ECODESIGN, BRINGING SOLUTIONS WITH HIGH PERFORMANCE POLYMERS TO CUSTOMERS

A PORTFOLIO OF RECYCLING SOLUTIONS

BIO-BASED POLYMERS SOLUTIONS

INTERVIEW WITH VALÉRIE GOFF, SENIOR VICE PRESIDENT OF TOTAL POLYMERS BU

LEADING THE WAY WITH INNOVATIVE SUSTAINABLE SOLUTIONS FOR THE PLASTICS VALUE CHAIN
INTERVIEW WITH VALÉRIE GOFF
ON THE ENVIRONMENT AND REDUCE THE IMPACT TO CONSERVE RESOURCES
CONTINUING TO INNOVATE TO CONSERVE RESOURCES AND REDUCE THE IMPACT ON THE ENVIRONMENT
INTERVIEW WITH VALÉRIE GOFF SENIOR VICE PRESIDENT OF TOTAL POLYMERS BU
FOR THIS NEW ISSUE OF K-FAIR, WE MET WITH VALÉRIE GOFF, SENIOR VICE-PRESIDENT FOR POLYMERS AT REFINING & CHEMICALS SO THAT SHE COULD SHED SOME LIGHT ON TOTAL’S AMBITIONS FOR THE CURRENT CHALLENGES FACED BY THE PLASTICS INDUSTRY.

WHAT ARE THE AMBITIONS OF TOTAL POLYMERS?
Total aspires to be the major player in responsible energy by 2035 and to integrate the climate in its strategy by taking due account of the IEA’s sustainable development scenarios (2°).
Plastics are part and parcel of Total’s ambition. Lighter than many alternative materials, they help reduce the carbon footprint of the final applications, in particular by improving their energy efficiency. In the case of vehicles, they help to reduce the weight of vehicles thereby contributing towards more sustainable mobility. Plastic parts of vehicles are up to 50% lighter than the alternative materials. As a packaging material, plastics also help to make packaging lighter relative to alternative materials which results in a reduction in CO₂ consumption during transport (which accounts for 20% of CO₂ emissions worldwide).
Plastics are also an important material for insulating buildings. In Europe, 40% of CO₂ emissions stem from buildings; 340 million tonnes of CO₂ could be avoided if 50% of the buildings used insulating material of the highest standards made of plastic.
Finally, plastics are an indispensable part of the medical and healthcare sector.

HOW DOES TOTAL POSITION ITSELF ON THE POLYMER MARKET THEN?
The polymer industry is growing by more than 3% a year. We are convinced that the sector has to continue to innovate to conserve resources and reduce its environmental impact.
We cannot produce plastics without asking how to optimize resources, nor the end of the service life of products, which is a vital issue for the sector. We have to go from a linear to a circular economy by optimizing the use, reuse and recycling of resources.

TOTAL IS COMMITTED TO RECYCLING PLASTICS AND HAS MADE IT A TOP PRIORITY OF ITS POLYMER STRATEGY. WE ASPIRE TO BECOME THE LEADER IN MECHANICAL AND CHEMICAL POLYMER RECYCLING BY INTEGRATING 30% OF RECYCLING IN OUR PRODUCTION BY 2030.

PLASTICS ARE PART AND PARCEL OF TOTAL’S AMBITION. LIGHTER THAN MANY ALTERNATIVE MATERIALS, THEY HELP REDUCE THE CARBON FOOTPRINT OF THE FINAL APPLICATIONS, IN PARTICULAR BY IMPROVING THEIR ENERGY EFFICIENCY.

We are founding members of the Alliance to End Plastic Waste which brings together forty companies in the plastics and consumer goods value chain which aims to provide solutions for eliminating plastic waste in the environment, particularly in the oceans.

ITS MEMBERS ARE COMMITTED TO SPENDING $1 BILLION WITH THE AIM OF REACHING $1.5 BILLION IN 5 YEARS’ TIME.
The Alliance will develop and implement solutions to reduce and manage plastic waste and promote recycling pursuant to the circular economy rationale.
Furthermore, our researchers are mobilized to reduce the environmental impact of plastics through an ongoing drive for improvement beginning with our manufacturing processes. We are targeting an improvement of the energy efficiency of our plants by 1% per year. In addition, through the improvement of the properties of our polymers we provide our customers solutions for reducing the environmental footprint. We have developed a “super tough” polyethylene range, for instance, which helps to reduce the thickness of packaging by 15% at no sacrifice to performance.

HOW DO YOU INTERVENE IN THE END-OF-LIFE MANAGEMENT OF PLASTICS?
Total is committed to recycling plastics and has made it a top priority of its polymer strategy. We aspire to become the leader in mechanical and chemical polymer recycling by integrating 30% of recycling in our production by 2030.
Plastic recycling is a complex and multilayered subject. The enormous variety of plastics makes the collection, sorting and implementation of recycling systems a complex and expensive process.

In parallel, we are developing plastics from renewable materials and are one of the world leaders in bioplastics. Our Total Corbion joint venture (50/50) has just inaugurated a PolyLactic Acid (PLA) plant in Thailand with a capacity of 75,000 tonnes, a biopolymer sourced and made from GMO-free sugarcane, with our Dutch partner Corbion. PLA is a bio-sourced, recyclable and compostable material. It can be used on various markets, e.g. in packaging, consumer goods, and 3D printing.

We therefore work with our processing customers, principals, public authorities, waste collection stakeholders and recyclers to come up with concrete and sustainable responses to recycling issues.
Recycling is also a real business opportunity and a growth driver for our polymer business line. As pioneers in innovating polymers (our high quality propylene has no equivalent on the market) we want to show the same leadership in recycling by bringing our polymer expertise, industrial know-how and R&D drive force concurrently to bear.
We are working on all types of recycling to bring about innovative and attractive circular economies. We have been offering regenerated grades in our range for years. They stem from mechanical recycling, a technology we master. We make recycled polymers with premium properties for high-value-added applications.
We have acquired Synova, the French leader in the production of high performance recycled propylene, and are capable of offering a wide range of raw materials thanks to the synergies already put in place.
Chemical recycling is also an important challenge for our development as an integrated stakeholder in refining and petrochemicals. It is bound to become a strategic component of the end-of-life management of plastics. What makes chemical recycling so promising, by comparison with mechanical recycling, is that it can be used to treat all household waste collected and to produce polymers from recycling that meet the safety criteria for food applications.

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CONTINUING TO INNOVATE TO CONSERVE RESOURCES AND REDUCE THE IMPACT ON THE ENVIRONMENT
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To find a solution fast.

We are in the process of demonstrating that certain materials have more or less impact than others. So, given the right formulations, recyclability can be improved. We are working together with clients who are looking for ways to replace multilayer structures or to improve the sustainability of structures of that type.

Our project aims to develop an alternative that can improve recyclability by adding value to what was previously waste.

Our project is all about.

The industry has already taken some initiatives on this. The CSIFLEX organization, of which we are a member, is a good example. It aims to promote the recycling of flexible films.

So far, we have introduced a polymer grade on the market, which is ready to be recycled.

They can contain up to 15 different layers of raw materials. By producing resins that will help ensure the recyclability of the end product, we have to anticipate how they will be transformed or what will happen to our products, what will be added to the value chain, we don’t always know what the final product and its use will be.

Behind the scenes, many steps have to be taken to ensure that they can be assigned to the right recycling process. That is what our project is all about.

Alpine MDO with Patented Trio System, the mechanical properties of the film are extremely important to ensure a good holding force and to be able, for example, to transport six packs of bottles. Total Lumine SuperTough® (6ST01) can be used as a booster to integrate recycled materials in the formulation while maintaining mechanical properties comparable to a film made from a virgin material. The good optical properties and acceptable gel levels of the film are remarkable.

When we introduce a polymer grade on the market, we already need to have established an action plan for its lifecycle. Ecodesign is part of the process that ensures the plan is there. As a supplier of raw materials, we have to anticipate their impact both during use and at all the recycling stages. That is what our project is all about.

Of course, we all do not always know what happens to our products, what will be added to the value chain, we don’t always know what the final product and its use will be. So, to begin, we took the case of multi-structure, multi-material packaging that often means complex flexible films producing in the sandwich-type lamination techniques and involving a large number of different materials.

Examples include: pet food packaging, bags of grated cheese, potato crisp packets, ready meals packaging, meat wrappers etc. These are barrier structures that are very complicated to recycle. They can contain up to 15 different layers of which each can be a different material. This type of structure represents 20-30% of the volume of consumer flexible packaging in the EU market. That’s between 0.8 and 1.2 million tonnes, a significant volume that is motivating us to find a solution fast.

Our project aims to develop an alternative that can improve recyclability by adding value to what was previously waste.

Ecodesign includes replacing multi-material flexible packaging structures with mono-material ones which can be easily sorted and would not disrupt the recycling stream. An important aspect of these R&D efforts is to market a "booster" virgin resin to compensate for the lack of mechanical, optical properties and processability when using post-consumer recyclate. In addition, downgauging remains decisive in the ecodesign efforts.

From the Stand-Up Pouch market, the multi-material laminate film structures of PE/PE/PE used are currently not recyclable. However, together with our partners Hosokawa Alpine and Coveris, we offer a mono-material PE solution, which is ready to be recycled.

Ecodesign incorporates as a fundamental element the principles of sustainable development and circular economy into the product development process. As an innovative, responsible producer, Total is integrating the concept of ecodesign into the research conducted by its polymers department.

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RIGID PACKAGING: PRODUCT PERFORMANCE THAT DELIVERS MARKET LEADING DOWNGAUGING

ULTIMATE PROCESSABILITY, HIGH IMPACT RESISTANCE AND GOOD RIGIDITY

For many years, Total has been a market leader in products for the injection food packaging market in Europe. Capitalizing on our experience and know-how, we also lead the market in grades suitable for thin wall packaging demanded by the market.

Naturally, we aim to answer market needs with products that respond to the constantly evolving challenges of thin wall packaging applications such as downgauging, consistent quality and cost reduction.

PPC 14642: AN INNOVATIVE GRADE IN THE THIN WALL PACKAGING MARKET

PPC 14642, an innovative product was recently developed and commercialised which targeted an optimum balance of three major characteristics:

- Improved processing due to a higher MFI (Melt Flow Index) at 130 g/10'’
- Rigidity matching the market reference
- Impact resistance higher than the market reference

The unique fluidity of PPC 14642 increases productivity by shortening production cycles and reducing injection pressure temperature while at the same time reducing energy consumption and providing a quick return on new mould investments.

TOTAL CIRCULAR COMPOUNDS® BOOSTING RECYCLED PERFORMANCE

AS A PIONEER IN PLASTICS RECYCLING, TOTAL HAS CREATED THE CIRCULAR COMPONDS RANGE. THESE PRODUCTS, WHICH HAVE A HIGH POST-CONSUMER RECYCLED MATERIAL CONTENT MEET MARKET DEMAND BY PERFORMING SIMILARLY TO VIRGIN MATERIALS.

A UNIQUE RECIPE TO PROVIDE QUALITY RECYCLED MATERIAL

Total is committed to improving the end of life of plastics and contributing to the circular economy and consequently has become the leader in recycling.

Following the creation of NOPE Circular Compounds, Total has launched a unique range of 12 grades of polypropylene, homopolymers and copolymers based on resins derived from recycled household waste.

A FULLY MASTERED RECYCLING PROCESS

The technical process developed by Total for mechanical recycling ensures a minimum 50% content of recycled material while guaranteeing properties similar to virgin polypropylene. The fluidity and/or mechanical properties of these recycled resins are paving the way for many high value-added applications such as the auto and construction sectors.

In summary, by broadening the range of recycled materials for demanding markets, Total is taking yet another major step towards the circular economy.

TOTAL CIRCULAR COMPounds® ENABLES CLOSED LOOP RECYCLING IN THE CONSTRUCTION SECTOR

TOTAL AND SEVERAL PARTNERS ALONG THE CONSTRUCTION VALUE CHAIN HAVE SET UP THE CLEAN SITE CIRCULAR (CSC) PROJECT. THIS IS A MAJOR LIFECYCLE MANAGEMENT PROJECT FOR THE NATURAL SHRINK HOODS USED ON CONSTRUCTION SITES.

THE RECIPE, CONTAINING 50% RECYCLED MATERIAL, HAS MADE IT POSSIBLE TO MEET THE STRICT REQUIREMENTS FOR THIS TYPE OF DEMANDING APPLICATION.
RECYCLING AMBITIONS CONFIRMED WITH SYNOVA ACQUISITION

THE DEVELOPMENT OF HIGH ADDED VALUE POLYMER RECYCLING SOLUTIONS IN MECHANICAL RECYCLING IS PART OF OUR AMBITION. IN FEBRUARY, WE CONFIRMED OUR COMMITMENT BY ACQUIRING SYNOVA, A FRENCH LEADER IN MANUFACTURING HIGH-PERFORMANCE RECYCLED POLYPROPYLENE FOR THE AUTOMOTIVE SECTOR** AFFIRMED THIERRY SAUDEMONT, RECYCLING DEPARTMENT MANAGER AT TOTAL.

Combining Synova’s recycling expertise and Total’s polymers know-how will increase the market availability of recycled polypropylene for automotive applications that deliver the same performance as virgin polymers.

By contributing to the weight reduction of vehicles, plastics improve their energy efficiency and reduce CO₂ emissions. Providing they have the same level of performance, the substitution of virgin polymers with recycled solutions further reduces the overall vehicle carbon footprint. This can only be achieved with high-performance recycled products such as those developed by Synova.

THE SYNORA WAY

INTERVIEW WITH MARCO MELONI

MARCO MELONI, EXECUTIVE DIRECTOR OF SYNOVA, EXPLAINS THE OPPORTUNITIES AND CHALLENGES IN THE AUTO SECTOR’S PREMIUM RECYCLED PRODUCTS AND WHY SYNOVA AND TOTAL ARE POOLING THEIR EXPERTISE.

HOW ARE THE DEVELOPMENT PROSPECTS LOOKING SINCE YOU JOINED TOTAL?

SYNOVA has been able to develop the technical value of recycled products by producing recycled resins that have the same properties as virgin resins. This has enabled us to offer the automotive industry a complete range of approved grades and to position ourselves as the partner of first choice. We’re already distributing our products internationally, and with support from Total, we’re going in to accompany our customers while keeping developing new high-performance recycled polypropylene materials.

WHAT ARE THE PARTICULAR CHALLENGES IN YOUR MARKET AND HOW DOES SYNOVA MEET THEM?

We deal in waste materials because they’re a primary resource with great potential. Their intrinsic properties are complex. Particular knowledge is needed to make them match our clients’ demanding requirements. Those clients are becoming acquainted with our products.

We’ve been able to gain the carmakers’ confidence and their approval for our solutions. Clients are turning to us due to our ability to understand and respond to their needs, but also because of our reactivity. We provide them with assistance right from the outset of projects and we place our know-how at their disposal. In addition, we have a very well-equipped laboratory, which enables us to test materials and develop formulations that match the specifications.

YOU’VE STRESSED THE VALUE OF WASTE STREAM AS RAW MATERIALS. HOW DO YOU GO ABOUT RECOVERING THEM?

We’ve developed a tried and tested process for ensuring our supplies. The waste comes from industrial sources, such as recycled decommissioned vehicles or sorted household waste. We analyse all the incoming materials before approving them. That enables us to ensure their traceability throughout the manufacturing process and to guarantee optimum composition for our formulations. Total’s expertise in polymers will help us go forward.

POLYSTYRENE RECYCLING - A TANGIBLE SOLUTION

ONE OF THE GREAT STRENGTHS OF POLYSTYRENE IS ITS RECYCLABILITY. DRAWING ON ITS REAL EXPERTISE IN THIS FIELD, TOTAL IS DEVELOPING SOLUTIONS AND PARTNERSHIPS TO IMPROVE THE LIFE CYCLE OF THIS PLASTIC.

“Polystyrene is one of the easiest polymers to recycle,” explains Alain Standaert, the R&D Manager responsible for recycling by deconstruction at Total. “Its cost-competitiveness in certain solvents means it’s easy to partly purify compared to other polymers which are not soluble in solvents. The purified dissolved polystyrene associated with virgin material within polystyrene industrial lines can reach mechanical properties comparable to those of virgin resins, giving access to high-value-added applications.”

Isabelle Ydens, Marketing & Technical Manager at Total, puts it another factor. “The growing availability of post-consumer waste, particularly due to the broadening of sorting guidelines in some countries as well as the constant improvement in the quality of the flows available, is a major boost for polystyrene recycling.”

GREEN DEAL FOR A POLYSTYRENE RECYCLING CIRCUIT

Citeo, Saint-Gobain and Syndix have pooled expertise with Total to validate the feasibility of a polystyrene recycling value chain in France.

The entire polystyrene household packaging sector is actively working to create a recycling solution to develop a circular economy with these products. We must collect the packaging, find technical recycling solutions and find suitable uses of this recycled material, all at an acceptable cost. The quantities of polystyrene packaging placed on the market each year in France are estimated at 110 000 tonnes.

The sorted and prepared household packaging polystyrene wastes can be incorporated into our industrial plastic production facilities located in Carling (France) and Feluy (Belgium). The final product must meet the same specifications as that of 100% virgin materials.

TOTAL IS FORGING AHEAD ON POLYSTYRENE RECYCLING.

Polystyrene has an enormous circularity potential. Today, recycled polystyrene is found in high-value applications in the electronics and construction sectors. The real potential is in making polystyrene fully circular even for food contact applications such as yoghurt pots, where recycled polystyrene is currently underrepresented.

To move forward, the Styrenics Circular Solutions (SCS) group was founded. Created by the styrenics manufacturing industry, including Total as an active polystyrene recycler, SCS aims to achieve the full potential of polystyrene through technological innovation and cooperation with the whole styrenics value chain, raw material suppliers and sorting partners. “The industry has become aware of the issues around polystyrene recycling,” explains Herman Van Roost, Business Development Manager Recycling at Total, “but also of its unique circular potential, which we had probably underestimated.” One challenge that is not constrained by technology is access to the raw material polystyrene packaging wastes, whether solid or liquid. So right from the start, SCS has included key actors from the world of waste packaging collection and sorting. Strong collaboration is maintained with them at all times.

Now that high-quality circular solutions are within grasp, SCS is calling on the producers, brand owners and retailers of PF packaging to play an active part in its forthcoming “Design for Circularity” initiative. That way, they can jointly support and improve the robustness of polystyrene circularity.
**Total Corbion PLA is a strategic partnership that has brought together Corbion’s expertise in biolactic acid and biopolymers, and Total’s technical and marketing knowledge and leading position in polymers. Biopolymers are fully in line with Total’s strategy to expand in petrochemicals and, at the same time, innovate in low carbon solutions.**

**They provide an immediate, transparent way of strengthening their environmental commitment. And there is no limit to the applications in which they can be used, including food contact.**

**In line with the principles of co-processing and mass balance, these Certified Renewable Polymers are subject to ISCC PLUS certification. Our plants have this certification, which ensures full traceability of bio polymers right along the value chain, from the feedstock to the final use.**

**A PROOF OF REDUCTION OF CARBON FOOTPRINT**

Life cycle analysis by CIFRAG (International Reference Centre for the Life Cycle of Products, Processes and Services) indicates that Certified Renewable Polymers enable a saving of up to 2.5 kg of CO₂ per kg of polymer produced. Consequently, they will help to meet the targets set by Europe for an accelerated transition to sustainable economy. The production of Total Certified Renewable Polymers is currently based on sustainable palm oil from ISCC-certified sources and members of RSPO.

**These certified polymers with allocated bio-content from sustainable feedstock are available to customers as drop-in solutions.**

**To support its CO₂ reduction strategy, together with its recycling innovations, Total announces the commercial launch of polymers sourced from renewable feedstock of vegetable origin produced in its La Môle biorefinery, which is today one of Europe’s largest biofactories.**

**These certified polymers with allocated bio-content from sustainable feedstock are available to customers as drop-in solutions.**

**TrioPlast AS’s Nyborg has reached a new milestone in sustainability by developing a totally new approach to an environmentally friendly product. The new stretch food film from Total’s renewable certified polymers is the first in the world made out of bio-allocated material. With the ISCC PLUS certificate, as a polyethylene terephthalate, we can confirm that we are contributing to responsible sourcing of bio-allocated feedstock and contributing to global reduction of CO₂ emissions,” affirmed Nadja Herfurth, Head of Strategy & Product Management at TrioPlast Industrial Film.**

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**Interview with Stéphane Dion**

**Chief Executive Officer**

**At Total Corbion PLA**

**WHY A JOINT VENTURE BETWEEN TOTAL AND CORBIION?**

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- They have observed how Total’s strategy built around advancing sustainability.

- PLA specifically is the bioplastic of choice both in terms of sustainability and in terms of performance.

- PLA is made from renewable resources and features a reduced carbon footprint. It has many favorable end-of-life options, including composting and mechanical or chemical recycling. PLA applications such as compostable bin bags help to divert valuable organic waste from landfill.

**WHAT ARE THE CURRENT CHALLENGES OF BIOPOLYMERS?**

- One current challenge for bioplastics, compared with conventional polymers, is their cost, which is understandably higher as the scale of the production is much smaller today.

- Another risk, in the ongoing debate against plastics in general, is for some to hastily dismiss bioplastics whereas they are really part of the solution. There is a lack of understanding among the general public and sometimes the media about what terms such as ‘biodegradable’, ‘compostable’ really mean, which may hold back the wider adoption of bioplastics. We aim to address this through clear and accurate communication.

- A critical aspect of recycling is obviously building appropriate channels for collection and sorting, which is why we engage with waste collector and sorters. With Corbion’s CITEO, Loopline, Veolia and a few other parties, Total Corbion PLA has just entered into a project to optimize the options for collecting and recycling PLA yoghurt cups on the French market.

**WHAT IS THE DEMAND? WHAT VOLUMES DOES IT REPRESENT?**

- Bioplastics, with a combined production capacity around 1 million MT, represent a tiny fraction of the plastics market. Among them, PLA is the most developed both bio-based and biodegradable bioplastic and its worldwide production capacity is now in excess of 200 kt since Total Corbion PLA, at the end of 2018, launched its state-of-the-art, integrated PLA production facility with an annual capacity of 75 ktpa.

- Annual PLA demand worldwide has been growing at 10-15% per annum in recent years and will soon approach 200 kt. We strongly believe that this growth will accelerate further, driven notably by the ubiquitous calls for sustainability and the irresistible drive towards a more circular economy, as well as PLA’s unique properties.

**WHAT TYPES OF APPLICATIONS ARE INVOLVED?**

- The largest market today is food packaging. This is largely due to the extra end-of-life solutions PLA offers when compared with traditional, oil-based plastics. For example, a PLA coffee capsule that has passed the relevant testing standards can be industrially composted along with the coffee in it and other organic waste. The capsule will break down leaving nothing behind except water, CO₂, and biomass.

- The same can be said of plastic bags, which are another large market for us. A PLA plastic bag can be seen as a dual-use after its primary use of bringing home groceries from the store, the bag can then be used to collect valuable, nutrient-rich organic household waste. The bag together with the waste can be industrially composted, thus the bag fulfilled two valuable roles, and the PLA (bioplastic) material has closed the loop and been returned to soil as fertilizer.

- As innovation drives the performance of this polymer to new heights, we see new markets opening up, both within packaging and beyond. Within the packaging industry, we’ve been successful in developing the first single-use PLA bioplastic coffee cup that can withstand boiling water. Outside of packaging, we see developments in PLA for automotive applications like the plastic parts in the dashboard of your car, for clothing and textiles, 3D printing, consumer electronics like computer or phone housings, and children’s toys, for example.

**WHAT ARE THE CHALLENGES TO MOVE TO THE USE OF BIOPOLYMERS AND WHAT ARE THE PROSPECTS?**

- One current challenge for bioplastics, compared with conventional polymers, is their cost, which is understandably higher as the scale of the production is much smaller today.

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- As innovation drives the performance of this polymer to new heights, we see new markets opening up, both within packaging and beyond. Within the packaging industry, we’ve been successful in developing the first single-use PLA bioplastic coffee cup that can withstand boiling water. Outside of packaging, we see developments in PLA for automotive applications like the plastic parts in the dashboard of your car, for clothing and textiles, 3D printing, consumer electronics like computer or phone housings, and children’s toys, for example.

**WHAT ARE THE CURRENT CHALLENGES OF BIOPOLYMERS?**

- Total Corbion PLA is a strategic partnership that has brought together Corbion’s expertise in biolactic acid and biopolymers, and Total’s technical and marketing knowledge and leading position in polymers. Biopolymers are fully in line with Total’s strategy to expand in petrochemicals and, at the same time, innovate in low carbon solutions. They are a great complement to the more traditional petrochemicals products to meet the rising demand for polymers while contributing to reducing end-of-life concerns. They also complement Total’s strategy to expand in petrochemicals and, at the same time, innovate in low carbon solutions.

- Bioplastics, with a combined production capacity around 1 million MT, represent a tiny fraction of the plastics market. Among them, PLA is the most developed both bio-based and biodegradable bioplastic and its worldwide production capacity is now in excess of 200 kt since Total Corbion PLA, at the end of 2018, launched its state-of-the-art, integrated PLA production facility with an annual capacity of 75 ktpa.

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ALLIANCE TO END PLASTIC WASTE

PLASTIC WASTE IN THE ENVIRONMENT, PARTICULARLY THE OCEAN, IS A SERIOUS GLOBAL CHALLENGE THAT CALLS FOR SWIFT ACTION AND STRONG LEADERSHIP. DESPITE THE MANY BENEFITS PLASTICS BRING TO PEOPLE AND COMMUNITIES AROUND THE WORLD, INCLUDING IMPROVEMENTS IN LIVING STANDARDS, HEALTH, SAFETY, AND SUSTAINABILITY, UNMANAGED PLASTIC WASTE HAS BECOME A CHALLENGE IN SOME PARTS OF THE WORLD.

Total today participates in the creation of an alliance of global companies from the plastics and consumer goods value chain to advance solutions to help end plastic waste in the environment, especially in the ocean.

The cross value chain Alliance to End Plastic Waste, currently made up of nearly thirty member companies located throughout the world, has committed over $1.0 billion with the goal of investing $1.5 billion over the next five years to help end plastic waste in the environment. The Alliance will develop and bring to scale solutions that will minimize and manage plastic waste and promote solutions for used plastics by helping to enable a circular economy.

In the months ahead, the Alliance will make additional investments and drive progress in four key areas:

- **Infrastructure development** to collect and manage waste and increase recycling.
- **Innovation** to advance and scale new technologies that make recycling and recovering plastics easier and create value from all post-use plastics.
- **Education and engagement** of governments, businesses, and communities to mobilize action.
- **Clean up** of concentrated areas of plastic waste already in the environment, particularly the major conduits of waste, like rivers, that carry land-based plastic waste to the sea.

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