow moulding bioplastic juice bottles and extruded profiles.

The project MIPLASCOE, funded by CDTI through the programme Interconecta 2016, will focus on extracting different monomers from the citrus waste using microbial fermentation and biopolyester synthesis.

Two plastics processors involved are PET bottle moulder Plastipak Iberia of Toledo and profile extruder Lisanplast, based in Murcia.

Spain is the world's fifth largest grower of oranges and the largest in Europe. The orange industry is centred in AIMPLAS' home region of Valencia, where three million tonnes of citrus fruits are produced each year, approximately the 60 per cent of the national production.

Currently, the citrus waste derived from this important industry undergoes energy intensive processing into animal feed pellets or is consigned to landfill. In both cases, there are environmental impacts.

Click [here](#) for more information.

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## Coffee packaging from Braskem



*Pixabay*

Braskem, the largest petrochemical company in the Americas, and União Plásticos, a company that manufactures and markets flexible plastic packaging, has partnered with the Cooperative of Family Farmers of the Poço Fundo Region (COOPFAM) in Minas Gerais, for the supply of the I'm Green Green Plastic. The polyethylene from sugarcane, a 100% renewable raw material, will be used in the production of organic coffees packaging.

Each year the cooperative distributes four metric tons of these grains, and União Plásticos is responsible for the development and production of these packages. Initially, COOPFAM will be using Braskem's renewable resin in the production of traditional packaging, known as almofadas ("cushions"). The cooperative is a reference in organic, solidary and agroecological agriculture, benefiting more than 400 families of small coffee farmers from the municipalities in southern Minas Gerais.

A result of the combination of innovation, technology, and sustainability, the Green Plastic captures 3.09 metric tons of CO<sub>2</sub> for each metric ton of resin of renewable origin produced, according to the Life Cycle Assessment (LCA) carried out by the consulting firm ACV Brasil.

Click [here](#) for more information.

## Kelheim Fibres develops biodegradable viscose for wet-wipes

Marine Litter is a global problem which is attracting more and more public attention: Plastic waste is not only ugly and a danger to flora and fauna – vast amounts of small plastic particles are floating in our oceans and are able to enter our food chain without being detected.

Kelheim Fibres, the world's leading manufacturer of viscose speciality fibres, presents a new concept that can help to prevent at least a part of this pollution in the first place by substituting conventional wet wipes, which usually contain a significant share of synthetic fibres, by wet wipes made with Kelheim's viscose speciality short cut fibre Viloft® and cellulose.

Both raw materials are plant-based and therefore completely bio-degradable.

With moist toilet tissue in particular, disposal via the toilet is clearly the obvious solution – but in contrast to conventional wipes containing polyester, wipes made of Viloft® short cut fibres can be flushed without concern, as the fibres have two plus points: there is neither a reason to fear an entry of plastic particles into the oceans nor the blockage of private or municipal sewage systems. Wipes made of Viloft® short cut fibres disintegrate in the sewage systems to small particles that do not harm this infrastructure.

Click [here](#) for more information.

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## Bio-on's PHA expanding into unexpected applications

Bio-on, listed on the AIM segment of Borsa Italiana and a leading player in the new eco-sustainable chemical industry, has announced the creation of 5 new Business Units (BU) to speed up its response to the growing demand for PHAs, the 100% natural, biodegradable bioplastic. The new divisions will enable more effective and faster development of new materials from biopolymers and new applications.

Every year, 300 million tons of polluting plastic are produced and sold, and thousands of types of oil-based polymers are made for myriad uses. Each of these is called a product "grade" and each one comes with its own technical data sheet. In recent months, and particularly since the recent presentation of Bio-on's 2017-2020 industrial plan released in November 2016, Bio-on's technicians have developed hundreds of new grades to replace existing high-pollution plastics. But, more importantly and surprisingly, there has been an exponential increase in the number of international patent applications submitted by Bio-on in high added value sectors unthinkable until as recently as last year.

Bio-on Plants, the production BU, will be based in Castel San Pietro Terme, outside Bologna, where an innovative plant is being built, controlled by Bio-on, that will produce micro bioplastics for cosmetics. The RAF (Recovery and Fermentation) and CNS (Cosmetic Nanomedicine & Smart Materials) business units will also be based here. The SMD BU (Structural Materials Development) will further develop the current Bentivoglio (Bologna) site, in operation since 2016, with new spaces for studying and developing structural materials. The ENG BU (engineering) will be based at Bio-on in Via Santa Margherita al Colle in Bologna and will develop projects for the construction and assistance of licensed plants.

Click [here](#) for more information.

## Itaconix polymers to get first applications



*Itaconix*

Itaconix has finalized the first application agreement for bio-based polymers to result from its collaboration with AkzoNobel's Specialty Chemicals business, announced earlier this year. This application agreement involves AkzoNobel's Performance Additives unit developing applications for Itaconix polymers to be used in the coatings and construction industries.

Under the agreement, Itaconix will contribute its proprietary polymers from itaconic acid, which are obtained from sugars through fermentation. Continued Nieuwenhuizen: "In addition to applications in coatings and construction materials, bio-based polymers have the potential to be used in a range of other everyday essentials, ranging from improving water quality to cleaning and hygiene products." Nieuwenhuizen also pointed out that the collaboration with Itaconix is another example of AkzoNobel's approach to embracing open innovation to help find more sustainable solutions.

Click [here](#) for more information.

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## Bio-On to open first Bio-PHA plant for cosmetics

Bio-on has assigned to INCICO S.p.A. based in Ferrara a contract worth approximately 2 million Euro for the development of the basic and detailed engineering of the first PHAs production plant for cosmetics.

The plant will be built in Castel San Pietro Terme, outside Bologna, on the site of a former Granarolo plant and will have a production capacity of 1000 tons per year. It will be the first plant producing PHAs in the form of micro powders for cosmetics, natural and 100% biodegradable, produced to date solely in an industrial scale-up plant in Bologna.

The plant construction, in which Bio-on is investing 15 million Euro overall, is particularly challenging and envisages opening a site in October with a view to going into production by summer 2018.

INCICO's multidisciplinary engineering services (over 40,000 engineering hours) will cover the specialities needed to acquire equipment and launch the plant construction phase. The project will implement a 3D model in PDMS that will allow the coordinated development of the various disciplines and control of the interfaces; INCICO will also oversee technical supervision and management of the site during the works.

All the 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 at ambient temperature.

Click [here](#) for more information.

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# Chemicals

## Circa forms partnership to launch Cyrene solvent



*Circa Group*

Biotechnology company Circa Group has announced a partnership with formulation science consultancy iFormulate, to support the upcoming launch of new biosolvent Cyrene®.

Cyrene® is a chiral dipolar aprotic solvent, a bio-based alternative to polar aprotic solvents such as NMP, DCM and DMF, which are under regulatory pressure worldwide due to their toxicity.

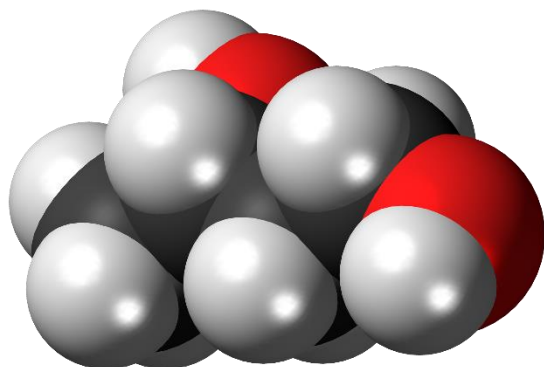
With a unique property set including viscosity, surface tension and polarities, Cyrene® is an interesting prospect for producing advanced materials. Over two years of testing and trialling Cyrene® with researchers and companies has yielded some promising results to date, showing Cyrene® as a safer, healthier, high-performance alternative to traditional solvents.

By collaborating with iFormulate, Circa will better understand its customers' formulation needs and help them develop new products.

Click [here](#) for more information.

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## Genomatica announces new 1,3-butylene glycol process



*Wikimedia Commons*

Genomatica has announced its latest innovation, the GENO BG™ process, a new biobased process technology to make a naturally sourced 1,3-butylene glycol. The GENO BG process has already produced biobased butylene glycol for sampling and Genomatica has transferred the process to 85,000 litre production fermenters.

Butylene glycol, a four-carbon alcohol, is used globally in cosmetics to improve moisture retention and as a carrier for plant extracts. Conventional approaches to make butylene glycol start with fossil fuel-derived acetaldehyde, which is a toxin, an irritant, and a carcinogen.

By contrast, Genomatica's biobased butylene glycol is made via fermentation, starting from natural, sustainable, plant-based ingredients. This approach has the potential for high appeal in personal care products.

Additionally, Genomatica has leveraged the power and selectivity of biology to create a process that produces a distinctively pure product as compared to fossil fuel-derived, chemistry-based processes. Product purity and performance, plus a simpler process design that is readily deployed at large scale, also have the potential for additional market applications in everyday wellness products.

Click [here](#) for more information.

## BioAmber launches Pharmaceutical Grade Biosuccinic Acid

BioAmber Inc. is pleased to announce the launch of BIO-SA™ pharmaceutical grade. This new grade of material provides a USP/NF and FCC Grade of bio-succinic acid manufactured under the United States Food and Drug Administration's good manufacturing practices for food and Excipients. The United States Pharmacopeia, the National Formulary, and the Food Chemicals Codex are the public pharmacopeia standards for medicines, food ingredients, dietary supplement products, and ingredients.

These standards are used by regulatory agencies and manufacturers to ensure products are of the appropriate identity, strength, quality, purity and consistency.

Click [here](#) for more information.

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## Amyris to produce nutrition chemicals for DSM

Amyris, Inc., the industrial bioscience company, has announced that it has entered into its first product development and production agreement with Koninklijke DSM N.V. (Royal DSM), the global science-based company active in health, nutrition and materials, to develop a food and nutrition molecule for which DSM is a major market provider.

As part of the previously announced equity investment DSM is making into Amyris, DSM and Amyris have agreed to focus on a number of short- to medium-term product development & production opportunities in vitamins and other nutritional ingredients. This agreement is the first of what is expected to be several of such development and production projects.

As part of the agreement, DSM will partner with Amyris and fund the development of the

technology to produce the specific molecule that Amyris will scale and supply long term to deliver improved performance while growing its business. DSM will take the molecule to market utilizing its channel and market access and take advantage of Amyris's biotechnology production, which provides a lower cost of production than currently available.

Click [here](#) for more information.

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### **Bio-based adipic acid - four pathways analysed**

Techno-economic studies of four processes for production of adipic acid from glucose were used to compare the minimum cost of production by each route. This paper analyses the purely biological production via reverse  $\beta$ -oxidation in *E. coli*; a purely chemical process using oxidation of glucose via chemical catalysis to glucaric acid that undergoes catalytic hydrodeoxygenation to adipic acid; and two hybrid routes that biologically convert glucose to either 6-hydroxyhexanoic acid or 1, 6-hexanediol, that are subsequently converted chemically to adipic acid using a metal catalyst. All analyses were based on adipic acid production capacity of 80 000 metric ton/year. Estimated total capital investments were US\$157 million, \$81 million, \$166 million, and \$177 million for the purely -biological, chemical, and two integrated hybrid routes, respectively. Catalyst costs were estimated as \$72 million, \$36 million, and \$37 million for the purely chemical and two integrated routes, respectively. The estimated adipic acid minimum selling prices were \$1.36, \$1.56, \$1.48, and \$1.70 per kg for the purely biological, purely chemical, and two integrated routes, respectively. Co-product revenue and the use of unpurified sugars improved the economics of adipic acid production in the purely biological and two integrated routes. Comparison of the economics of the chemical catalytic steps shows that catalyst yields, turnover frequency, and

catalyst life must be greater than 40% of theoretical, 0.01 s<sup>-1</sup>, and 100 days to achieve economic viability of purely chemical and integrated routes to adipic acid.

Click [here](#) for more information.

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### **Hoover Color partners with Ecoat for bio-based coatings**



*Hoover Color*

Hoover Color, a division of Cathay Industries, and Ecoat, French developer of bio-based chemistry for the coatings industry, have started a collaborative project to develop coatings formulations on the basis of environmentally friendly raw materials.

In this project Hoover Color is responsible for the pigments side, whereas Ecoat contributes the binder products.

Cathay's new American division Hoover Color is one of the market leaders in naturally occurring semi-transparent raw and burnt umbers as well as in eco-friendly transparent iron oxides for the paints and coatings industries. Hoover Color recovers iron oxides from abandoned coal mining drainage and converts waste streams into transparent "EnvironOxide" pigments. Through this process, waste waters get purified and the solid substances are turned into high quality pigments. Application areas for the products are among others paints and coatings for wood and metals.

Ecoat pursues a strategy similar to Hoover Color's in order to develop binders for waterborne

coatings. By using bio-based raw materials and designing production processes with significantly reduced energy consumption, the company develops and produces bio-sourced emulsions for architectural paints on the basis of patented technologies. The product range also involves functionalised emulsions with e. g. formaldehyde scavenging or self-crosslinking alkyd. For metal and wood care, Ecoat supplies alkyd urethane dispersions. The portfolio is completed by the full range of solvent-based conventional as well as urethanised or thixotropic alkyd resins.

Click [here](#) for more information.

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### **Verdezyne commissions first renewable chemicals facility, to begin with DDA**

Verdezyne's first commercial-scale renewable chemicals manufacturing facility, will be built at the Bio-XCell premier biotechnology and ecosystem park in Nusajaya, Iskandar, in southern Malaysia. The new facility is designed to produce biobased long-chain diacids via fermentation of Verdezyne's proprietary yeast, which has been engineered to use non-food biomass to produce high value chemicals. The first product produced at VerdePalm will be dodecanedioic acid (DDDA), a 12-carbon diacid that is a component of many consumer products currently made from petroleum.

Crude palm oil and palm by-products, as well as other plant-based raw materials, will be used to produce approximately 6,000 metric tons of industrial grade DDDA each year.

DDDA is a key component of FerroShield, which can be used in numerous corrosion inhibitor applications including metalworking fluids, engine coolants, metal cleaners, die cast release agents, and aqueous hydraulic fluids.

Click [here](#) for more information.

### **Enza Biotech acquired by Croda**

# **CRODA**

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*Croda*

Croda International Plc, who make, create and sell innovative and sustainable speciality chemicals have announced their acquisition of Enza Biotech AB, a research enterprise established as a spin-out company from Lund University in Sweden.

Enza Biotech was founded in 2012 by researchers at Lund University with the aim to develop the next generation of renewable surfactants using carbohydrate-based chemistry. Through this acquisition, Enza Biotech's patented technology will enhance Croda's well-established natural and renewable product portfolio to offer their customers, particularly in the Personal Care, Crop Care and Health Care markets, the sustainable ingredients they are looking for to satisfy the demands of consumers.

Croda will also gain the expertise of Enza co-founders Maria Andersson and Stefan Ulvenlund, and their team, as they become full time employees to lead the commercialisation of their work using Croda's technical and formulation expertise, global operational footprint and sales force and track record at bringing new technologies to market.

Click [here](#) for more information.

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## Metsä commissions new bioproduct plant

Metsä Group's next-generation bioproduct mill in Äänekoski came into operation as planned on Tuesday, 15 August 2017 at 6:00 in the morning. Pulp deliveries from the new mill to customers will begin in early September 2017. The construction project was carried out as planned, in accordance with its schedule and its EUR 1.2 billion budget.

Before the bioproduct mill started up, the old pulp mill in Äänekoski was shut down and its dismantling is currently in progress.

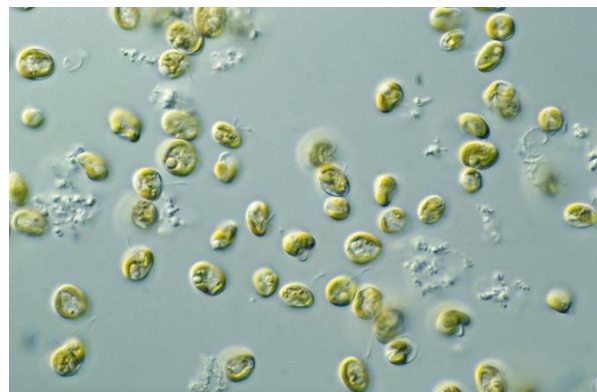
The bioproduct mill will achieve its nominal capacity approximately a year after start-up. The mill will produce 1.3 million tonnes of pulp per year, along with other bioproducts such as tall oil and turpentine. New bioproducts that already complement the product concept include product gas from bark, sulphuric acid from the mill's odorous gases, and biogas and biofuel pellets from sludge.

With this new bioproduct mill Äänekoski's industrial ecosystem is developing and growing, and the mill will be a platform for production of new bioproducts. Several processes and product paths are being actively studied. The most important new bioproduct development projects are lignin products, textile fibres, and biocomposites.

Click [here](#) for more information.

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## Corbion seeks to purchase struggling microalgae company



*Wikimedia Commons*

Corbion announced it had entered into a "stalking horse" stock and asset purchase agreement with TerraVia Holdings, Inc., a food and speciality ingredients company with a broad and diverse platform centred on ingredients and branded products derived from microalgae.

San Francisco-based TerraVia leverages its microalgae platform to deliver high-value ingredients with clear benefits, such as Omega-3 for animal nutrition and tailored oils, structured fats and proteins for food and biochemical applications. It operates an R&D centre in San Francisco, and two manufacturing facilities: one wholly-owned in Peoria, Illinois and one in Brazil in a joint venture (50.1% owned by TerraVia) with Bunge. The acquisition of TerraVia's microalgae platform would extend Corbion's product portfolio into algae-based fatty acids and proteins, while leveraging Corbion's extensive fermentation and downstream processing capabilities.

Click [here](#) for more information.

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## Gevo's isobutanol technology now available for licensing

Praj Industries Ltd and Gevo, Inc. have unveiled a new commercial opportunity in renewable bioproducts, jointly announcing that Gevo's proprietary isobutanol technology will now be available for licensing to processors of sugar cane juice and molasses. This follows on the back of Praj's development work, adapting Gevo's technology to sugar cane and molasses feedstocks.

A Joint Development Agreement and a Development License Agreement were entered into between Praj and Gevo in November 2015. The goal of these agreements was for Praj to adapt Gevo's isobutanol technology to using non-corn based sugars and lignocellulose feedstocks. The process technology development was performed at Matrix, Praj's R&D centre located in Pune, India.

In the first phase of development, Praj worked with Gevo's technology using sugar cane and molasses feedstocks, undertaking test-runs in order to develop a process design package that will now be offered for commercialization to cane juice and molasses-based ethanol plants, as licensees of Gevo's isobutanol technology. Licensing is expected to be focused on Praj plants located in India, South America and South-East Asia, with initial capacity targeted to come on-line in the 2019/2020 timeframe.

In the next phase of commercialization, Praj is working to adapt Gevo's technology to Praj's 2nd generation bio-refineries, enabling the production of isobutanol from lignocellulosic biomass.

Click [here](#) for more information.

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# Consumer Products

## Spectra unveils 100% bio-based cosmetic bottles



### SPECTRA PACKAGING

*Spectra*

Spectra recently provided new environmentally friendly bottles for natural skin care brand Pure Lakes.

Made from 100% biopolymer PET, Pure Lakes' new bottles take advantage of Spectra's popular tubular design. In addition, the new bottles were 2-pass printed in multiple variants for their extensive range of personal care products.

The new packs, blow moulded in 50ml, 100ml, and 250ml capacity options, were complemented with shallow screw caps from Spectra's extensive standard closure ranges.

Indeed, Spectra's Biopolymer offers all the premium look advantages of conventional polymers, yet provides a truly sustainable alternative without compromising the quality of the finished pack. It means customers can have luxurious high-end packaging that's also kinder to the environment.



Spectra's biopolymer materials are produced using ethanol from the waste of sugarcane as opposed to conventional polymers, which traditionally contain fossil-based raw materials such as oil or natural gas.

The renewable sugarcane captures CO<sub>2</sub> from the atmosphere, helping to reduce greenhouse gas emissions. Unlike regular biopolymers, which can't be recycled without damaging the recycling chain, Spectra's biopolymers are totally recyclable and provide a genuine direct replacement for standard plastics, perfect for a truly sustainable packaging solution.

Customers concerned about compromising the end result can rest assured that biopolymers maintain exactly the same chemical properties as conventional oil based polymers, which means there is no difference in performance or appearance to the end result.

Click [here](#) for more information.

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### **Pond complete first fully biobased and biodegradable particleboard**

Did you know that 300.000 cubic meter particleboards are produced every single day?! That corresponds to 3500 football pitches covered with particleboards. The first ever Pond biobased and biodegradable particleboard has been made on a visit to Siempelkamp in Germany. The board was made and tested according to the MDF-norm.

Click [here](#) for more information.

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## Events

### **Chemistry and Industrial Biotechnology Showcase 2017 York, 20th-21st September 2017**

Showcasing how UK chemistry and industrial biotechnology sectors are helping to enable growth in key UK supply chains through innovation.

This two-day conference and exhibition hosted by the Knowledge Transfer Network is a major event to bring together industry, researchers, investors and government agencies to showcase how the UK chemistry and industrial biotechnology sectors are helping to enable growth in key UK supply chains through innovation.

Click [here](#) for more information.

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### **Value from Unavoidable Food Waste York, 21st September 2017**

Join us to discuss the opportunities, barriers and latest technologies for extracting high-value products from unavoidable food waste. With the help of a panel of experts from industry, policy and academia, we will be exploring the issues over breakfast.

Click [here](#) for more information.

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## **EFIB 2017**

### **Brussels, 9th-11th November**

The 10th European Forum for Industrial Biotechnology and the Bioeconomy (EFIB) returns to Brussels October 2017 and will attract industry executives committed to a shift towards renewable, biologically-based manufacturing. EFIB is organised by EuropaBio, Europe's largest and most influential biotechnology industry group and Smithers Rapra, global leader in rubber, plastics, polymer and composites information products.

Click [here](#) for more information.

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## **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.

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## **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.

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## **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.

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## **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.

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## **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.

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## **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.

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## **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.

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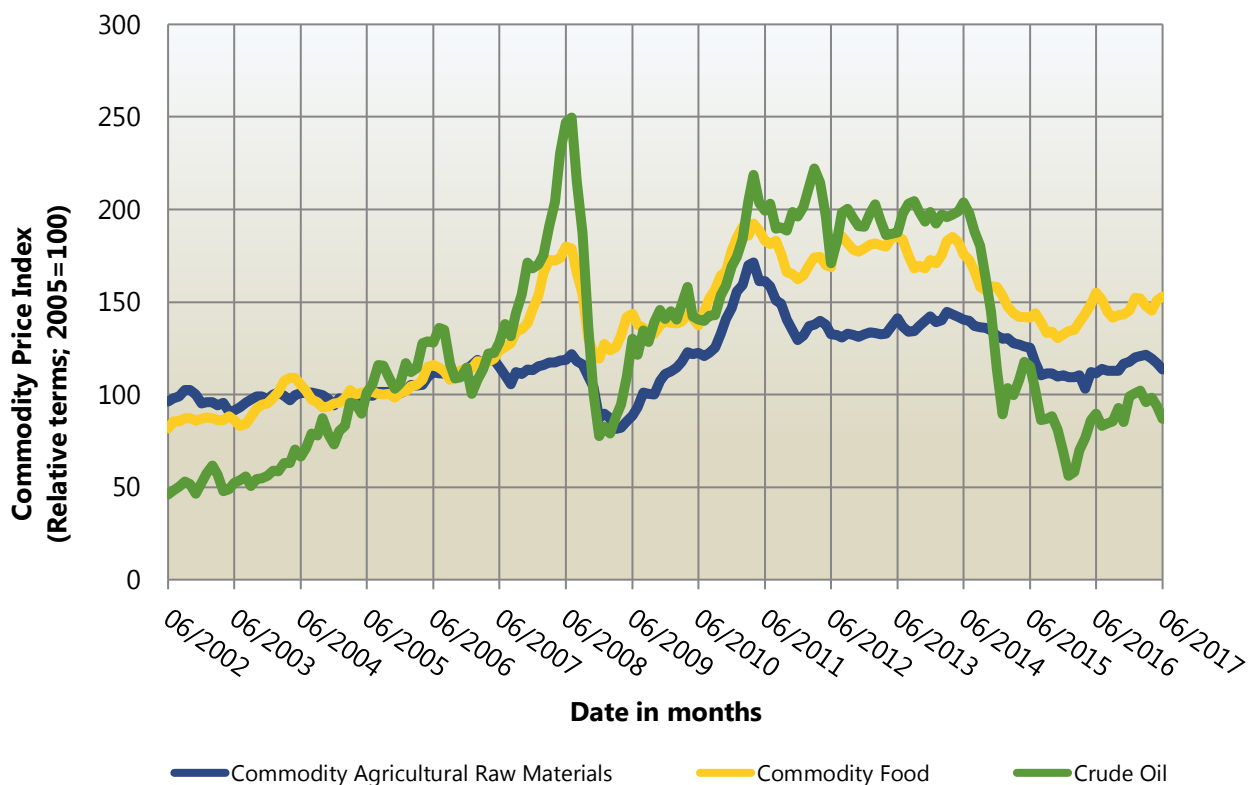
# Price Information

**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](http://www.indexmundi.com/commodities); Ethanol prices from Govt of Nebraska at [www.neo.ne.gov/](http://www.neo.ne.gov/)

## Raw materials 15-year Price Indices



For details on the nature of these commodities please see [www.indexmundi.com/commodities](http://www.indexmundi.com/commodities)

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