

News Review



Issue Eighty-Five

April 2019

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 all to April's Biobased Products News Review.

As the season is turning, and the weather is getting better, we're going to be wanting to spend more time outside (though here at NNFCC we have a few outdoorsy types who would scoff at the idea of only going outside in good weather!) Outdoor activities such as running can require high-performance footwear, and recently, VIVOBAREFOOT have released a line of trainers made of almost 50% biobased materials, provided by DuPont Tate & Lyle. The company has history with regard to making sustainable footwear – they have previously produced shoes from recycled plastic bottles – and don't wish to stop there, pursuing an ambitious target of 90% sustainable production materials across all their products by next year. Biobased clothes of all ilks have been on the market for some time, but remain expensive in many cases. The key to wider market penetration is to reduce production costs through continued process development, allowing the price to also come down in the shopping aisles.

Another sector that is starting to embrace biobased alternatives is 3D printing. Even though this technology continues to develop at an impressive rate, there are now sustainable options. We recently reported on a cellulose-based 3D printing formulation in development, which is just one approach: Natureworks have released a biobased PLA polymer specifically for use in 3D printing, that, so Natureworks claims, offers performance improvements on common materials used for 3D printing such as high-impact polystyrene and polyvinyl alcohol. Once again, a biobased product has offered a higher performance solution than conventional products – certainly a recurring trend, in these pages at least!

Lastly, not a biobased product per se, but one that may become important in the bioeconomy nonetheless. Paper is an oft-forgotten sector within the bioeconomy, and relies on recycling to maximise its resource efficiency. However, adhesives commonly used in paper stickers can lead to complications in the recycling process – creating holes in the paper produced. UPM have announced that they have developed an adhesive (not biobased, alas) that does not cause this problem, showing that, sometimes at least, bioeconomy solutions can occasionally come from non-biobased sources. The next step, of course, is to make the adhesive from biobased chemicals...

Read on for the latest news.

Markets

Covestro partners with Genomatica to develop biobased materials



Genomatica

Materials manufacturer Covestro and biotechnology company Genomatica have joined forces to research and develop high-performance materials based on renewable feedstocks. Both partners are aiming to reduce the use of fossil-based resources such as crude oil. These are today still the most common carbon and raw material sources of the chemical and plastics industries. Using carbon from plants instead would help reduce CO₂ emissions and close the carbon loop in another move towards a circular economy.

This long-term partnership involves teams from both companies working together to drive commercially-focused innovations. Genomatica will deploy its strengths in developing industrial-scale bioprocesses to produce widely-used chemicals. Covestro complements the collaboration with strong know-how in chemical process technology and application development. This initiative is another example of Covestro's approach to drive innovation by sustainability.

Click [here](#) for more information.

Research & Development

New council to push for plant-based products

Archer Daniels Midland Co., Cargill, Tate & Lyle, and Ingredion are among the founding members of the Plant Based Products Council, which will seek more sustainable consumer products and packaging through greater use of plant-based materials.

The council will promote the adoption and use of products derived from renewable biomass. It will advocate for private sector programs and government policies to encourage use of renewable materials and feedstocks, including policies to reduce carbon emissions, improve water quality and soil health, and curtail solid waste destined for landfills. The Plant Based Products Council launched a database featuring more than 480 plant-based and bio-based products already on the market.

The council released polling conducted in August 2018 showing strong interest from millennials in bioplastics. The polling found 48% of millennials said they feel most guilty about their own plastic use, which compared to other resources such as paper (33%), water (31%) or how much they drive (31%). Sixty-four per cent of millennials said they were willing to use plastic alternatives, and 60% said they were surprised by the lack of alternative options to plastic.

Click [here](#) for more information.

Chemicals from paper waste



Pixabay

Bioplastics magazine reports ISPT, the Netherlands-based Institute for Sustainable Processing Technology, has launched a new project to produce valuable chemicals from paper waste. The Cell-U-Value project will run until October 2022 in partnership with KNN Cellulose, the University of Groningen and Nouryon (former AkzoNobel Specialty Chemicals).

The tons of paper that are flushed down the toilet every year contain high volumes of cellulose, that currently simply go to waste. The Cell-U-Value project will kick off with a lab feasibility study to convert this cellulose to acetic acid, which can be used to make useful chemicals such as MCA (mono-chloro acetic acid).

Converting the cellulose into biobased, sustainable chemicals will be achieved through a process of hydrolysis and fermentation integrated with reactive extraction. The focus will be on scaling up to a full-scale value chain, both on an economical and an environmental level. This will be followed by a pilot to gain clear insight into what the functional process to produce 10 tons of bio-based fine chemicals made from cellulose will entail.

Click [here](#) for more information.

Novel pathway for biobased aromatics

BTX (aromatic hydrocarbons such as benzene, toluene, ethyl benzene and three xylene isomers)— play an essential role in the petrochemical and fine chemical industries, but have been difficult to synthesise from biomass resources to date.

A team at RWTH Aachen University has developed a novel route for the efficient production of BTX from bio-derived isobutyraldehyde.

The process involves the aromatization of isobutyraldehyde over zeolite catalysts in a continuous fixed bed reactor, producing value-added aromatic compounds with a yield of 93%. Benzene, toluene and xylenes are the major compounds formed with 79% yield and a productivity of 65 mmol g_{cat}⁻¹ h⁻¹.

Traditionally, BTX aromatics are obtained mainly by catalytic cracking and catalytic reforming processes of petroleum.

Fermentation production of isobutyraldehyde is being examined as well as photosynthetic catalysis of CO₂ to isobutyraldehyde.

Click [here](#) for more information.

Polymers

Natureworks releases new biobased 3D printing polymer

NatureWorks, the world's leading manufacturer of Ingeo™PLA biopolymer, has introduced Ingeo 3D450, a new break-away formulation for use in dual extrusion 3D printers. The clean, fast mechanical break-away of Ingeo 3D450 support structures results in parts with high finish quality, reducing post-processing time and improving overall productivity.

Applications for Ingeo 3D450 support material include complex industrial parts such as jigs and fixtures, patterns for investment metal casting, and architectural and retail models. Ingeo 3D450 is designed to work with the Ingeo 3D series of grades, including 3D850 and 3D870, that was developed for the professional printing market. At printing speeds up to 100 mm/s, Ingeo 3D450 prints and cools without warping even across large sections of support structures.

The Ingeo 3D450 break-away formulation can reduce or eliminate speed and buildability issues sometimes encountered with soluble support materials such as polyvinyl alcohol (PVA) or high-impact polystyrene (HIPS). Compared to these soluble supports, Ingeo 3D450 has a longer and more stable shelf life, dramatically reduced moisture sensitivity during printing, and reduces the need for post-processing with its clean break-away from a build. The new grade is compatible with large format printers, and since Ingeo 3D450 break-away supports do not rely on solvent baths for removal, 3D450 avoids the size constraints encountered with needing to submerge a build.

Click [here](#) for more information.

Stahl and Elevance to release biobased coatings



Elevance

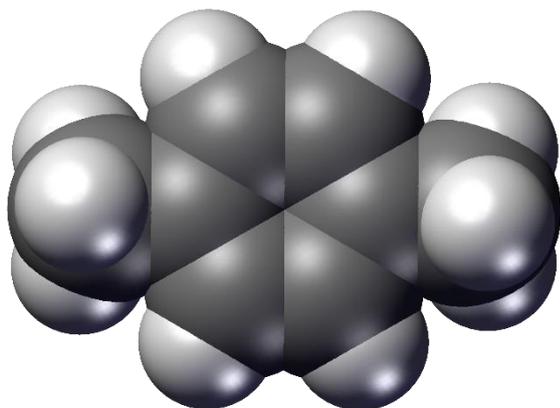
Elevance Renewable Sciences, Inc., a leading producer of novel, high-performing specialty chemicals from renewable feedstocks, has signed a supply agreement with Stahl, the global leader in leather chemicals and high-performance coatings. The agreement enables Stahl to commercialize new coatings and Polyurethanes Dispersions (PUDs) based on Elevance's C18™ Polyol technology.

Stahl and Elevance have collaborated since 2016 to develop high-performing coatings using Elevance's C18™ Polyols, a new class of bio-based polyurethane building blocks. Under the recent agreement, the companies will continue to develop new C18-based coatings with an emphasis on flexible substrates for various markets, including the demanding automotive segment.

This novel C18™ Polyol technology enables the development of hydrophobic and semi-crystalline bio-based coatings, with improved hydrolytic stability, while keeping the desired flexibility.

Click [here](#) for more information.

Partnership intends to commercialise Bioforming paraxylene process



Wikimedia Commons

BP, Virent Inc. and Johnson Matthey have signed an agreement that will further advance the commercialization of Virent's Bioforming® process for production of bio-paraxylene (PX), a key raw material for the production of renewable polyester.

Virent's Bioforming® technology, which is being developed with JM, produces drop-in reformat product from renewable sources that can be used to produce renewable fuels and also processed into lower carbon intensive bio-PX, the feedstock for bio- purified terephthalic acid (PTA), using existing technologies.

As part of this agreement, the parties will work together to commercialise the BioForming® technology – BP will contribute technical resources and has exclusive rights to negotiate becoming the sole manufacturer of bio-PX using Virent's technology.

Click [here](#) for more information.

Nouryon expands supply agreement with Itaconix

Nouryon will expand its offering to customers in the personal care market with bio-based polymers through an exclusive global supply agreement with specialty polymers maker Itaconix.

This is the second deal arising from a joint development agreement signed in 2017 to explore opportunities for polymers made from itaconic acid using Itaconix's technology. Earlier this year, the companies announced a deal for bio-based polymers with chelating properties that Nouryon will market to customers in the detergents market.

Nouryon has been expanding its range of innovative products to customers in the personal care market, one of the company's key market segments. These include a recently launched film-forming polymer for use in long-lasting, high SPF sunscreen products.

Click [here](#) for more information.

Chemicals

BioSafe Systems biobased herbicide

BioSafe Systems, LLC announced that it has earned the U.S. Department of Agriculture (USDA) Certified Biobased Product label. The product, AXXE® Broad Spectrum Herbicide, is now able to display a unique USDA label that highlights its percentage of biobased content.

AXXE is a sustainable herbicide formulated to deliver maximum performance through ammoniated pelargonic salts. AXXE can be applied outdoors and around buildings or structures, with no residue left behind.

The USDA Certified Biobased Product label displays a product's biobased content, which is the portion of a product that comes from a renewable source, such as plant, animal, marine, or forestry feedstocks. AXXE's active ingredient, Ammonium Nonanoate, is a plant fatty acid that penetrates the cell wall of plants, disrupting the cellular functions of the targeted weeds and killing them within hours of application.

BioSafe Systems' AXXE holds this third-party verification for a product's biobased content, which is administered through the USDA BioPreferred Program. One of the goals of the BioPreferred Program is to increase the development, purchase and use of biobased products. This aids in the expansion of the U.S. bioeconomy – where society looks to agriculture for sustainable sources of fuel, energy, chemicals, and products.

Click [here](#) for more information.

Nynas releases biobased tyre oil



Pixabay

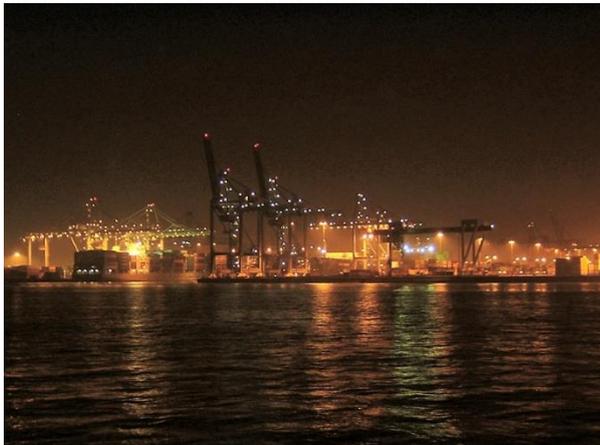
As the market demand for non-mineral oil-based products continues to increase, Nynas is launching NYTEX BIO 6200, the company's first tyre and rubber process oil to be produced using renewable feedstock. This new product will support customers in reaching their sustainability goals without sacrificing important technical properties.

Nynas® NYTEX® BIO 6200 tyre oil has been specially developed to provide tyre companies with a product that meets the high-performance standards of all Nynas tyre and rubber oils, while supporting them in reaching their sustainability goals.

NYTEX BIO 6200 is the first oil produced by Nynas to incorporate renewable feedstock. Moreover, this new addition to the tyre and rubber product portfolio aims to create sustainable value for customers and end users by reducing the rolling resistance of the tyre, an area where Nynas oils continue to deliver very strong results.

Click [here](#) for more information.

Shell joins Waste-to-Chemicals consortium



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A consortium of world-leading companies comprising Air Liquide, Nouryon, Enerkem and the Port of Rotterdam has announced that Shell will join as a partner in Europe's first advanced waste-to-chemicals facility in Rotterdam, the Netherlands.

Shell will become an equal equity partner in the proposed commercial-scale waste-to-chemicals (W2C) project, which will be the first of its kind in Europe to make valuable chemicals and bio-fuels out of non-recyclable waste materials.

The planned facility will convert up to 360,000 tons of waste into 220,000 tons (270 million litres) of bio-methanol – a chemical building block that is used to manufacture a broad range of everyday products, as well as being a renewable fuel. This represents the total annual waste of more than 700,000 households and represents a CO₂ emission savings estimated at about 300,000 tonnes when compared to the production of methanol from fossil fuels.

The project is supported by the Dutch Ministry of Economic Affairs & Climate Policy, which has agreed to develop mechanisms and regulation that will help bring this new technology to full scale to support the low-carbon transition of the Dutch economy. The waste-to-chemicals project is

also supported by the City of Rotterdam, the Province of Zuid-Holland and InnovationQuarter, the regional development agency.

The facility will be built within the Botlek area of the Port of Rotterdam using Enerkem's proprietary technology, and will convert non-recyclable mixed waste, including plastics, into syngas and then into clean methanol for use in the chemical industry and for the transportation sector. This is a departure from the reality of today, where methanol is generally produced from natural gas or coal.

Click [here](#) for more information.

Avantium Mekong plant to open in Netherlands

Avantium has decided to locate the new demonstration plant for its Mekong technology in Chemie Park Delfzijl, the Netherlands. The construction of the demonstration plant - with a capacity of around 10 tons of plant-based monoethylene glycol (MEG) - is on track, with the opening scheduled for the second half of 2019. This is an important step in commercializing the production of plant-based MEG, a fossil-free raw material for products such as plastic materials and textiles.

Avantium develops novel Renewable Chemistries technologies that use renewable carbon sources instead of fossil resources. One such technology is Mekong, which delivers an environmentally sustainable plant-based alternative for MEG, producing it in a single-step process from industrial sugars. Today, more than 99% of MEG is produced from fossil-based raw materials, with a market value of about \$25 billion. The Mekong technology aims to produce plant-based MEG that is chemically identical to fossil-based MEG and competitive in terms of cost and quality.

The construction of the Mekong demonstration plant is part of Avantium's strategy to invest in developing and scaling up breakthrough Renewable Chemistries technologies. A key factor behind the decision to build the Mekong plant in Delfzijl is a €2 million grant from the European Regional Development Fund, facilitated by Partnership Northern Netherlands (Samenwerkingsverband NoordNederland). This grant aims to accelerate innovation in the quest for a low-carbon economy.

Click [here](#) for more information.

Consumer Products

Nearly 50% biobased outdoor shoes

Designed with outdoor performance in mind, VIVOBAREFOOT continues to innovate with its bio shoe range, a new line of plant-based performance sneakers. Each shoe in VIVOBAREFOOT's new line is nearly 50-percent plant-based, making it VIVOBAREFOOT's latest stride in its quest to use 90-percent sustainable materials across its entire product range by 2020.

The materials used in new Primus Lite Bio range are harvested by DuPont Tate & Lyle Bio Products, a joint venture between DuPont, a global science innovator, and Tate & Lyle, a world-leading renewable food and industrial ingredients company. Using these renewable, high-performance materials, VIVOBAREFOOT can make a significant impact on the planet. Every 50,000 pairs of shoes produced using these materials equates to saving greenhouse gas emissions from 247,948 miles driven by an average passenger

vehicle or reducing CO2 emissions from 11,286 gallons of gasoline consumed.

Seventh-generation shoemakers Galahad and Asher Clark are firm believers that barefoot shoe-making is sustainable shoe making. The company has already pioneered shoes made of repurposed algae (Ultra 3 BLOOM), with each pair recirculating 57 gallons of fresh water back into the natural habitats, and an Eco range made of 50 percent recycled plastic. In 2017, VIVOBAREFOOT diverted over 2 million plastic bottles from landfills into barefoot shoes.

Click [here](#) for more information.



VIVOBAREFOOT

Clariant launches biobased pigmented coatings for vehicles

Clariant, a focused and innovative specialty chemical company, has announced more support for coatings to make their mark in the sustainable transformation of all kinds of land, sea and air transport – from personal mobility to passenger and commercial transportation, ships, and agricultural, construction and earthmoving machinery.

As the trends influencing how people and goods are moved evolve at an unprecedented fast pace, Clariant is spearheading innovation to bring coatings manufacturers closer to efficiently delivering more environmentally-compatible, safer products that achieve high-level aesthetics.

Clariant has launched the first bio-based version of iconic Pigment Red 254 - the automotive industry's most widely-used red pigment for exterior coatings. Clariant is the only pigment producer to offer high-performance Diketopyrrolo

Pyrrole (DPP) pigments, such as Pigment Red 254 and other red, pink and violet shades, based on renewable raw materials. It is pioneering the use of succinic acid derived from renewable resources rather than from crude oil for manufacturing all of its DPP reds.

Click [here](#) for more information.

Sealed Air plant to produce biobased food packaging



Pixabay

Sealed Air Corporation is investing in capacity at its Simpsonville, S.C. facility to produce plant-based food packaging. This facility will be the first in North America to produce materials made from Plantic™ plant-based resin and post-consumer plastic. Simpsonville is one of the world's largest packaging plants with over 1,000 employees and 1.4 million square feet of operations. Packaging materials and systems for food and consumer products are currently manufactured at this location.

In June 2018, Sealed Air and Kuraray America, Inc., a specialty materials company with headquarters in Japan, entered into an agreement to offer Plantic materials to package perishable foods such as poultry, beef and seafood in the U.S., Canada and Mexico.

Sealed Air's planned capital investment of \$24 million is underway and production is scheduled

to begin in the second quarter of 2020. To support this work, Kuraray is investing approximately \$15 million to install plant-based high barrier resin production and supporting capabilities in Houston, Texas. Kuraray's resin plant is scheduled to be completed at the end of September 2019 and will begin operating in early 2020.

As upgrades to both facilities progress, Sealed Air, under the agreement with Kuraray, will continue to serve customers in North America by importing materials from Plantic Australia. The investment positions both companies for strategic growth in the Americas as demand for sustainable materials continues to increase.

Click [here](#) for more information.

Nestlé outlines actions to tackle plastic waste

Nestlé has laid out its broader vision to achieve a waste-free future and announced a series of specific actions towards meeting its April 2018 commitment to make 100% of its packaging recyclable or reusable by 2025, with a particular focus on avoiding plastic-waste.

Between 2020 and 2025, Nestlé will phase out all plastics that are not recyclable or are hard to recycle for all its products worldwide. In doing so, Nestlé is rolling out alternative packaging materials across its global product portfolio and establishing partnerships with cutting-edge packaging specialists. Starting in February 2019, Nestlé will begin to eliminate all plastic straws from its products, using alternative materials like paper as well as innovative designs to reduce littering. Nestlé will also start rolling out paper packaging for Nesquik in the first quarter of 2019 and for the Yes! snack bar in the second half of 2019. Smarties will start rolling out plastic-free packaging in 2019 and Milo will introduce paper-based pouches in 2020.

Nestlé Waters will increase the recycled PET content in its bottles to 35% by 2025 at the global level and will reach 50% in the United States, with a specific focus on its iconic brand Poland Spring. In addition, Nestlé Waters will increase the recycled PET content for its European brands Acqua Panna, Buxton, Hennieze and Levissima to 50% by 2025.

Successful recycling requires an adequate infrastructure, which is currently not always in place. Nestlé Institute of Packaging Sciences is exploring new paper-based materials and biodegradable/compostable polymers that are also recyclable, among other alternatives. This could become a valuable option in places where recycling infrastructure does not yet exist and will not be available for some time.

Click [here](#) for more information.

UPM develops adhesive that doesn't interfere with paper recycling

Sticker attachments have recently seen a rise in popularity. However, the glues used in stickers have caused problems in the paper recycling process. The problem is not a new one but has become more notable as the quantity of sticker material attached to printed products has increased.

Enhancing recyclability was a key target when UPM Raflatac, UPM Communication Papers and UPM's Central European Research Centre joined forces.

The glue deposits from sticker material create holes in the produced paper and lead to breaks in the paper web, which is the paper running through the paper machine. For UPM and other paper producers who use recycled, deinked fibres, this leads to a loss of production and, of course, wastes valuable, sustainable, recycled fibre.

A new type of adhesive has now been developed and launched on the market, promising considerable improvements in the recyclability of UPM Raflatac paper labels.

The new glue behaves much better during the deinking process and the new label passes the European Paper Recycling Council's scoring criteria for recyclability.

The paper recycling and production knowledge of UPM Communication Papers and R&D with the product development knowledge of UPM Raflatac were closely linked in the collaboration. UPM Raflatac also collaborated with their customers when testing the new adhesive. INGEDE, the International Association of the Deinking Industry, also took part in the development work.

Recycled fibre accounts for nearly one-third of all fibre used in UPM's paper production. A well-functioning recycling process ensures that all the recovered paper material is used as effectively as possible. Improving the recyclability of paper products is one of the best ways to develop the sustainable use of paper.

Click [here](#) for more information.



PxHere

Patents

Processes for producing beta-lactone and beta-lactone derivatives with heterogenous catalysts

The present invention is directed to processes from producing beta-lactone and beta-lactone derivatives using heterogenous catalysts. In preferred embodiments of the present invention, the processes comprise the steps: passing a feed stream comprising an epoxide reagent and a carbon monoxide reagent to a reaction zone; contacting the epoxide reagent and the carbon monoxide reagent with a heterogenous catalyst to produce a beta-lactone product in the reaction zone; and removing the beta-lactone product from the reaction zone. In preferred embodiments, the heterogenous catalyst comprises a solid support containing a cationic Lewis acid functional group and a metal carbonyl compound comprising at least one of anionic metal carbonyl compound or a neutral metal carbonyl compound. In certain preferred embodiments, the epoxide reagent and carbon monoxide reagent have a biobased content.

Click [here](#) for more information.

Events

Securing markets and maximising value from biosolids and other biofertilisers **21st-22nd May 2019**

Sometimes it doesn't matter how strong the evidence is to support a particular practice – if the perception is sufficiently negative, that practice may never gain widespread support. Day 1 of this event will provide an opportunity for different sectors to share experiences and best practice – and explore how perceptions and evidence might better interact to secure long-term resilience in land-based markets. Day 2 of this conference focuses on strategies to reduce costs / improve value from land-based markets for biosolids and other bioresources.

Click [here](#) for more information.

Plant Based Summit 2019 **Lyon, 22nd-24th May 2019**

In May 2019, Plant Based Summit will launch its 5th edition in Lyon, with an even sharpened positioning on the innovation, the co-development and its operational implementation for the necessary deployment of bio-based products. It will be the opportunity for the participants to contribute to the evolution of plant-based, green and sustainable chemistry!

The 2019 congress is still focused on stimulating biobased product development through a market driven approach. You gain access to more than 700 professionals from all the biobased chemical industry value chain.

Click [here](#) for more information.

EUBCE 2019

Lisbon, 27th-30th May 2019

The EUBCE is the leading platform for the collection, exchange and dissemination of scientific and industrial know-how in the field of biomass.

The EUBCE combines one of the largest biomass science and technology conferences with a high-quality industry exhibition, attracting biomass professionals from around the globe.

Click [here](#) for more information.

RRB 15

Toulouse, 3rd-5th June 2019

The 15th edition of the International Conference on Renewable Resources & Biorefineries will take place in Toulouse, France from Monday 3 June until Wednesday 5 June 2019. Based on the previous RRB conferences, this conference is expected to welcome about 350 international participants from over 30 countries.

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.

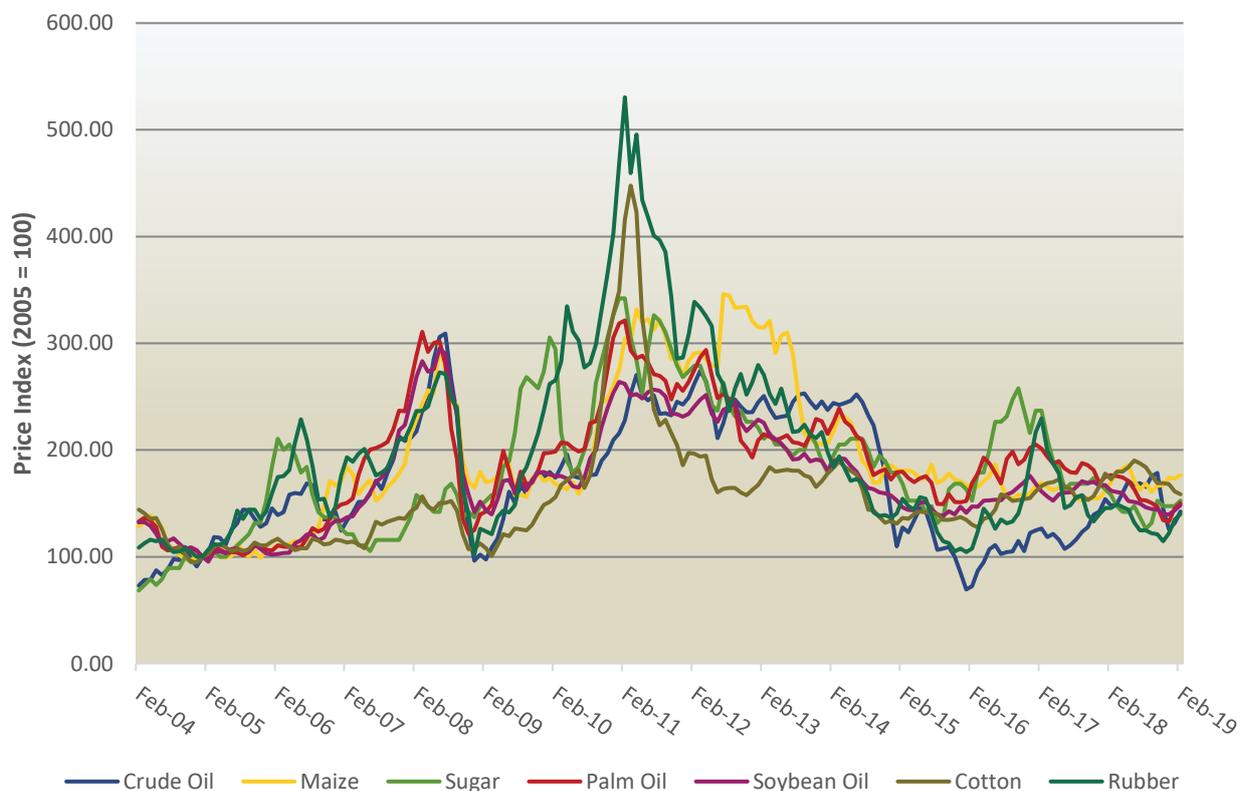
Price Information

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\$ (Feb 14)	Price, US\$ (Feb 19)	Price Change
Crude oil (petroleum, barrel)	104.83 (↑)	61.13 (↑)	-42%
Maize (corn, metric ton)	209.32 (↑)	169.72 (↑)	-19%
Sugar (pound)	0.37 (↑)	0.29 (↑)	-22%
Palm oil (metric ton)	908.00 (↑)	602.97 (↑)	-34%
Soybean oil (metric ton)	985.00 (↑)	772.82 (↑)	-22%
Cotton (kilogram)	2.07 (↑)	1.79 (↓)	-14%
Rubber (kilogram)	2.17 (↓)	1.65 (↑)	-24%

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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