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BIOSCIENCES & BIOPRODUCTION


FLASH NEWS

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CONTENTS

1. EQUIPEMENTS & TECHNOLOGIES 2
2. APPLICATIONS & MARCHES 9
3. PUBLIC POLICIES & REGULATIONS 29
4. AGENDA 36

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Biocatalysis/Bioconversion

4289 - A new enzyme is identified that could aid anticancer drug development

A research team at private American research university Rice has mapped out the full series of enzyme-powered reactions a marine fungus uses to produce 21R-citrinadin A, a complex molecule with anticancer properties. In the process, they identified a new enzyme, CtdY: the only one of its kind known to break an amide bond. The new enzyme belongs to a large family of enzymes known as cytochrome P450s that perform a variety of different functions and are being studied for their potential use in industrial and pharmaceutical settings. However, none of the P450s documented so far can break an amide bond. The enzyme is notable not only because it can break a highly stable bond, but also because it does so for a very complex molecular structure. Once CtdY breaks the amide bond – which has a circular 3D structure – a group of seven other enzymes intervenes to complete the assembly of the 21R-citrinadin A molecule. The enzyme's ability to cleave amide bonds could make it a useful tool for creating new drugs.

Publication: Fungal P450 Deconstructs the 2,5-Diazabicyclo[2.2.2]octane Ring *En Route* to the Complete Biosynthesis of 21*R*-Citrinadin A. Journal: Journal of the American Chemical Society. DOI: 10.1021/jacs.3c02109.

More information: Rice.edu
En savoir plus : Ma Clinique.fr

4290 - New discoveries in microbial electrosynthesis

With microbial electrosynthesis, microorganisms use CO_2 and electricity to produce organic compounds such as ethanol. How this process works biologically, however, was merely the subject of speculation until the work of a group of researchers from the Leibniz Institute for Natural Product Research and Infection Biology (Leibniz-HKI). They have now been able to confirm experimentally for the first time that the bacteria do not directly absorb the electrons supplied by electric current, but instead use hydrogen to transfer the electrons. They also found that the method could produce even more useful chemicals than previously thought and optimised the process for the highest possible yields. In addition, the team discovered new biosynthetic pathways, finding that amino compounds were formed that the bacteria do not normally produce. The team also discovered reactions between the nutrient medium and the cathode which had also not been described before. The discoveries should help make microbial electrosynthesis commercially viable and could open the door to new production methods for the chemical industry.

Publication: Microbial electrosynthesis with *Clostridium ljungdahlii* benefits from hydrogen electron mediation and permits a greater variety of products. Journal: Green Chemistry. DOI: 10.1039/D3GC00471F.

More information: Leibniz-hki.de
En savoir plus : Techno Science.net

4291 - New species of plastic-degrading fungi and bacteria discovered

In May 2021 in the coastal salt marshes of Jiangsu, China, an international team of scientists took 50 samples of plastic waste from polyethylene terephthalate (PET), expanded polystyrene (EPS), polyethylene (PE), polyurethane (PU), polyamide (PA), polypropylene (PP) and polyvinyl chloride (PVC). The sampling confirmed the presence of a '*terrestrial plastisphere*', a term that is relatively new to terrestrial ecology as past studies have primarily focused on marine environments. The microbiome of this '*man-made ecological niche*' of coastal plastic debris was further found to be distinct from the surrounding soil. Following analysis, the scientists counted 184 fungal and 55 bacterial strains capable of breaking down polycaprolactone (PCL), a biodegradable polyester commonly used in the production of various polyurethanes. Among the samples, the researchers identified 14 genera of fungi, including

the plant pathogens *Fusarium* and *Neocosmospora*. The study's findings indicate these fungi may be better at degrading PCL plastics and other synthetic polymers than saprotrophic fungi – fungi that feed on dead plant and animal remains. Alongside the fungi, the research team recognised two genera of bacteria, *Streptomyces* and the recently discovered genus *Jonesia*, as promising candidates for plastic degradation. In particular, the species *Jonesia cf. Quinghaiensis* dominated the 55 sampled bacterial strains. Although the study's authors faced some limitations in precisely identifying the analysed strains down to a species level, they believe their recent discoveries could still lead to the development of enzymes effective in biologically breaking down plastic waste.

Info: To date, 436 species of fungi and bacteria that degrade plastic have been identified worldwide.

Publication: The distinct plastisphere microbiome in the terrestrial-marine ecotone is a reservoir for putative degraders of petroleum-based polymers. Journal: Journal of Hazardous Materials. DOI: 10.1016/j.jhazmat.2023.131399.

More information: Kew.org, Phys.org
En savoir plus : France TV Info.fr, Premium Beauty News.com

4292 - Discovery of new microbial consortia capable of efficiently converting cellulose co-products into valuable chemicals

A research team at the Indian Institute of Technology Mandi used the consolidated bioprocessing (CBP) method, which combines saccharification (converting cellulose into simple sugars) and fermentation (converting simple sugars into alcohol) in a single phase. Scientists at IIT Mandi examined two synthetic microbial consortia (SynCONS) systems for a cellulose processing method followed by pyrolysis. For this test, two kinds of microbes were chosen, one for saccharification and the other for fermentation. According to Dr Shyam Kumar Masakapalli of IIT Mandi: *'We analysed multiple microbes to create SynCONS that could convert cellulose to ethanol and lactate. We developed two SynCONS – a fungal-bacterial pair and a thermophilic bacterial-bacterial pair – both of which exhibited effective cellulose degradation with total yields of 9% and 23%, respectively. After pyrolysis of the remnant biomass, we obtained a carbon material with desirable physicochemical properties*.' By combining the thermophilic SynCONS with an additional fermentative partner, the researchers were able to achieve an ethanol yield of 33%. The use of cellulose-acting enzymes in tandem with saccharification resulted in an ethanol yield of 51%.

More information: News18.com

Synthetic biology

4293 - Launch of Hubei PHAngel Biotechnology: a joint venture to expand synthetic biology applications

Created by yeast manufacturer Angel Yeast and biotech firm PhaBuilder, the joint venture will accompany the launch of the first synthetic biology (SynBio) industrial park in Hubei, China, and the construction of a major polyhydroxyalkanoate (PHA) production line. The planned factory will have a production line capacity of 30,000 tons and is set to be the world's largest PHA production line built with Next Generation Industrial Biotechnology (NGIB). In addition to the PHA factory, Angel Yeast rolled out a strategic plan for SynBio. It aims to build a comprehensive service platform catering to the needs of biotechnology companies when they are transforming and commercialising SynBio products. The company will also seize downstream opportunities and actively seek cooperation partners who have complementary advantages in technology, products, channels and branding. It will promote the application of SynBio in areas such as healthcare, biodiversity preservation and pharmaceuticals.

More information: Press release
En savoir plus : Communiqué de presse

Modelling/AI

4294 - Molecular simulation used to control the correlation between the molecular architecture, properties and applications of semicrystalline polymers such as polyethylene (PE)

Researchers from the Institut Charles Sadron (CNRS/University of Strasbourg) have simulated the growth of the largest ever PE single crystals as part of a recent collaboration between French group TotalEnergies and the CNRS. Their results show the crystals' multilamellar structure in unprecedented detail. They have also demonstrated that the structure and thickness of the layers can be controlled just by introducing a few additional branches along the chains. This is of particular importance for industrial applications, as the molecular structure on a small scale governs the mechanical properties – such as fracture toughness (shock resistance) – on a large scale. New, even higher-performance polymers could be designed and manufactured if this process can be optimised.

Publication: Molecular Simulations of Controlled Polymer Crystallization in Polyethylene. Journal: ACS Macro Letters. DOI: 10.1021/acsmacrolett.3c00146.

En savoir plus : CNRS.fr

4295 - A new enzyme is designed using Antarctic bacteria and computer calculations

A team of researchers from the University of Uppsala, Sweden, and the University of Tromsø, Norway, have successfully predicted how to modify an enzyme's optimal temperature by carrying out extensive computer calculations. To do so, they started with a cold-adapted enzyme, found in bacteria and fish that live in the Antarctic Ocean. The researchers were interested in whether computer simulations of the catalysed chemical reaction could predict a small number of mutations in the Antarctic enzyme that could result in an increase in its optimum temperature. The results of their calculations showed that this would be possible if 16 mutations were inserted from the corresponding pig enzyme into the bacterial variant. The researchers then produced this hybrid enzyme and measured its catalytic activity as a function of temperature. They found that the new variant had a 6°C higher optimum temperature than the original variant and was faster than both the Antarctic and pig enzymes at 50°C. They also solved the three-dimensional structure of the hybrid enzyme by X-ray crystallography and showed that the necessary structural changes predicted by the computer calculations had indeed taken place. The study is a major breakthrough in the biotechnology and theoretical chemistry field. It demonstrates that computer calculations can be used to predict and perform specific modifications to enzymes to change their properties.

Publication: Computational design of the temperature optimum of an enzyme reaction. Journal: Science Advances. DOI: 10.1126/sciadv.adi0963.

More information: Press release
En savoir plus : Enerzine.com

4296 - A hybrid machine-learning method developed to design new proteins

Scientists at the MIAT unit in Toulouse, the INRAE Occitanie-Toulouse centre and Toulouse Biotechnology Institute (TBI) combined two types of artificial intelligence (AI) to teach a machine to play Sudoku: a neural network to learn the rules from examples, and a prover to apply these rules to solve new puzzles. Their hybrid method is a quick (just 15 minutes!) and efficient learner, requiring just 200 examples of completed grids – a fraction of other approaches. It is also transparent, as the decision taken by the prover can be understood by analysing the rules learnt. This 'window' into the process improves understanding and control. The scientists went on to use the proof of principle obtained to solve Sudoku puzzles to design proteins. Seen as a brain-teaser that requires atoms to be placed correctly, teaching protein models was akin to learning the 'rules of the game', which could then be used by automated reasoning tools to design new proteins. The research combines the intuitive recognition of deep learning with the meticulous logic of automated reasoning. In addition to its speed and transparency, the real benefit of this method is its ability to model diverse problems, ranging from solving Sudoku to real-world issues such as designing new proteins.

Article: Bridging the gap between learning and reasoning.
Publication: Scalable Coupling of Deep Learning with Logical Reasoning. DOI: 10.48550/arXiv.2305.07617.

En savoir plus : Inrae.fr

4297 - Launch of Aurora genAI: an artificial intelligence model primarily designed for scientific research

Launched by American semi-conductor manufacturer Intel in collaboration with Argonne National Laboratory (one of the biggest research centres in the United States) and American company Hewlett Packard Enterprise (HPE), this artificial intelligence (AI) model will be 'built' from general text, code and scientific data from the biology, chemistry, materials science, physics and medicine fields, and other sources. The models produced can therefore be used in a variety of scientific applications: from the design of molecules and materials to the summary of knowledge from millions of sources. The aim is to suggest novel experiments of interest in systems biology, polymer chemistry and energetic materials, climatology and cosmology. The model will also be used to accelerate the identification of the biological processes linked to cancer and other diseases, and suggest targets for drug development. In terms of performance, Aurora genAI is five to six times more powerful than ChatGPT: while ChatGPT draws on 175 billion parameters, the Aurora genAI supercomputer is capable of handling 1 trillion. It will therefore be able to generate very precise answers to user questions. Aurora genAI will be launched this year and is expected to sell for $200 million (€184 million).

En savoir plus : Science et Vie.com, 01 net.com

4298 - Launch of PeSTo: a new AI tool that can predict protein interactions

Developed by a team at EPFL, the Swiss Federal Institute of Technology in Lausanne, PeSTo (short for Protein Structure Transformer) can predict the specific regions on the surface of a protein that can interact not only with other proteins, but also nucleic acids, lipids, ions and small molecules. These interfaces are crucial for the formation of supramolecular complexes and function modulation. According to Lucien Krapp, main developer of PeSTo: *'The model evaluates the chemical and physical context of each atom by examining all nearby atoms. Using the self-attention mechanism, it focuses on significant atoms and interactions within the protein structure. It means that this method effectively captures the complex interactions within protein structures to enable an accurate prediction of protein binding interface.*' Because PeSTo's predictions are based solely on the position in space and the type of atoms, it can make predictions without needing to describe the physics and chemistry of the protein interface using additional external methods. This eliminates the '*overhead*' of pre-computing molecular surfaces and additional properties, making it much faster, robust and more general than current methods. The new tool is available free of charge via this link and does not require prior registration. The server can handle any protein structure or model in PDB format. The predicted interfaces can be viewed directly in the browser.

Info: PeSTo is built on a neural network based on transformer technology – a type of neural network designed to process sequential data, such as natural language, by using self-attention mechanisms to weigh the importance of different parts of the input sequence and make predictions.

Publication: PeSTo: parameter-free geometric deep learning for accurate prediction of protein binding interfaces. Journal: Nature Communications. DOI: 10.1038/s41467-023-37701-8.

More information: Epfl.ch
En savoir plus : Epfl.ch

4299 - Development of a new AI method to predict whether an enzyme can use a specific molecule as a substrate

In collaboration with scientists from Chalmers University of Technology in Gothenburg, Sweden and the Indian Institute of Technology in Mumbai, a team from the Computational Cell Biology research group and Heinrich Heine University Düsseldorf (HHU) have developed an artificial intelligence (AI)-based method that can predict with a high degree of accuracy whether an enzyme can work with a specific substrate. According to Dr Martin Lercher from the Computational Cell Biology research group, *'the special feature of our Enzyme Substrate Prediction (ESP) model is that we are not limited to individual, special enzymes and others closely related to them, as was the case with previous models. Our general model can work with any combination of an enzyme and more than 1,000 different substrates*.' The new method paves the way for a huge number of potential applications, both in drug research and biotechnologies.

Publication: A general model to predict small molecule substrates of enzymes based on machine and deep learning. Journal: Nature Communications. DOI: 10.1038/s41467-023-38347-2.

More information: News Medical.net, European Biotechnology.com
En savoir plus : Ma Clinique.fr

Processes

4300 - Inauguration of the AdChem4 platform to help scale innovations in the Chemicals-Materials-Environment industry

The platform will help start-ups, SMEs and businesses in the chemicals, materials and environment industry to scale up by giving them access to shared pilot tools. The project is led by Belgian chemicals company Solvay and Lyon-based open innovation chemistry-environment platform Axel'One and is nestled in Solvay's huge R&D complex in Saint-Fons, France. AdChem4 will make it easier for the chemicals and materials industry to remove the barriers to scale up and accelerate the productive investment and growth of SMEs and start-ups comprising the local industrial community. The platform required a total investment of €12 million, €10 million of which was contributed by Solvay and €1 million each by the French government via the Investments for the Future programme and the Rhône-Alpes Region. The funds go towards the purchase of new equipment and the digitalisation of tools, and focus on four main areas:

- Polymer synthesis;
- Organic synthesis;
- Synthesis and formation of solids and powders;
- Effluent treatment.

AdChem4 has been certified by chemicals and environment competitiveness cluster Axelera and rubber, plastics and composites competitiveness cluster Polymeris. The project also received support from France Chimie AURA, a professional organisation bringing together chemicals manufacturers in the Auvergne-Rhône-Alpes Region. The platform is due to be fully operational in 2026.

En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

4301 - Update on a project to develop efficient and profitable pre-treatment methods and robust enzyme cocktails to deconstruct lignocellulosic biomass

German biotech firm Insempra and fellow biotech firm Fibers365, which has developed a chemical-free biomass pre-treatment technology to produce fibres and substrates, announced that they had successfully conducted tests to develop and scale sustainable solutions to transform lignocellulosic waste into high-value ingredients via fermentation. Fibers365's technology can competitively extract functional cellulosic fibres, lignin and sugars from multi-feedstock non-wood biomass. The sugars, currently used to generate biogas, can be further converted by producing high-value products via fermentation for various industrial applications. Through their partnership, Insempra has successfully tested its proprietary fermentation technology platform to process the feedstock prepared by Fibers365 derived from agricultural waste streams (e.g., wheat straw). Insempra is using this technology to develop lipids for the beauty and personal care, nutraceutical and food industries. In addition to lipids,

Insempra is working on the production of protein fibres and high-value functional ingredients with feedstocks from agricultural waste.

More information: Press release

4302 - Discovery of microbes that can degrade certain types of plastic at low temperatures

Scientists at the Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Switzerland, made their discovery by burying plastic in soil from the Alps and Greenland and examining the bacteria and fungi that grew on it over the course of several months. They also isolated microbes from plastic buried for one year in Greenland and waste collected on the island of Spitzbergen, Norway. They sampled 19 strains of bacteria and 15 strains of fungi, then let them develop in the lab in the dark at 15°C. After this experiment, they isolated bacterial strains belonging to 13 genera in the classes *phyla Actinobacteria* and *Proteobacteria*, as well as fungi belonging to 10 genera in *phyla Ascomycota* and *Mucoromycota*. Lab testing on sterile samples of non-biodegradable polyethylene (PE) and biodegradable polyester-polyurethane (PUR), as well as two commercially available biodegradable blends of polybutylene adipate terephthalate (PBAT) and polylactic acid (PLA), found that none of the strains were able to degrade the PE, even after 126 days of incubation. However, 19 strains, of which 11 fungi and 8 bacteria, degraded the PUR at 15°C, while 14 fungi and 3 bacteria degraded the PBAT and PLA plastic blends. The scientists got the best results with two fungal species from the uncharacterised genera *Neodevriesia* and *Lachnellula*, which were capable of degrading all the plastics tested (except the PE). The researchers think these microbes would be capable of digesting plastic compounds at temperatures between 4 and 20°C, with an optimum of around 15°C. They believe this ability to degrade plastic probably stems from the similarity between plant cutin and some plastic polymers.

Next steps: identify the plastic-degrading enzymes produced by the microbes, optimise the process to obtain large amounts of enzymes, and further modify the enzymes to optimise properties such as stability.

Publication: Discovery of plastic-degrading microbial strains isolated from the alpine and Arctic terrestrial plastisphere. Journal: Frontiers in Microbiology. DOI: 10.3389/fmicb.2023.1178474.

More information: Wsl.ch
En savoir plus : Wsl.ch, Futura Sciences.com, Ça m'intéresse.fr, Liberation.fr, Enerzine.com

4303 - Development of a digital millifluidics technology based on droplet trains that can accelerate the development of microbial ecosystems

The technology, named MEM (short for Microbial Evolution Machine) and developed by Revobiom, a start-up specialised in the selection of microbial consortia, can be used to create, by natural evolution, microbial communities within which interactions are stable and effective. The digital millifluidics technology based on droplet trains can screen all the microbial consortia in a given environment, then simultaneously incubate up to 300 'cocktails', track their activity in order to select the most interesting blends, and propagate them, thus managing their evolution to obtain an optimal solution. Each droplet is a bioreactor and is identifiable and traceable thanks to its position, which doesn't change. In addition, MEM technology contains a number of optical sensors that can screen the bioreactors for one particular factor. This droplet-by-droplet screening identifies the consortia that perform the desired function. While the technology obtained its first proof of concept on a pesticide-degradation process, Thomas Bibette, Revobiom CEO and co-founder, says that '*Revobiom is an agnostic technology, and as such we have many potential partners outside the agri-food industry, including in the bioremediation, agriculture (biostimulation, biocontrol, etc.), biofuels, probiotics and cosmetics fields*.'

En savoir plus : L'Usine Nouvelle.com

4304 - A fresh way to depolymerise polycarbonate

Chemists at the Institut de chimie et biochimie moléculaires et supramoléculaires (CNRS/University Claude Bernard Lyon 1/INSA/Ecole supérieure de chimie physique électronique de Lyon) and the Catalysis, polymerisation, processes and materials laboratory (CNRS/Ecole supérieure de chimie physique électronique de Lyon/University

Claude Bernard) have developed a new way to depolymerise poly(bisphenol A carbonate) using specific depolymerisation agents dubbed α-hydroxyketones. The process takes place at ambient temperature in a 'green' solvent made from sustainable feedstock, with an organocatalyst (metal-free catalyst). The scientists managed to regenerate the original monomer under these conditions. They also obtained high-value co-products such as vinylene carbonates, which are used as additives for electrolytes in lithium-ion batteries and the pharmaceutical industry. This new recycling strategy has already proven itself to be effective in deploymerising polycarbonate found in used materials such as CD-ROMs, safety glasses and polycarbonate insulation sheets.

Publication: Chemical upcycling of poly(bisphenol A carbonate) to vinylene carbonates through organocatalysis. Journal: Green Chemistry. DOI: 10.1039/d2gc04413g.

En savoir plus : CNRS.fr

2. APPLICATIONS & MARKETS

Food & feed

4305 - Corbion

The Dutch chemicals company announced the launch of AlgaVie™, a new range of feed ingredients rich in omega-3 and omega-9 and produced through algae fermentation. After several years of R&D, Corbion has assembled a library of more than 9,000 microalgae strains for use in active nutritional ingredients. Its technology platform uses a high-throughput process to isolate thousands of cells per minute to determine which variant has the exact lipid and DHA content to bring to scale. It is already planning to add new active nutritional ingredients to its portfolio in the near future.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

4306 - Eurogerm & Revobiom

The food group specialising in ingredients and solutions for the wheat-flour-bread-pastries industry and the start-up, which has developed a Microbial Evolution Machine (MEM) to formulate complex, stable bacterial consortia at high frequency, announced a new collaboration to develop a family of innovative leavening agents to meet the latest market requirements in terms of nutritional and organoleptic qualities. Revobiom has accepted the challenge of stabilising – in just four months – a 'theoretical' leavening agent composed of two yeasts and six bacteria using its MEM with 240 millimetre-scale bioreactors. The partners plan to extend their partnership if the experiment is a success.

More information: Press release
En savoir plus : Communiqué de presse, Agro Média.fr

4307 - Fermentis by Lesaffre

The Lesaffre group business unit for fermented beverages such as beer, wine and spirits inaugurated its new Campus on the former site of the Lesaffre grain alcohol and genever distillery in Marquette-Lez-Lille, France. The 3,000 m² space brings together in a single location the company's fifty or so employees based in the Lille metropolitan area and houses new facilities including a brewery with more than 50 fermenters, laboratories (some of which are dedicated to sensory analysis) and a reception and training centre. The Campus houses a pilot infrastructure for the production of fermented beverages, designed to test yeasts, bacteria and yeast derivatives under thousands of different conditions. It also has dozens of fully equipped and connected fermentation tanks.

More information: Press release
En savoir plus : Communiqué de presse

4308 - Ginkgo Bioworks & Ambrosia Bio

The American biotech company specialising in synthetic biology and precision fermentation and the Israeli company, which develops new bioprocesses to replace sugar, have entered into a partnership to develop a new enzyme process to produce allulose, a next-generation sugar substitute, at scale. Unlike other currently available sweeteners, allulose has a low caloric value – typically under 10% compared to equivalent amounts of sucrose – meaning it has a minimal impact on blood glucose and insulin levels while maintaining sugar's sensory and culinary properties. Mass production of allulose requires enzymatic conversion of common carbohydrates, but many of the natural enzymes available on the market today lack stability and effectiveness. Over the past three years of stealth mode development, Ambrosia Bio has successfully developed a unique bioprocess using proprietary enzymes alongside a complementary production process to affordably and scalably convert lower-margin feedstocks (e.g., sugar and starch) into rare sugars and specialised ingredients such as allulose. To further optimise its process, Ambrosia Bio will leverage Ginkgo Enzyme Services, a service powered by ultra-high-throughput screening and machine learning-guided protein design. The aim is to help Ambrosia Bio produce an optimised version of its proprietary enzyme in a productive expression strain. In particular, the Israeli company is looking to benefit from access to Ginkgo's extensive strain engineering Codebase, as well as Ginkgo's Foundry capabilities in enzyme expression and analytical chemistry, to develop a more scalable and affordable commercial allulose solution.

More information: Ginkgo Bioworks.com

4309 - Green Spot Technologies

The early-stage business, which has developed a process to convert waste fruit, vegetables and pomace into a highly nutritious powder, is one of the four winners of the third C'Demain innovation competition organised by French retail group Casino. The competition began in 2018 and helps start-ups get innovative projects off the ground, accelerates the deployment of foodstuffs, and increases their chances of being sold in Casino's stores. The winners will receive development and business strategy advice, assistance scaling products, and the opportunity to join Casino's Services for Equity initiative if they wish. They will also receive two training courses in negotiation, given by the Fédération des Entreprises et Entrepreneurs de France.

En savoir plus : Groupe Casino.fr

Green Spot Technologies can optimise sugar, fibre and protein content with its process and in response to requirements. Although the start-up launched its business activities a few months ago, its teams are aware that there is still work to do, particularly in environmental terms (energy and water use, etc.). According to Benoît de Sarrau, Chief Technology Officer of Green Spot Technologies, *'this is still a very difficult process to set up, and could have a lower environmental impact.*'

En savoir plus : France3 regions.francetvinfo.fr

4310 - iMEAN & Limagrain

The start-up whose technology is based on the reconstruction of digital organisms (predictive models) and the French agricultural cooperative specialising in seeds announced they had received a grant of €2 million from Bpifrance for their iCORN project to speed up the development of new drought-resistant maize varieties. To do so, the two partners aim to accelerate genomic selection using a systems biology method powerful enough to predict the behaviour of complex characters while guaranteeing a high predictive capacity in exploratory studies where data are not yet available. With support from the French government, the partners will have five years to demonstrate their technology can substantially increase genomic selection and obtain new varieties with impressive genotyping and phenotyping.

More information: iMEAN biotech.com

4311 - Roquette

The French group specialising in plant-based ingredients opened its new Food Innovation Centre. Located on its long-established site in Lestrem, France, the new centre will provide formulators with state-of-the-art services, including technical assistance and R&D support, cutting-edge equipment, labs and scale-up testing. The goal is to foster innovation and accelerate the market launch of new products. The building contains a demonstration kitchen, a sensory analysis laboratory, various collaborative spaces and labs for pilot-scale testing of various food applications. All food sectors, whether dairy, savoury, confectionery, bakery, beverage or specialised nutrition, will benefit from these new services. The new Innovation Centre cost €4.5 million.

More information: Press release
En savoir plus : Communiqué de presse

4312 - Willow Biosciences & Kalsec

Hot on the heels of the instant success of their first collaboration, the Canadian biotech company and the American company signed a follow-on master services agreement to develop an enzyme used in the biocatalytic production of a new, high-value ingredient for use in beverage manufacture. Willow Bioscience's FutureGrown™ technology platform is a fully integrated, proven solution for rapid enzyme and strain engineering, process development and scaled-up manufacturing that incorporates the latest technologies available for precision fermentation. Kalsec's projects focus on yeast, which is an ideal host for the production of numerous ingredients for the food and beverage sector. The two partners have set their sights on commercial-scale production in 2024.

More information: Press release

Biocontrol/Biostimulation

4313 - Amoéba

The industrial biotech firm specialising in the treatment of microbiological risk, which is developing a biocontrol agent for the treatment of plants in agriculture and a biological biocide for the treatment of industrial water, announced that it would sell its biological pest control solutions under the brand name AXPERA. Amoéba has chosen to retain the AXP (Amoéba Experimental Product) prefix in its brand name as a reminder of the different experimental formulations (AXP12, AXP13, AXP17), an important part of its company history. The AXPERA brand could be used for a range of products (AXPERA Joy, AXPERA Eva, AXPERA Noa, etc.) per the company's marketing positioning. Its biocontrol solutions are expected to hit the shelves in early 2025.

More information: Press release
En savoir plus : Communiqué de presse, Enviscope.com

4314 - Biotalys

The Belgian agrotech which has developed AGROBODY™, a technology platform that can synthesise protein-based plant protection products, announced it had obtained subscription commitments amounting to €7 million through private investment. The investors are the current shareholders: the private equity and venture capital fund of the Union des agriculteurs belges Agri Investment Fund (AIF) and the sovereign Belgian wealth fund Federale Participatie- en Investeringsmaatschappij. Biotalys will use these new funds to continue development of its AGROBODY™ platform and its product portfolio, to support the market launch of its first product candidate Evoca™ and recruit new talent.

En savoir plus : L'Usine Nouvelle.com

4315 - Ginkgo Bioworks & AgBiome

The American biotech firm, which has built a cell programming and biosecurity platform, and fellow biotech AgBiome, specialising in the bioproduction of high-value molecules for various industries, have signed a partnership to optimise the performance of AgBiome's portfolio of agricultural biological products. It is hoped that the agreement will improve the scope and effectiveness of the current biological crop protection products, but also accelerate the discovery and deployment of new products. By leveraging Ginkgo's ultra-high-throughput encapsulated screening capabilities, AgBiome aims to provide growers with new and improved live microbial strain products. AgBiome's crop protection products, discovered using its proprietary Genesis™ platform, are based on natural microbial strains that have undergone extensive testing and evaluation to ensure consistent performance. Ginkgo's ultra-high-throughput encapsulated screening technology makes it possible to search through up to one million strain variants in a single run and select the best-performing candidates for further development. Built on nanoliter encapsulation technology, Ginkgo's screening capabilities provide nanoscale growth and assay compartments and make it possible to greatly reduce the screening time for large libraries.

More information: Press release

4316 - Micropep

The Toulouse-based biotech firm, which develops organic products using micropeptides (small, natural proteins that can be used to adjust the intrinsic capacities of plants, from germination to reproduction) announced that it had hired Dr Kevin Leiner as its new Head of Regulatory & Head of Development, Americas. Dr Leiner holds a PhD in zoology from Texas A&M University and has over 20 years' experience in various sectors, including pharmaceutical biotechnology, agricultural biotechnology and contract research organisations. Before joining Micropep, he worked at Syngenta, supporting the safety assessment and registration of new synthetic and biological crop protection active ingredients and products and genetically modified varieties of food and feed crops. In his new role, Dr Leiner will spearhead Micropep Technologies' global regulatory strategy and oversee product development activities in North and South America. He will drive the company's activities to secure market authorisations for its innovative natural micropeptide-based crop protection products in key market countries, focusing on the United States, the European Union, and Brazil.

More information: Press release

4317 - Syngenta & Biotalys

The Swiss group specialising in seeds and crop protection and the Belgian agrotech have signed a strategic partnership agreement to research, develop and commercialise new biocontrol solutions to manage major pests for a wide variety of crops. Under the terms of the agreement, Syngenta will take part in a research programme to use the AGROBODY™ technology platform developed by Biotalys, which can synthesise protein-based plant protection products. The financial particulars of the agreement have not been released.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

Chemicals & Materials

4318 - ArcelorMittal & LanzaTech

The steel group and the New Zealand-based company specialising in harnessing biotechnology to recycle carbon announced that the Steelanol commercial carbon capture and utilisation facility on the ArcelorMittal site in Ghent, Belgium, had produced its first ethanol samples. The first gases from the steel mill's blast furnace were safely introduced to LanzaTech's biocatalyst in May 2023. After a successful inoculation, initial samples that contained ethanol were produced, demonstrating that the carbon in the gases is being converted into new chemical products.

The ethanol produced by Steelanol will be jointly marketed by ArcelorMittal and LanzaTech under the Carbalyst® brand name. It can be used to produce a variety of products, including sustainable transport fuels, packaging materials, apparel, and even cosmetics. The Steelanol plant required a €200 million investment and has the annual capacity to produce 80 million litres of ethanol, around half of Belgium's total current demand. It should be fully operational before the end of the year.

Info: The LanzaTech process implemented at the Ghent site is fully flexible: not only can it use industrial gases from today's steel production methods but it can also adapt as industry transitions to future steel production technologies with increased green hydrogen input. LanzaTech's process is already employed by three operational commercial facilities, and it anticipates the launch of two additional commercial facilities, in Asia, before the end of the year.

More information: ArcelorMittal.com
En savoir plus : Zone Bourse.com

4319 - ADEME

The French agency for the environment and energy management has published a notice [in French] titled 'The limits of compostable plastic packaging', in which it reiterates that the term 'compostable' means 'biodegradable in a 'compost' environment' under the conditions and requirements stated in the current guidelines – not the capacity to biodegrade in the natural environment. The term 'compostable' does not in fact guarantee that the packaging will biodegrade quickly enough so as not to have an impact on any ecosystems if it is left to break down in the natural environment. ADEME has therefore stated that choosing compostable plastic packaging is not a solution to the issue of plastic pollution in the environment. Instead, it is better to respect the order of priority of end-of-life processing methods: reduce, reuse, then recycle packaging and, where appropriate, direct it towards other upcycling channels. According to ADEME, composting plastic packaging cannot be considered recycling because the material, which is mainly converted into CO_2, is no longer available to make a new product. Degraded compostable plastic packaging does not add any value as a fertiliser, either. It can, however, be considered an asset if it is used as a container that improves or facilitates the organic repurposing of waste. A compostable plastic bag used to separate food waste can increase the quantities of food waste repurposed through composting or anaerobic digestion. It is, in fact, the food waste, and not the plastic container, that generates fertilising material which can be spread over soils, and/or biogas. To limit the environmental impact of end-of-life compostable packaging, ADEME is calling for everyone to start by reducing how much packaging they use, whether by not using any in the first place or by reusing existing packaging. ADEME is also recommending that end-of-life packaging be thrown away in the yellow recycling bin, including those described as 'compostable' or 'biodegradable' in any environment. ADEME did, however, also issue reminders about precautions to take when compostable plastic packaging is disposed of in food waste bins, and some changes to official guidelines to prevent negative impacts:

- Strengthen and/or update biodegradation standards for compostable plastics in compost and anaerobic digestion environments so they do not disrupt the composting and digestion process and no more plastic pieces remain when the end product is spread on soils;
- Update the rural code to assess the safety of returning compostable plastics to the ground.

En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

4320 - Afyren

The French company, which produces seven organic acids (carboxylic acids C2-C6) via fermentation, announced the successful production of several tons of products at its Afyren Neoxy facility, and the successful delivery of the first batches of biobased organic acids. The teams are now working to make operations more reliable so they can launch continuous production in the autumn of 2023. Afyren then plans to gradually ramp up volumes to produce 16,000 tons of carboxylic acids per year at full capacity, for total annual sales (including fertiliser sales) of around €35 million.

Recap: Afyren has commercial commitments for 75% of Afyren Neoxy's annual acid production and 100% of the fertiliser, representing total cumulative sales of more than €165 million.

More information: Press release
En savoir plus : Communiqué de presse, Agro Média.fr

4321 - Bioenzymatic Fuel Cells (BeFC)

The French specialist in enzymatic paper-based biofuel cells that can electrify low-power single-use electronics announced that it had raised €16 million in a Series A funding round. The operation was managed by Avolta Partners with the participation of long-standing investors Demeter Partners, BNP Paribas développement and Supernova Invest, as well as new lead investor Otium Capital. The funds will enable it to leap from a pilot production capacity of around one thousand biobatteries per day to mass production of one million units per day in 2024. It also plans to target new markets and expand abroad, particularly in North America and Japan, and grow its team.

More information: BeFC.global
En savoir plus : L'Usine Nouvelle.com, Les Echos.fr

4322 - Carbios

At a presentation of the results of its Special Meeting and Annual General Meeting, the specialist in the enzymatic recycling of plastics and textiles announced that it had integrated its Purpose into its articles of association following the vote at the Annual General Meeting held on 22 June 2023, as permitted by France's PACTE Act of 2019. The Purpose is 'to generate a positive and significant social, societal and environmental impact in the conduct of its activities.' The Purpose underpins Carbios' business activity, which is to provide solutions to the environmental emergency of tackling plastic pollution.

More information: Press release
En savoir plus : Communiqué de presse

Carbios announced a capital increase through which it hopes to raise at least €122 million, with a maximum capital increase of €141 million if the oversubscription option is exercised in full. Carbios plans to use 85% of the net proceeds of the operation to fund construction of the world's first PET biorecycling plant, located in Longlaville, France. The remainder of the capital increase will finance a ramp-up in research. The result of the operation is expected on 11 July.

En savoir plus : L'Usine Nouvelle.com, Les Echos.fr

At a strategy update for investors, the French company announced that it was planning to become a leader in the burgeoning recycled polyethylene terephthalate (PET) market by capturing a 4 to 8% market share by 2030, rising to 8 to 12% by 2035. To achieve its goal, Carbios' business model will focus on the granting of licences, which will be applied in all the plants:

- the granting of licences for the use of its know-how and intellectual property: these will generate revenue in the form of upfronts paid by the licensee based on the installed capacity and will range between €100 and €200 per ton;
- royalties from the sale by Novozymes of Carbios' proprietary enzymes directly to manufacturers using Carbios' technology. This revenue stream will result from a portion of the margin realised by Novozymes (under the exclusive long-term partnership agreement) on the sale of the fully patented Carbios enzyme to the licensee. It will be proportional to the volume of enzymes sold;
- royalties from the premium generated by manufacturers from the sale of biorecycled PET.

The royalty streams are estimated at around €250 or more per ton of r-PET produced. In its constant efforts to expand its innovation pipeline and extend its proprietary technologies to other polymers, especially polyamides and polyolefins, with first patents expected from 2023, R&D and industrial costs are expected to increase by 15 to 20% on a yearly basis until 2035. General and administrative expenses are expected to increase in the meantime by 8 to 10%, mainly to support the company's licensing and commercial efforts. From a licensing standpoint, payback is expected to be below 7 years from start of investment for a 100 kt plant and provide an internal return rate above

20%. The company also expects its first PET biorecycling plant in Longlaville to be cash positive for operations within the first year of commissioning, which is expected in 2025.
The green chemistry company also announced that from 2023, one of the key focus areas for the intellectual property team will be to protect innovation related to enzymatic degradation of other polymers and ensure that Carbios stays ahead of the game. Carbios' proactive policy with regard to IP ensures that innovations are protected throughout their lifetime.

En savoir plus : Communiqué de presse, L'Usine Nouvelle.com, Les Echos.fr

Carbios and Thai chemicals company Indorama Ventures Public Company Limited (IVL) signed a memorandum of understanding (MoU) concerning the creation of a joint venture for construction of the world's first polyethylene terephthalate (PET) recycling plant, in Longlaville, France. On this basis, and subject to the general terms and conditions in the MoU, Indorama Ventures intends to mobilise around €110 million in equity and non-convertible loan financing for the joint venture. The total investment in the new plant is re-estimated to be around €230 million, accounting for the recent impact of inflation. The project will be financed by Indorama Ventures and subsidies from the French government and the Grand-Est Region, and Carbios will take a participating interest in the joint venture. Carbios' equity contribution will be partly financed by a portion of its current cash position (€86 million as of 30 April 2023). The company is actively studying the best options to fund the remaining amount and will choose the best solution and timeline in response to market conditions. The new unit will be able to process 50,000 tonnes each year and is due to go online in 2025.

Info: Contingent on the results of this first plant in France, the Thai group confirmed its intention to potentially extend the technology to other PET sites for future developments.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com, L'Usine Nouvelle.com

Carbios announced that its plan to scale its unique polyethylene terephthalate (PET) biorecycling process in Longlaville, France, was chosen in the 'plastics recycling' call for proposals run by the French agency for the environment and energy management, ADEME, and that it would therefore obtain government funding of €30 million through the France 2030 investment plan, as well as €12.5 million from the Grand-Est Region. The release of this funding is conditional on the European Commission's approval of the corresponding state aid scheme, followed by the conclusion of national aid agreements. The flagship plant in Longlaville will be the world's first PET biorecycling plant, with entry into service planned for 2025. This plant will make it possible to relocate to France the production of the two basic components of PET, PTA and MEG, both derived from the Carbios process. The green chemicals company also announced that it has been granted total funding of €11.4 million from the French government as part of France 2030, of which €8.2 million directly for Carbios (€5 million in repayable advances) and €3.2 million for its academic partners INRAE, INSA and CNRS via the TWB and TBI joint service and research units. This funding means Carbios can continue its research into the continuous improvement and optimisation of its enzymatic technologies and explore breakthrough technologies.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

Carbios was one of ten businesses chosen (among the 22,000 start-ups in the French Tech ecosystem) to exhibit their new technology at the Château de Versailles for the 6th Choose France international summit, which showcases France as an investment destination.
Carbios also announced it had joined the Coq Vert community which has over 2,000 members working in sustainable development who are committed to playing a part in the green energy transition. Launched by Bpifrance, in partnership with the French agency for the environment and energy management, ADEME, and the ministry of ecological transition, the community encourages committed business leaders to share expertise.

More information: Press release
En savoir plus : Communiqué de presse

4323 - Citeo

The private company specialising in the recycling of household packaging and paper announced the launch of the first French closed-loop recycling activity for polyethylene terephthalate (PET) pots and trays. Thanks to innovative technologies combining mechanical, chemical and enzymatic recycling, the majority of pots and trays, such as those used to package cold meats and pastries, will be recyclable in France from 2025, so they can be used to package food once again. Two successful tenderers were selected to handle at least 17,000 tonnes of packaging from 2025:

- Paprec was selected to handle 70% of the tonnage proposed by Citeo. Initially, this will mean mechanically recycling single-layer trays. Then, through a partnership with Eastman.com, the pots and trays will be processed at the future plant in Port-Jérôme-sur-Seine, France, using a technology proven at scale for molecular PET recycling via depolymerisation. Once recycled, the packaging can be used again for food, medical and cosmetic purposes. Paprec has signed a nine-year contract with Citeo.
- The group formed of Carbios, Wellman and Valorplast, selected to handle 30% of the tonnages proposed by Citeo. This group will recycle single-layer and multilayer trays from 2023. Wellman will process the bulk of the packaging, separating and recycling the single-layer trays via a mechanical process so they can be reused as food packaging. The rest of the steam will be recycled by Carbios from 2025 at its future plant in Longlaville, the first in the world to biorecycle any type of PET, including multilayer PET. This project will require French company Carbios to apply its unique technology, which used highly selective enzymes to transform PET pots and trays back into PET, on a large scale. The group has also signed a nine-year contract with Citeo.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

4324 - Enzymicals & Syngulon

In May 2020, the German company specialising in industrial biocatalysis and the Belgian synthetic biology start-up, which is developing genetic technologies using bacteriocins (anti-microbial peptides) to improve microbial fermentation, signed a non-exclusive licensing agreement for the use of the technology developed by Syngulon to produce new enzymes. This year, the two partners announced they had completed the R&D phase, which enabled them to begin production at scale, then the commercialisation phase for the new enzyme solutions. Bolstered by the success of these two phases, the companies plan to increase internal production capacity and develop the use of this technology for new products.

More information: Press release

4325 - Futerro

At the launch of the consultation prior to the construction of the first polylactic acid (PLA) biorefinery in Europe, the Belgian group confirmed its PLA biorefinery would be located in Port-Jérôme-sur-Seine, France. The future site, which will cost €500,000 million, will produce 75,000 tonnes of PLA annually from starch derived from Normandy wheat. Construction is set to begin in late 2024 and last 12 months. The first tests will be launched in early 2026, before production begins later the same year.

En savoir plus : La Gazette Normandie.fr

4326 - Ginkgo Bioworks & Octarine Bio

The American biotech firm and the Danish synthetic biology company entered into a multi-stage partnership focused on the biobased production of tryptophan, to engineer a strain to produce violacein – a naturally occurring pigment with potent bioactive properties including anti-microbial, anti-oxidant and UV protective properties – and its derivatives. Although initially focused on violacein, the collaboration has the potential to expand to other tryptophan-

derived compounds, each with their own unique applications. With Ginkgo Bioworks' expertise in strain engineering, Octarine will be able to introduce new bioactive colours and dyes to the market.

More information: Press release

4327 - LanzaTech & ADNOC

The New Zealand specialist in harnessing biotechnology to recycle carbon and the Abu Dhabi energy company have entered into a partnership to explore innovative technological solutions to reduce the industry's carbon footprint while producing sustainable fuels and chemicals. The two partners will mainly explore potential opportunities with gas fermentation technology for the production of ethanol and other chemical intermediates such as acetone and isopropanol from waste gases (carbon monoxide, hydrogen and carbon dioxide, for example), as well as the production of sustainable aviation fuel (SAF).

Recap: LanzaTech's technology uses proprietary bacteria that consume carbon-rich waste streams from oil, gas, and manufacturing facilities, and convert them into CarbonSmart™ chemical intermediates for the production of rubber, plastics, synthetic fibres and other hydrocarbons.

More information: Press release

4328 - Mycocycle

The American start-up which has developed a mushroom-based technology to convert industrial waste into renewable raw materials announced that it had obtained €2.2 million (€2 million) in seed funding. The fundraising operation was led by Anthropocene Ventures with the participation of TELUS Pollinator Fund for Good, Alumni Ventures and Telescopic Ventures, among others. Mycocycle has raised €3.7 million (€3.46 million) in total, and will use the new funds to build a pilot facility to expand its operational capabilities and develop its first-generation decentralised treatment container, MYCOntainer, which will process toxic waste in a climate-controlled environment. The funds will also go towards recruiting more staff and validating the reuse of its biobased byproduct by Q3 of 2023.

More information: Press release

4329 - Novozymes & Fibenol

The Danish enzyme specialist and the Estonian company specialising in breaking down wood into raw materials have entered into a commercial partnership to scale the lignocellulosic biorefining process developed by Fibenol, which effectively opens habitually recalcitrant lignocellulosic structures. To do so, Fibenol combined its Sunburst™ pre-treatment technology with tailored enzymatic cocktails from Novozymes, enabling it to convert over 90% of birch wood processing residues into high-quality cellulosic sugars and co-products, including lignin.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

4330 - Seabird

The French specialist in the manufacture of bioplastics for applications in a wide range of sectors has developed biobased, biodegradable fishing nets. While the full formulation is a secret, Marie Chauvel, CEO of Seabird, confirmed that they *'employ biobased polymers supplied by biorefineries that use sugar cane, sugar beet, and potato or maize starch*.' The nets, which have a theoretical lifespan of 1 year, degrade 40 times faster in seawater than a classic nylon net. After three years of testing at sea, the nets have won over fishermen with their fast degradation time. Although they are 10 to 20% more expensive than conventional nets, national or European subsidies could aid their deployment.

Info: Seabird plans to build a 1,000 m^2 plant within the next two years to increase production from 150 to 1,000 tonnes.

En savoir plus : L'Usine Nouvelle.com, Les Echos.fr

4331 - Solvay

The Belgian chemicals company, which produces speciality ingredients for the agrochemicals, home and personal care markets, announced plans to build a multipurpose microbiology lab on its Lyon site in France. The facility will increase the company's internal biodegradability and toxicity testing capabilities. As such, Solvay believes it will be able to improve testing efficiency while building expertise and accelerating efforts to develop more environmentally friendly and safe products through its Renewable Materials and Biotechnology growth platform. Solvay expects a significant increase in the number of samples it can assess each year once the new lab is operational, with product time to market decreasing considerably as a consequence. The company will also integrate digital approaches to capitalise on end-of-life data obtained by the laboratory, accelerating future product development. The new lab is due to be operational in 2024.

More information: Solvay.com
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

In the context of the demerger announced by the Belgian chemicals company, the Solvay name will be retained for EssentialCo, a leader in essential chemistry, while SYENSQO will become the new name of SpecialtyCo, which explores the future of science. Solvay, the new name of EssentialCo, will comprise leading mono-technology businesses including Soda Ash, Peroxides, Silica, Coatis and Special Chem, which generated approximately €5.6 billion in net sales in 2022. SYENSQO, the new name for SpecialtyCo, will be an exploratory science business investigating original perspectives to achieve breakthrough innovations while exploring the future of science. SYENSQO will include the innovative Specialty Polymers, Composites, Novecare, Aroma, Technology Solutions and Oil & Gas businesses, as well as the four growth platforms in batteries, green hydrogen, thermoplastic composites, and renewable materials and biotechnology. The SYENSQO businesses generated approximately €7.9 billion in net sales in 2022. The new names will be effective upon completion of the separation of Solvay, which is on track for December 2023, once the usual requirements have been met.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

4332 - TotalEnergies Corbion

Following examination of the project's investment proposal, the Dutch chemicals company Corbion, partnered with TotalEnergies for the joint venture TotalEnergies Corbion, announced that it would abandon plans to build a new PLA production plant in Grandpuits, France. With a production capacity of 100,000 t/year, the unit, initially due to open in 2024, was to make TotalEnergies Corbion the world's leading PLA producer, ahead of NatureWorks. TotalEnergies Corbion and its shareholders remain committed to the growth of Luminy PLA bioplastics. The announcement will impact neither the global sales and marketing network nor the operations in Thailand, where TotalEnergies Corbion will continue to operate its 75 kT PLA bioplastics plant. There are currently no plans to dissolve TotalEnergies Corbion.

More information: TotalEnergies Corbion.com
En savoir plus : L'Usine Nouvelle.com, Les Echos.fr

The joint venture between broad-energy group TotalEnergies and the Dutch speciality chemicals company Corbion has announced that its Luminy® polylactic acid (PLA) bioplastics meet the stringent criteria of the European Union (EU) Taxonomy Regulation on climate change mitigation and adaptation. The EU Taxonomy Regulation is critical for sustainable innovation because it sets a standard for what can be labelled as 'sustainable' by EU businesses. The framework uses six environmental objectives:

- climate change mitigation;
- climate change adaptation;

- sustainable use and protection of water and marine resources;
- transition to a circular economy;
- pollution prevention and control;
- protection and restoration of biodiversity and ecosystems.

The regulation's purpose is to help increase sustainable investment and further drive the implementation of the European Green Deal.

More information: Press release

TotalEnergies Corbion and the Chinese company Bluepha, which has developed a biology automation platform to engineer microorganisms to design and manufacture sustainable molecules and materials, have signed a memorandum of understanding (MoU) to accelerate the market adoption of PLA/polyhydroxyalkanoate (PHA)-based solutions in China. The collaboration aims to bring together the expertise and resources of both companies to further advance the development of high-performance biopolymer solutions, combining Bluepha® PHA with Luminy® PLA technology. Under the terms of the MoU, Bluepha and TotalEnergies Corbion will jointly promote PLA and PHA market applications in China.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

TotalEnergies Corbion and the Chinese producer of plastic film Changsu Industrial have signed a strategic cooperation agreement to further the biaxially oriented polylactic acid (BOPLA) industry. BOPLA is made with biobased PLA using biaxial stretching technology, making Changsu Industrial's BOPLA product BiONLY® biodegradable and capable of significantly reducing the carbon footprint of packaging materials. Under the terms of the agreement, the two partners will work together to promote new products on the market and on R&D to find new technologies and applications. Changsu Industrial and TotalEnergies Corbion are currently working on the development of BOPLA BiONLY®-based adhesive tapes for the Chinese postal service to replace conventional fossil-based material.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

The joint venture has teamed up with plastic transformation specialist Coexpan and Innotech, the innovation centre dedicated to packaging solutions, to launch a biobased cup made of recycled PLA. Available in both white and high transparency, the cup can be produced at a speed comparable to that of other plastic materials using Form-Fill-Seal (FFS) technology, a high-speed packaging process for semi-liquid products.

More information: Press release

4333 - Packaging: a study confirms that packaging certified 'compostable' does indeed biodegrade

In partnership with French higher education establishment AgroParisTech and the University of Montpellier, Chaire CoPack has carried out a study on the materials intended for the food packaging market made from biobased, biodegradable and compostable resins produced by European and French manufacturers in the value chain. Carried out between October 2022 and February 2023, in an open environment without forced aeration, the study consisted in industrially composting 20 tonnes of food and organic waste collected from households, to which were added 323 kilos of assorted compostable packaging, certified under standards NF EN 13432 and T51-800, to achieve an incorporation rate '*voluntarily overestimated at 1.3%.*' In parallel, checks were carried out on and samples taken regularly from a control compost. The main results of the test showed that the addition of certified compostable packaging had a positive effect on the compost yield; had no negative consequences on the agronomic quality of the end compost; did not generate any ecotoxicity for higher plant species, worms or daphnia;

and that all the tested materials fully met requirements in terms of disintegration rate. They also looked at what became of compostable microfragments remaining in the soil and found that they immediately continued to break down, and that the speed of biodegradation increased depending on how long they remained in the compost. The initial results therefore appear to show the non-persistent nature of remaining compostable microfragments still present at the end of the composting process.

En savoir plus : L'Usine Nouvelle.com, Agro Média.fr

4334 - Launch of the Dyestuff Library project: a digital library of sustainable dyes

Launched by the Fashion for Good association, which champions sustainable fashion, the Dyestuff Library project is a digital tool that will enable the association's partners to choose sustainable dyestuff based on competitive performance and environmental metrics for commercial use. The library hopes to '*accelerate the shift from harmful chemistry to more sustainable options by enabling visibility and access to innovations*.' The project involves submitting 15 dyes, created mainly from plants, microorganisms, algae and food waste, to pilot trials in the lab for 1 year. The goal is to ensure their quality, conformity and absence of toxicity so they can be commercialised. Thanks to this project, the textile industry will be able to access the most high-performance ecological dyestuffs and begin new trials on a broader palette. The initiative has received support from Fashion for Good partners including Adidas, Inditex, Otto International, Bestseller, Target, Patagonia, Welspun, Shahi Exports and Paradise Textiles.

More information: Fashion for Good.com
En savoir plus : 20 Minutes.fr

Energy

4335 - Biogaz Services

Biogaz Services, a French company specialised in the setup, biological monitoring, servicing and maintenance of biogas plants, announced that it had tasked Wessling with testing the efficacy of natural enzymes and the safety of scale inhibitors in biogas production. The laboratory tested four procedures; the first contained no enzyme and served as a benchmark, while the other three contained an enzyme supplied by Biogaz Services. The procedures were tested using the same product to digest – rye – at the dosage recommended by the manufacturer. Robin T'Jampens, Head of the Waste Recovery Division at Wessling, said: '*We analyse the effects of each enzyme compared with a standard product by comparing their biogas production. The tests are still ongoing, but we can already tell that the enzymes increase the speed at which organic matter degrades*.'
In addition, at the request of a client who wanted to ensure that the scale inhibitor used would not disrupt the metabolism of the bacteria found in the digester and therefore disrupt biogas production, Biogaz Services and Wessling performed laboratory tests on three scale inhibitors with two different concentrations available on the market. After 31 days of incubation, Wessling concluded that all three scale inhibitors had a negative impact, with 2% to 30% of biogas production loss. By calculating how much biogas was lost for each scale inhibitor, Biogaz Services was able to advise the operator which product had the least impact on biogas production.

En savoir plus : Wessling Group.com, Revue ein.com

4336 - Elyse Energy

During his speech on the future of sustainable aviation, French President Emmanuel Macron announced that the start-up Elyse Energy would build a sustainable aviation fuel (SAF) production unit in Lacq, Pyrénées-Atlantiques, together with its partners Avril, Axens, Bionext and IFP Investissements. The facility, which will be run by a company called BioTjet created especially for this purpose, will be able to produce 110,000 tonnes of products per year, including 75,000 tonnes of biokerosene (which should meet 20% of French aviation needs by 2030) and 35,000 tonnes of naphtha for road transportation and green chemistry. The project will require a €1 billion investment, but funding is not yet in place – Elyse Energy plans to rely mainly on banks and investment funds specialised in this type of infrastructure. The decision will not be taken until 2025–2026 with operations scheduled

to start in 2028. There are plans to set up two other renewable energy production units on the same site: a hydrogen power plant and an Elyse Energy biomethanol production plant for sustainable marine fuel.

En savoir plus : L'Usine Nouvelle.com, L'Usine Nouvelle.com, Les Echos.fr

4337 - Emirates

Emirates, an airline based in Dubai, United Arab Emirates, announced that over the next three years it would invest $200 million (€187 million) in R&D projects to reduce the carbon footprint of the aviation industry. To do so, Emirates will conclude partnerships with leading organisations that develop solutions in the field of advanced technologies in fuel and energy. The Emirates leadership team in charge of environmental sustainability will oversee disbursement, with support from technical experts.

More information: Emirates.com
En savoir plus : Air Journal.fr

4338 - Ginkgo Bioworks & Visolis

Ginkgo Bioworks, an American biotechnology company, and Visolis, a company specialised in synthetic biology, signed a partnership agreement to improve upon an existing microbial strain for the commercial production of a key feedstock ingredient for biobased isoprene and sustainable aviation fuel (SAF). Ena Cratsenburg, Chief Business Officer at Ginkgo Bioworks, said: '*Visolis has demonstrated early success in scaling production of isoprene because of their ingenuity in combining bioengineering and chemical processing. We're thrilled to collaborate with Visolis to optimise this innovative and sustainable process with the power of synthetic biology*.'

Recap: Isoprene is a key monomer used for commercial-scale synthetic rubber production. Achieving the production of biobased isoprene at scale is a significant step towards decarbonising tyre manufacturing. Biobased isoprene can also be used as an intermediate for the production of high-performance, lower-carbon intensity SAF.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

4339 - Global Bioenergies

Global Bioenergies, a French industrial biotechnology company, announced that its sustainable aviation fuel (SAF) made using its bio-isobutene production process had been certified by ASTM International, an international standards organisation that develops and publishes technical standards for a wide range of materials, products, systems and services. The SAF made by Global Bioenergies can now be blended up to 50% with fossil kerosene in existing aircraft. The updated ASTM D7566 standard, which describes the fuel specification requirements and the maximum blending percentage with conventional fuels, will be published in the coming weeks. To produce SAFs in France, Global Bioenergies will need to set up a wood-derived sugar production unit near its facilities. The first unit is due to open in Évry, Essonne in 2026 and produce 2,000 tonnes of biobased isobutene per year, which will be used for cosmetics and the first litres of SAF. Industrial production is planned for 2028 through a joint venture with sugar maker Cristal Union. The plant, which will be set up near deciduous forestry residue resources in northern France, will have a production capacity of 30,000 tonnes of isobutene per year.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

4340 - Naskeo

The French company, a subsidiary of the Keon group, specialising in biological methanation, has announced the launch of Mono-métha, a comprehensive methanation solution for farmers. From a technical point of view, Mono-métha was designed to meet specific farming needs and boasts features such as:

- An incorporation system tailored to various farming inputs;
- A simpler process equipment chain designed for easy, fully independent use;

- Reduced electricity consumption;
- Prolonged residence time to ensure maximum biogas production;
- Fitted with leading brands (Suma agitators, Vogelsang pumps and grinder, Pumpe hopper, Baur membranes, etc.) to guarantee that the solution is robust and long-lasting;
- Possibility to extend its capacity for integrated production from the project design stage.

As part of its overall service offer, Naskeo wants to make it easier for farmers who are just embarking on methanation. The manufacturer provides farmers with financial support and advice throughout the project, first through a dedicated project manager followed by an engineer responsible for overseeing all construction works.

En savoir plus : Agri Mutuel.com

4341 - Rayonier Advanced Materials (RYAM)

RYAM, an American company specialised in the production of high-purity cellulose specialty products, hosted a groundbreaking ceremony for its new second-generation bioethanol plant located in Tartas, France. The future plant will capture residual sugars from existing biomaterials refinement processes and convert those sugars into 2G bioethanol that will be used in the automotive and aviation industries. The plant, designed to produce up to 21 million litres of bioethanol, has received ISCC EU certification and entered a long-term agreement with a large international petrochemical company. The new facility is scheduled to begin commercial operation during the first half of 2024.

En savoir plus : L'Usine Nouvelle.com, Le Journal des Entreprises.com, Le Maître Papetier.ca

4342 - TotalEnergies

TotalEnergies, a global multi-energy group, and **Saint-Gobain**, a French group that designs, manufactures and distributes materials, have signed a 100 GWh biomethane purchase agreement for three years starting in 2024. The biomethane will be produced by TotalEnergies at its BioBéarn biomethane plant in Mourenx, Pyrénées-Atlantiques, which came on stream at the beginning of the year. The plant's production is certified sustainable by ISCC under the highest sustainability criteria of the EU REDII Directive. By acquiring the Guarantees of Origin, and thanks to their sustainable certification, Saint-Gobain will be able to attest, within the framework of the EU Emissions Trading Scheme, to the decarbonisation of its energy consumption in France. This contract is also an example of the purely commercial, i.e., non-subsidised, sale of biomethane.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

At the Paris Air Show, TotalEnergies announced that, as of 2028, the company will be in a position to produce half a million tonnes of sustainable aviation fuel (SAF), enough to cover the gradual increase in the European SAF blending mandate, set at 6% for 2030. To this end, TotalEnergies is investing massively and is launching multiple SAF production projects:

- In Ile-de-France: TotalEnergies is investing €400 million to convert its site in Grandpuits, Seine-et-Marne, into a zero-crude platform, primarily focused on producing SAF from circular feedstock such as animal fat and used cooking oil. Grandpuits will be able to produce 210,000 tonnes of SAF per year as of 2025, and a new investment has been announced to produce a further 75,000 tonnes per year by 2027.
- In Normandie: TotalEnergies has started coprocessing SAF from used cooking oil at its Gonfreville-l'Orcher refinery in Seine-Maritime. The company plans to increase annual production at the site to 40,000 tonnes from 2025. In addition, following technical work carried out with its aeronautical partners, TotalEnergies will produce an additional 150,000 tonnes per year of SAF by coprocessing HVO biodiesel produced at La Mède, Bouches-du-Rhône as soon as this production method is approved by the ASTM.
- In Provence-Alpes-Côte d'Azur: TotalEnergies has invested €340 million to convert its refinery in La Mède, Bouches-du-Rhône, into a biorefinery. Biodiesel produced at La Mède is already being used to make SAF at the TotalEnergies Oudalle plant in Seine-Maritime. TotalEnergies is examining a new investment that would give it the capacity to produce biofuels and SAF entirely from waste from the circular economy (used cooking oil and animal fat) via coprocessing at La Mède by 2024.

The broad energies group aims to produce 1.5 million tonnes of SAF per year by 2030 at production units in Europe, the United States, Japan and South Korea, which will account for 10% of the world market by that date.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

Following the decision taken by its partner, Belgian chemicals company Corbion, to abandon plans for a new PLA production plant in Grandpuits, Seine-et-Marne, TotalEnergies has shared its plans for the future of the Grandpuits site:

- Double SAF production and bring the site's annual production capacity to 285,000 tonnes per year (almost double the capacity announced in 2020). This new investment responds to the gradual increase in minimum SAF shares mandated by the EU, set at 6% for 2030;
- Develop low-carbon energies at the Grandpuits zero-crude platform, with the construction of a biomethane production unit with an annual capacity of 80 gigawatt hours (GWh) per year, equivalent to the average annual demand of 16,000 people. It will be supplied with organic waste from the biorefinery and will prevent the emission of almost 20,000 tonnes of CO_2 every year.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com, Connaissance des Energies.org

TotalEnergies announced that it had acquired a 20% stake in Ductor, a start-up based in Finland that has developed an innovative technology involving the use of bacteria to process high-nitrogen organic waste, which is usually difficult to use for biomethane production. The technology makes it possible to extract nitrogen from poultry manure and turn it into ammonia solution, a sustainable fertiliser that can be sold for gardening purposes. It will enable TotalEnergies to seize new market opportunities. In addition, the two partners have signed an agreement to develop and invest in several biomethane production projects, primarily in the United States and Europe. Ductor already has a pipeline of 15 to 20 projects, some of which are at an advanced stage. The companies are planning to develop an initial facility in Ohio, United States. Under the terms of this joint venture, TotalEnergies will market the production of biomethane, and Ductor the production of the sustainable fertilisers.

For info: In Finland, Ductor already has a first pilot site with the capacity to process 1,400 tonnes of poultry manure and produce 266,000 Nm^3 of biogas per year.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com, Gaz Mobilité.fr

Health & Beauty

4343 - Amyris & Croda

Amyris, an American biotechnology company that uses its Lab-to-Market™ technology platform to produce squalene by fermenting sugarcane, and Croda, a British specialty chemicals company, have signed an exclusive licence agreement for the supply of sustainable squalene for the pharmaceutical industry. Under the terms of the agreement, Amyris will manufacture and supply squalene to Croda and Croda will license squalene technology for Amyris to market, distribute and sell squalene as an excipient or ingredient. The formulated products will be for use in human or veterinary vaccines, drug delivery systems, or nucleic acid delivery systems. Croda will also leverage its experience with good manufacturing practices for the pharmaceutical industry and speed up commercialisation of the final packaged squalene products. As part of the agreement, Amyris will receive an upfront payment of $4 million (€3.7 million) and a future, performance-based milestone payment of $4 million (€3.7 million). The American company will also receive a share of profits generated from the sale of squalene excipients and formulated products incorporating Amyris' squalene technology for use in the vaccine field.

More information : Press release

En savoir plus : L'Usine Nouvelle.com

4344 - BBGI & Conagen

BBGI, the leading manufacturer and distributor of sustainable fuel in Thailand, and Conagen, a US biotechnology company, have signed a memorandum of understanding regarding a joint venture to produce sustainable biobased products to benefit consumer health and well-being. The partnership aims to explore innovative biosolutions made through precision fermentation for commercial distribution, with the anticipated potential to increase business opportunities and future earnings. A joint feasibility study is underway to explore product opportunities and examine the production facilities and key terms of the joint venture. Under the plan, BBGI intends to retrofit and upgrade one of its existing ethanol manufacturing facilities or build a new manufacturing factory in Thailand, to produce products using state-of-the-art synthetic biology developed by Conagen.

More information: Press release, Biofuels Digest.com

4345 - BGene

BGene, a French start-up that develops new manufacturing procedures for aromatic compounds through bacterial fermentation for the cosmetics industry, announced that it had committed to transparency and traceability regarding its innovation to help the world transition to a green economy. BGene has identified three main concerns: limit the company's impact on resources, guarantee a more environmentally friendly process, and share scientific knowledge. Looking ahead, the start-up would like to manufacture its first batches of ingredients this year and further increase its workforce within three years, to scale up commercially and work towards mass production.

En savoir plus : Industries Cosmetiques.fr, L'Usine Nouvelle.com

4346 - Debut

Debut, a US biotech company that has developed a cell-free advanced biomanufacturing platform for producing complex natural products such as high-performance polyphenols, biopolymers and natural dyes (which can then be used in cosmetics, skincare and packaging), announced that it had raised $34 million (€31 million) in a series B fundraising round. The operation was carried out by Bold, L'Oréal's corporate venture capital fund, with contributions from Fine Structure Ventures, Material Impact, GS Futures, Cavallo Ventures, Cultivian Sandbox Ventures and ACVC Partners, among others. The investment builds on existing joint development programmes between L'Oréal and Debut that leverage Debut's extensive intellectual property portfolio, from which more than 7,000 ingredients can be created in order to bring high-value, more sustainable ingredients to market faster. The new funding will help Debut upgrade its technology quickly and develop a wide variety of cosmetics ingredients.

More information: L'Oréal's press release, CEN.acs.org
En savoir plus : Communiqué de presse de L'Oréal, Premium Beauty News.com

4347 - Dyadic & Fermbox Bio

Dyadic, a US biotechnology company focused on the bioproduction of low-cost proteins, metabolites and other biologic products, and Fermbox Bio, a US synthetic biology company specialised in microbial precision fermentation, have signed an agreement to design, develop and commercialise innovative animal-free alternative proteins and biomaterials intended for non-pharmaceutical purposes. Under the agreement, Dyadic and Fermbox expect to use Dyadic's proprietary Dapibus™ filamentous fungal-based microbial protein production platform. Joe Hazelton, Chief Business Officer at Dyadic, said: '*Fermbox has extensive expertise in bio-alternate development and microbial precision fermentation, which we expect will accelerate our ability to exploit the Dapibus™ platform and expand Dyadic's product offering for non-pharmaceutical alternative protein applications, such as food, nutrition, wellness and other bioproducts*.'

Recap: Dyadic has also developed a protein production platform based on the fungus *Thermothelomyces heterothallica* (formerly *Mycekiophthora thermophila*). The platform serves to manufacture proteins that will be used for the development of biologic vaccines and medications.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

4348 - International Flavors and Fragrances (IFF)

IFF, an American company specialised in perfumes and fragrances for the cosmetics and food industries, announced the launch of its new Designed Enzymatic Biomaterials (DEB) platform for the development of biopolymers at scale. The platform's performance is comparable or superior to fossil-based materials. The new technology has various applications in personal care and home care products, and in fabrics and packaging.

More information: Press release

4349 - Merck

Merck, a German science and technology company, opened a new facility in Corsier-sur-Vevey, Switzerland: the Merck Biotech Development Center, which will manufacture all of the company's biotechnology medicinal products at an industrial scale. The new facility, which required an investment of over €250 million, is equipped with two identical clinical batch production lines, both fitted with single-use 200- and 2,000-litre bioreactors for the continuous production of therapeutic proteins. In addition, equipment and workstations are digitised and automated as far as possible to ensure traceability of all operations. At full capacity, the new facilities could lead to as many as six developments per year in the fields of immunology, oncology and neurology. The first clinical batches for testing should be ready as early as the start of next year.

For info: Biotechnology is becoming increasingly prominent in the company's Healthcare pipeline and today accounts for around 60% of its pharmaceutical sales. Cédric Hyde, Chief Financial Officer for Western Europe, said that the sales of Merck's biotech compounds are predicted to grow by around 5% per year in the medium term (i.e., over the next 3 years), while the entire Healthcare business sector is expected to grow by between 2% and 3% this year.

En savoir plus : Merck Group.com, L'Usine Nouvelle.com, Pharmaceutiques.com

4350 - Modern Meadow & Evonik

Modern Meadow, a US biotech start-up, and Evonik, a German leader in speciality chemicals, have concluded a new partnership to create sustainable, clean beauty products that are high-quality and vegan. To do so, the partnership will combine Modern Meadow's Bio-Coll@gen™ yeast fermentation-based technology for manufacturing a safe and scalable replacement for animal-derived collagen with Evonik's expertise in beauty and personal care ingredients to develop new formulations and enhance existing products.

For info: Modern Meadow's Bio-Coll@gen™ promotes the skin's natural ability to produce more collagen. It improves the skin's appearance and health, and provides a comprehensive range of anti-ageing properties.

More information: Press release

4351 - Roquette Frères & Beren Therapeutics P.B.C

Roquette, a French company specialised in plant-based ingredients for the food and healthcare industries, and Beren, a US biopharmaceutical company focused on therapeutic research, have signed an innovation agreement to expand the full potential of Beren's technologies based on cyclodextrins (natural cage-shape molecules that can encapsulate various molecules) and their medical applications. The agreement should help Roquette strengthen its position on the market of "host" molecules (molecules with a pore-like structure that is able to capture other molecules, with which it can form compounds). It should also open up expanded capabilities for Roquette in excipient manufacturing and in chemistry, manufacturing and controls (CMC) management. For its part, Beren Therapeutics P.B.C. will receive support that should help speed up scientific innovation in the design and manufacturing of medicinal products.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

4352 - Sweetech

Sweetech, a French start-up and spin-off of Toulouse Biotechnology Institute (TBI), has developed an enzyme technology for the large-scale production of oligosaccharides (short-chain sugars). The technology makes it possible to manufacture many new compounds with a high potential for use in human health on account of their prebiotic, immunomodulatory and antigenic properties, among others. Currently hosted by TBI, Sweetech has filed a new patent and is planning the industrial production of its compounds, which it already sells to stakeholders in the healthcare, cosmetics and pharmaceutical industries. Julien Durand, CEO of Sweetech, said that the company plans to acquire its own production plant within two years. Discussions with investors are taking place to ensure that the scale-up is achieved.

En savoir plus : POC Média.fr

4353 - Wacker & ADL BioPharma

After acquiring fermentation facilities with a capacity of 800 m^3 from the Spanish contract manufacturing company (CMO) ADL BioPharma in 2016, the German chemical group Wacker announced that it had acquired 100% of the shares of the same company from Kartesia, a financial investor and previous owner of the shares. The acquisition, which cost more than €100 million, should allow Wacker to hire 300 more employees, increase its fermentation capacities by around 2,000 m^3, and add additional capacities for recovery and purification processes. Wacker will continue and grow existing customer relationships maintained by ADL BioPharma in its capacity as CMO for fermentation-based products for the food, pharmaceutical and consumer goods industries.

More information: Press release
En savoir plus : L'Usine Nouvelle.com

4354 - Willow Biosciences

Willow Biosciences, the Canadian start-up that developed FutureGrown™, a biotechnology platform that enables the large-scale production of precision-fermented functional ingredients for the health and wellness, food and beverage, and personal care markets, announced that it had signed a master services agreement with an innovative biotech company focused on age-related diseases. Through this partnership, Willow Biosciences will develop precision fermentation processes for a class of molecules with targets being developed as nutritional supplements for health and wellness and active pharmaceutical ingredients (APIs). Willow will use its technology platform and yeast-strain engineering expertise to develop a strain and process for the production of the partner's ingredients. If the R&D phase is successful, both parties anticipate that the next steps will be a full process optimisation programme and entering into a commercial agreement to scale up the targeted ingredients. Due to the potentially highly innovative nature of its research, the partner's name and target molecules are not being disclosed at this time.

More information: Press release

Others

Industrial biotechnology services

4355 - Technip Energies & Processium

The French group Technip Energies announced the acquisition of Processium, which specialises in developing processes and has a laboratory and pilot facilities in Lyon, France. Technip Energies designs and develops next-generation processes to support energy transition and improve industrial competitiveness in sustainable chemicals. Through this acquisition, the group will pursue its strategic aim of stepping up the development of new processes and technologies to meet the pressing needs of a high-growth market, guided by sustainability goals. Technip Energies will build on its R&D portfolio and add to its service offerings with the help of Processium's experienced team, who have specific skills in reactor design and scale-up and are experts in purification and downstream processing.

More information: Press release
En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

4356 - TWB

Having successfully scaled up TWB operations over the last four years, Olivier Rolland has decided to pursue new professional opportunities. Commenting on Olivier's departure, Nicolas Seeboth, Research Director (Polymers and Chemical Additives) at Michelin and Chair of the TWB Strategic Steering Committee, said, *'The TWB Strategic Steering Committee commends Olivier Rolland's commitment and the outstanding results he has achieved with his entire team over the last four years.'* Fabrice Garrigue will succeed Olivier in his role as Managing Director. Fabrice joins TWB with the task of continuing to grow the business while improving operational excellence and the integrated offerings that make the TWB business model a success. The new Managing Director has solid professional experience in the plant chemistry and biotechnology industries, within large industrial groups and start-ups alike.

En savoir plus : Communiqué de presse, La Tribune.fr, Le Journal des Entreprises.com

4357 - Plant-based chemistry: publication of a map listing industrial and R&D sites in France

The French plant-based chemistry association Association Chimie du Végétal (ACDV) listed 640 production and research sites across France (compared to 310 sites in the last edition). The new map shows how energised the industry is, both with new start-ups – a source of momentum and innovation – and new facilities, illustrating that some companies have scaled up. The selection criteria for companies in the biobased industry were redefined for this new listing to be more representative of the industry, and four main stakeholder categories were determined: agribusiness (production of agri-resources, plant extraction), plant-based chemistry and biobased product manufacturers, industrial biotech companies, and R&D laboratories. With turnover exceeding €10 billion, 5% growth year on year and 165,000 jobs, plant-based chemistry is a great opportunity for industrial developments that are part of a sustainable circular economy.

En savoir plus : Communiqué de presse, L'Usine Nouvelle.com

3. PUBLIC POLICIES & REGULATIONS

In France

4358 - France 2030: first assessment report issued by the future investments supervisory body

Produced during the first half of 2023, the report [in French] titled *France 2030 : lancement maîtrisé d'un plan d'investissements à impacts majeurs* [France 2030: controlled launch of a high-impact investment plan] shows that the France 2030 investment plan is likely to have substantial effects on the economy as it could increase GDP by €40–80 billion and create 288,000–600,000 jobs by 2030. It also showed a clear impetus from innovation ecosystems and value chains. Public investments facilitate, accelerate and enable the transformation of a range of sectors, such as the automotive, hydrogen, and electronics industries, new quantum technologies and next space. By 30 April 2023, 1,900 new projects received support, led by over 2,200 successful tenderers. In this first wave of projects, some 2,000 patent applications are expected to be filed, and 40,000 direct jobs will continue to exist or be created. In addition, 12,000 new training courses will be launched for future jobs and up to 4 million fewer tonnes of CO_2 will be emitted annually. The supervisory body stressed that the success of the France 2030 launch was mainly due to significant political undertakings, specific administrative governance and a good financial framework. The fact that investments across the value chain have been consistent also had its part to play. The independent assessment showed that the plan also stood out thanks to its regional approach, combining the need for investments with achieving a geographical balance. Local ecosystems, local authorities and decentralised services were mobilised to implement this plan as part of good regional governance. The plan was also rolled out quickly thanks to political and administrative will. By the end of 2023, around half of the resources earmarked for France 2030 will have been allocated. Following a successful launch, this new stage for France 2030 heralds a focus on the impacts. The report gave 24 recommendations to optimise the plan's effects in the years to come: the supervisory body proposed intensifying investment prioritisation and further personalising support. Applying 'commando' leadership traits will help businesses go even further, faster. The body also recommended that the government expand its strategic role, technology watch capabilities and anticipation for public investments.

En savoir plus : Communiqué de presse, Gouvernement.fr, Les Echos.fr, Le Figaro.fr

4359 - Launch of 'Je choisis la French Tech' plan

This initiative was launched by Bruno Le Maire (Minister of Economics, Finance and Industrial and Digital Sovereignty), Jean-Noël Barrot (Deputy Minister of Digital Transition and Telecommunications) and Mission French Tech to encourage the uptake of French tech solutions. The plan is designed to help resolve the difficulties start-ups face when selling their solutions to the biggest buyers in the French economy, to double public and private orders for start-ups with the help of 500 partners by 2027. The plan has five leverage points:

- training public and private entities;
- networking: over 30 events for start-ups and other stakeholders in the French economy are scheduled by the end of 2023;
- funding: new funding will be deployed for new stakeholders, whether from the public procurement office or the France 2030 plan;
- regulations: the introduction of a suitable regulatory framework will remove obstacles and pave the way for partnerships with start-ups;
- communication: champion successful partnerships between key public and private industry leaders and French Tech start-ups.

This plan also anticipates the launch of a research panel headed by the mediator Pierre Pelouzet to determine the state of relations between start-ups and public and private leaders. In addition, Mission French Tech will hold an annual event – Choisissons la French Tech [Let's choose French Tech] – that will award prizes to the best partnerships between start-ups and other stakeholders in the French economy. The first such event will take place in November 2023. The plan is also to appoint a 'Je choisis la French Tech' ambassador to convey messages to all economic stakeholders, major groups and government offices. To date, 45 professional federations, digital associations and public stakeholders have signed up for the plan. Add to that figure 255 companies, including 108 major groups, who have also committed to 'choosing French Tech' in two areas: 'partner' companies have promised to double their start-up purchases by 2027, while 'support' companies have made medium-term commitments (designating a start-up focal point, setting up an accelerated procurement process, doubling the number of start-ups referenced as suppliers, and holding events).

Source: lafrenchtech.com.

En savoir plus : Economie.gouv.fr, L'Usine Digitale.fr, La Tribune.fr, Le Figaro.fr

4360 - French Tech 2030: list of winners for this first edition

For its first edition, the French Tech 2030 support programme selected 125 companies in a position to accelerate their scaling-up activities. The technology level was particularly high, as was the economic potential. The winners address the challenges laid out in France 2030's ten goals and six levers. Particular attention went to solutions that bolstered France's industrial and technological sovereignty. The 125 emerging businesses selected will benefit from the support of Mission French Tech for at least a year, a period that can be renewed. Through individual and group support, the aim of the programme is to provide financial and extra-financial help to tackle the strategic challenges faced by companies: international development, funding, commercial development (public and private procurement), recruitment, set-up in local areas, intellectual property, and regulatory issues.
Of the winners, ten stemmed from or benefited from research work by the French national research institute for agriculture, food and the environment (INRAE), putting forward original solutions in three areas:

- Supporting the transition to a diet rich in non-animal protein;
- Supporting the agroecological transition;
- Innovating for human health.

Info: The start-up Green Spot Technologies, a member of the TWB consortium, was one of the winners of this first edition. The start-up uses white biotechnologies to produce new high-value food ingredients with better nutritional profiles. It uses a wide range of streams of fruit and vegetable sub-products that are currently wasted.

En savoir plus : La French Tech.com, Dossier de presse, Inrae.fr

4361 - Decarbonising aviation: Macron's plan for the industry

France's President Emmanuel Macron announced a major plan to develop a 'zero emissions' aircraft with several hundreds of millions of euros in financial aid and investments to develop biofuels and new engines and aircraft. Of this sum, an annual envelope of €300 million will be allocated to the design of new lighter aircraft and more fuel-efficient engines over 2024–2030. In parallel, the French government will invest €200 million to develop cutting-edge biofuel to produce a target annual volume of 500,000 tonnes by 2030. A sustainable biofuel facility BioTJET, managed by Elyse Energy, will open in Lacq, Pyrénées-Atlantiques. The French President also announced a €50 million envelope for *'emerging players and start-ups'* to *'develop small hybrid, electric or hydrogen aircraft*.'

En savoir plus : Elysée.fr, La Dépêche.fr, France TV Info.fr, Connaissance des Energies.org, La Tribune.fr

4362 - Decarbonising aviation: the Occitanie region steps up its Avion Vert plan

Last year, the Occitanie region's Avion Vert (Green Aircraft) plan was unveiled with an initial budget of €100 million to *'turn the region into the place where environmentally friendly aircraft are designed and brought to life.'* An additional €50 million has now been earmarked for this plan. In the words of Carole Delga, President of the Occitanie region: *'Over 45% of the initial envelope for the plan has already been used. We decided to top it up, especially to encourage investments in sustainable fuel production and distribution, innovation and training.'* The new money will go towards funding studies and building a synthetic electro-sustainable aviation fuel (e-SAF)

production facility – expected to enter into service within five years. It will also fund other technology development products for green aircraft.

En savoir plus : La Région.fr, L'Usine Nouvelle.com, La Tribune.fr, Le Figaro.fr

4363 - France 2030: launch of the 'Recyclability, recycling and reincorporation of recycled materials' PEPR research programme

Led by the CNRS and funded to the tune of €40 million over six years by the France 2030 investment plan, this PEPR research programme aims to remove the scientific and technological barriers encountered in the field of recycling. It focuses on five everyday materials: plastics, composites, textiles, strategic metals, and paper & card. The programme is unusual in its approach in that it mobilises most disciplines and includes the human and social sciences. Of the ten research projects, five concern families of materials:

- The 'Recycling, recyclability and reuse of plastics' project will focus on the behaviour of contaminants in plastics, disassembly and dismantling lines for complex structures such as multilayer packaging, and chemical recycling possibilities for plastics.
- The 'Innovative strategies and processes for the recycling of strategic metals: moving towards a more circular economy' project will carry out a socio-economic and environmental assessment of the recycling of strategic metals, develop an automated sorting line, examine operations to dissolve and recover strategic metals, model the processes for such and develop tools to optimise these processes.
- The 'New generation of recyclable composites made from recycled raw materials: moving towards a circular economy' project will look into the separation of the components of composites from the wind, electronics and automotive industries found in end-of-life composite streams both now and in the future. It will also study the development of new composites made from recycled materials, accounting for their end of life.
- The project focusing on paper and card will deploy new sustainable processes to improve the properties of recycled fibres, study the upcycling of solid and liquid waste from the conventional recycling process, and develop new processes to reuse and recycle all the separate elements in the case of composite materials. It will produce an environmental and societal analysis of the targeted processes.
- The 'Textile upcycling: recycling, recyclability and reuse' project will investigate textile recycling strategies and the design of polymers for spinning that can fit into a circular textile economy. It will study sustainable textile processing methods and the design of textile objects, guided by a recycling approach that incorporates a life-cycle analysis of the resources and a sociological analysis of end-of-life textiles.

Last, a targeted project will mobilise all parties involved in the human and social sciences: the 'Recycling and reuse society' project will focus on the political and regional recycling ecosystem, consumer behaviour in the face of new regulations for public and private partners, and the mechanisms of regulation and the associated business models, as well as recycling practices.

En savoir plus : CNRS.fr

4364 - Deep tech start-ups: publication of a white paper to simplify seed fundraising

This 'entrepreneur's survival guide' [in French] on good practices for entrepreneurs wanting to scale from lab to start-up is the result of a year-long joint project involving deep tech investors and academics. Published by Bpifrance, the guide is one of a range of tools it has developed to meet the government's goal of creating 500 deep tech start-ups by 2030. It aims to encourage successful seed fundraising rounds for deep tech start-ups that began life in labs. The guide gives practical advice to help entrepreneurs effectively and constructively negotiate with Technology Transfer Organisations (TTOs) and investors. It also tackles topics such as managing risk, forming trust-based relationships, and understanding the financial models of the various parties involved.

En savoir plus : Communiqué de presse

4365 - French Tech Finance Partners: 42 recommendations from the report to be taken on board to strengthen the French tech ecosystem

Minister for Digital Transition and Telecommunications Jean-Noël Barrot announced that he would take on board 42 of the 92 recommendations made by the French Tech Finance Partners, a 16-member body that represents French tech investors. Of the 42 recommendations validated, 27 will be implemented immediately and 15 addressed in the near future. The recommendations adopted immediately include the designation of a French tech capital (outside Paris) each year; the creation of a deep tech label for start-ups and investment funds; the inclusion of French investment fund representatives on official overseas visits; and the audit and update of the unicorn status to be included in the Next40/FT120 index. In parallel to the implementation of the selected recommendations, new topics will be addressed by the French Tech Finance Partners in the second half of 2023: managing funding difficulties, exit strategies for start-ups, and ESG in tech. This body's purpose is to have a long-term role in the creation of public funding policy for innovation, to develop the French tech ecosystem and respond practically to its expectations.

En savoir plus : Communiqué de presse, L'Usine digitale.fr, L'Usine Nouvelle.com

4366 - Presentation of the draft 'Green Industry' law

This draft law, the aim of which is to accelerate reindustrialisation and make France Europe's green transition leader, is structured around 15 actions hinging on 4 priorities:

- Facilitate and accelerate the establishment of industrial sites in France: provide 50 'France 2030' sites and decontaminate brownfield sites; accelerate the drive for reindustrialisation across France; halve the time taken to commission industrial sites; create a simplified exceptional procedure for projects of significant national interest; and encourage the recycling of industrial waste.
- Fund green industry by mobilising public and private funds: support green technology with a 'green industry investment' tax credit; support the decarbonisation of existing industry; and mobilise private savings to fund green industry.
- Favour 'virtuous' companies in all government interventions: identify the most virtuous businesses (with the 'Triple E' label: European Environmental Excellence); set up a public procurement process that favours products with good environmental credentials; make state subsidies conditional on businesses having a virtuous business plan; make the ecological bonus conditional on the ecological footprint of electric vehicles; and make the government budget greener.
- Provide training in green industry professions: train more engineers and technicians in France; put industry back at the core of training programmes; and increase the appeal of green industry.

By 2030, this draft law could reduce France's carbon footprint by 41 million tonnes of CO_2, attract €23 billion in investment and create 40,000 direct jobs.

En savoir plus : Economie.gouv.fr, Dossier de presse, Entreprises.gouv.fr, L'Usine Nouvelle.com, 20 Minutes.fr

4367 - Green Industry Action Plan: Bpifrance boosts its support and funding continuum to forge ahead with industrial decarbonisation

Through new measures put in place under the Green Industry Action Plan steered by the French government, Bpifrance will deploy €2.3 billion in direct loans or guarantees and €490 million in equity by creating two special funds. More specifically, the French state investment bank will offer:

- A €750 million 'Green Loan';
- €200 million mobilised through the new 'Green Industry Loan';
- €1 billion in funding with a 'Green Guarantee';
- The 'Green Guarantee' for equity;
- €50 million in 'France Nation Vert' subsidies in partnership with ADEME;
- Support creating and deploying their transition plan for twice as many businesses each year, provided by local Bpifrance teams;
- The Climat Global 1 (FFCG 1) fund with a target size of €250 million;

- The France Investissement Energie Environnement 2 (FIEE 2) fund with a target size of €240 million, managed by Bpifrance's Impact Environnement team.

Bpifrance will also '*extensively canvass 20,000 businesses of all sizes, in all sectors of activity and in all areas of France over the next five years.*'

En savoir plus : Communiqué de presse

4368 - France 2030 investment plan: list of new winners of the 'First Factory' call for proposals

Thirteen new start-ups and industrial SMEs were selected from the 60 applications submitted for this second call for proposals. The selected projects will receive €57 million in government aid and represent cumulative investment of €236 million in strategic sectors including biotechnology, electronics, hydrogen, low-carbon materials and robotics. Together with the 18 projects announced in November 2022, 31 first industrial sites are receiving support under this programme. In addition to the financial support provided by France 2030, the start-ups chosen for the 'First Factory' programme will receive direct, personalised support from Mission French Tech for one year. They will contribute to transforming innovation potential into production capacity across France, by creating new leaders in their respective markets.

Info: Global Bioenergies, a member of the TWB consortium, is one of the winners of this second call for proposals with its ARIANA project. The project involves accelerating the development of biobased ingredients via fermentation for the cosmetics and agri-food industries, primarily.

En savoir plus : Entreprises.gouv.fr, Dossier de presse

4369 - France 2030: launch of the French Tech 2030 programme

The programme will select around 100 emerging innovators and give them tailor-made support from all government and regional departments, coordinated by Mission French Tech. The support will also combine the expertise of Bpifrance and all government arms (Business France, ADEME, etc.), the dedicated innovation agencies (the health innovation agency, in particular), the French Tech correspondents network and the decentralised departments and *préfectures*, as well as the *chambres consulaires*. The future winners must reflect the priorities and vision of the France 2030 investment plan and have already begun a business activity based on their innovation, or be on the verge of launching one. The innovative businesses selected must be able to display a certain level of technological and economic maturity to prove that government support is appropriate. In line with France 2030, 25% of the final selection must be run or jointly run by women, and 50% must be committed to the green transition and reducing the carbon footprint. Last, each chosen business must agree to a charter of values, and if it fails to adhere to it, the support will be withdrawn. Each selected business will receive an assessment of its requirements and the government uplifts available to accelerate its development so the most effective support methods can be chosen and an action plan devised. Mission French Tech – an expert in supporting start-ups and innovative businesses – will have overall responsibility for steering the support. The selected businesses will have access to targeted support (regulatory, customs and IP issues; monitoring; cybersecurity; administrative authorisations; visibility; and international delegations) and a personalised road map through the France 2030 measures that meet their requirements, as well as the opportunity to meet private investors.

En savoir plus : Communiqué de presse

4370 - Publication of a new decree on the ban on plastic packaging for fruit and vegetables

While plastic packaging has been banned from the fresh fruit and vegetables aisle for most products since 1 January 2022, a new decree published in France's official gazette on 20 June 2023 lists 29 fruits and vegetables that will be exempt after all, in addition to '*perfectly ripe fruits sold to the final consumer at peak maturity.'* The exemption has been granted because of the '*risk of deterioration*' if these products are sold loose. The fruits and vegetables concerned by the new decree include salad leaves, asparagus, broccoli, early potatoes, new season carrots, cherries, lamb's lettuce, chicory, mushrooms, spinach, raspberries, blueberries, blackcurrants, redcurrants and sprouting seeds. All the fruits and vegetables that are not exempt have, in addition, been given until 31 December 2023 to comply, '*so packaging stocks can be exhausted.*'

En savoir plus : Agri Mutuel.com, Que Choisir.org

4371 - Biogas: publication of new regulatory measures to boost roll-out of the industry

Agnès Pannier-Runacher, France's energy transition minister, announced the publication of an order increasing the purchase price of biomethane injected into the gas networks, improving the indexation of price variations for this source of energy. This represents an increase of around 12% compared to the previous order. The new order specifies that the price will now be indexed twice a year, instead of once. The minister also decided to authorise the cumulation of the obligation to purchase biomethane at the regulated price with other investment subsidies (from ADEME or the French regions, for example), provided that such subsidies are granted on a case-by-case basis following analysis of the profitability of each project. In addition, several provisions will give project developers flexibility and security, in particular the extension of commissioning timelines in the event of a legal appeal, following the example of the provisions already in place for renewable electricity sources.

Info: The purchase price for biomethane by gas suppliers is currently around 90 to 100 euros, depending on site size.

En savoir plus : Communiqué de presse, Agri Mutuel.com,

In Europe

4372 - Presentation of the road map to reduce air transport CO_2 emissions

The text agreed by the European Parliament and the European Union Member States stipulates that all flights leaving the EU must partially run on sustainable aviation fuel (SAF): a minimum of 2% by 2025, 6% by 2030, 20% by 2035, 34% by 2040, then 42% by 2045 and, finally, 70% by 2050. The road map is a compromise, as the MEPs had recently pushed for 85% while the European Commission dug its heels in at 63%. The text also provides a specific sub-target for synthetic fuels, which will rise from 1.2% in 2030 to 5% in 2035, before reaching 35% in 2050. The European Parliament also settled on a new definition for SAF: '*certain biofuels produced from agricultural or forestry residues, algae, bio-waste, used cooking oil or certain animal fats, and recycled jet fuels produced from waste gases and waste plastic*.' The new definition excludes biofuels from intermediate crops, palm fatty acid distillate (PFAD) and palm and soy-derived materials, in addition to biofuels from food and feed crops.
The road map also sets out plans for a European label for the environmental performance of flights (eco-label) to be implemented from 2025. It will indicate the carbon footprint per passenger and the CO_2 emissions per kilometre. Revenue from fines for non-compliance with the new rules will be funnelled into researching the production of innovative forms of SAF. The European Commission is also required to prepare a report by 2027, and then every four years, examining the impact of the regulation on the fuel market, and the competitiveness and connectivity of the EU's aviation sector. The political deal reached between Parliament and Council must now be officially ratified by both institutions before it becomes law.

More information: Euractiv.com
En savoir plus : L'Usine Nouvelle.com, Euractiv.fr, France.representation.ec.europa.eu, Connaissance des Energies.org, Actu Transport Logistique.fr, Aero Buzz.fr

JULY 2023

17th International Conference on Synthetic Biology and Metabolic Engineering

19-20 July 2023. Paris, France.

More information: Website

17th International Conference on Industrial Biotechnology and Synthetic Biology

19-20 July 2023. Toronto, Canada.

More information: Website

AUGUST 2023

15th annual Bioprocessing summit

14-17 August 2023. Boston, United States.

More information: Website

OCTOBER 2023

9th NutrEvent

17-18 October 2023. Rennes, France.

More information: Website

Les rendez-vous Carnot

17-18 October. Lyon, France.

More information: Website

Cosmetic 360

18-19 October 2023. Paris, France.

More information: Website

Annual Biocontrol Industry Meeting

23-25 October 2023. Basel, Switzerland.

More information: Website

European Forum for Industrial Biotechnology and the Bioeconomy (EFIB)

24-25 October 2023. Rotterdam, Netherlands.

More information: Website

ENZYNOV2. Unleashing the power of Enzymes and Biocatalysis for industrial applications

26-27 October 2023. Paris-Romainville, France.

More information: Website

JUNE 2024

European Congress on Biotechnology

30 June-3 July 2024. Maastricht, Netherlands.