



the ***circular*** potential of plastics

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Advancing Possible



Ken Lane

*Executive Vice President,
Global Olefins & Polyolefins (O&P)*

Dear Valued Customer,

LyondellBasell has launched a suite of products under the name **Circulen** enabling brand owners to improve the sustainability of consumer products. This announcement marks the next step in LyondellBasell delivering on its sustainability goal of producing and marketing two million metric tons of recycled and renewable-based polymers annually by 2030.

The LyondellBasell **Circulen** product family supports the reduction of plastic waste through the use of recycled content, and a lower carbon footprint through the use of renewable-based content as compared to feedstock from fossil-based sources. The **Circulen** product portfolio includes:

- **CirculenRecover** polymers, which are made from plastic waste through a mechanical recycling process;
- **CirculenRevive** polymers, which are linked to an advanced (molecular) recycling process that converts plastic waste into feedstock to produce new polymers, which have a wide range of uses; and
- **CirculenRenew** polymers, which are made from renewable feedstocks such as used cooking oil using a mass balance approach, and which have a wide range of uses.

As part of a multi-pronged approach to the company's sustainability ambitions, this new portfolio is another concrete action the company is taking to advance the circular economy today, innovate for the future and partner across the value chain. By bringing sustainable solutions to life, LyondellBasell is helping address the global challenges of plastic waste in the environment and climate change while meeting customer and brand owner needs.

Circulen products can be used in a variety of markets and applications. To learn more about the LyondellBasell **Circulen** family of sustainable solutions and its availability in your region, please visit our website at lyondellbasell.com/Circulen or connect with your LyondellBasell sales representative.

Sincerely,

Ken Lane
Executive Vice President, Global Olefins & Polyolefins (O&P)



Advancing Circularity

We believe in the circular possibilities of plastics, supporting people through applications in homes, packaging, transportation, and more.

Our ***Circulen*** brand of circular polymer solutions offers complementary, innovative, sustainable answers to help address the world's need to end plastic waste and address climate change.

Our solutions help our customers develop more sustainable products, lower their carbon footprint and **unlock the circular potential of plastics**.

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GLOBAL CHALLENGES

PLASTIC WASTE

CLIMATE CHANGE

THRIVING SOCIETY

OUR PILLARS

ENDING PLASTIC WASTE IN THE ENVIRONMENT



We believe that ending plastic waste in the environment is a critical issue of our time. We are committed to helping eliminate plastic waste and are engaged in collaborative efforts across the value chain to direct action where it is needed most.

ADVANCING A CIRCULAR ECONOMY



We believe that transitioning to a Circular Economy will reduce resource use and enable a more sustainable future. We are advancing technologies and innovations that will help conserve finite resources and retain their value for as long as possible.

ADDRESSING CLIMATE CHANGE



We believe that climate change is one of the most important global challenges both now and for future generations. We support the ambitions of the Paris Agreement and are reducing GHG emissions from our operations and delivering solutions that help advance a low-carbon economy.

GROWING OUR SUSTAINABLE SOLUTIONS



We believe growing our portfolio of sustainable solutions will help address society's most pressing challenges. By doing so, we will continue to reliably produce products and offer solutions that are critical to improving the quality of life for billions around the world.

ENHANCE OUR WORKPLACE, OPERATIONS & COMMUNITIES



We believe the health and safety of our people and the communities where we operate are our highest priorities. We are committed to operating our company sustainably to deliver industry-leading performance and enhancing our people and communities through the power of many.

Circulen Family of Sustainable Solutions

It is important to us to help our customers achieve circularity in their use of plastic packaging. To make this possible, we are continuously investing in technologies that span across molecular and mechanical recycling along with the use of renewable feedstocks.

We are supporting the reduction of plastic waste through the use of recycled content, and a lower carbon footprint through the use of renewable-based content as compared to feedstock from fossil-based sources.

LyondellBasell is now able to offer a new range of sustainable and circular solutions under our ***Circulen*** polymer brand. This global portfolio is organized into three primary categories; ***CirculenRecover***, ***CirculenRevive*** and ***CirculenRenew***.





CirculenRecover

Recovering plastic waste from the environment (both pre and post-consumer waste), **CirculenRecover** polymers are made from a mechanical recycling process to produce recycled resins. By processing the plastic waste through the shortest recycling loop, a lower carbon footprint can be achieved.

Historically, recycled polymers have been associated with low-end applications and were often noted to be less durable or lower in quality. **CirculenRecover** polymers offer a consistent, high-quality product containing recycled material that can be used in a number of applications, such as consumer rigid packaging and caps and closures.

- Available in a wide range of colors
- Carefully sorted and cleaned to ensure consistent quality feedstock
- Continually invest and improve in recylate quality. Our latest investment (NIR sorter) will be operational by summer 2021, allowing us to improve our grey quality and extend the applications we serve



CirculenRevive

Using advanced (molecular) recycling technology, **CirculenRevive** polymers are on their way to becoming one of the solutions that can address at scale the challenge of hard-to-recycle plastics. **CirculenRevive** polymers support taking plastic waste that is not easily recovered by mechanical recycling and converting it into a feedstock to produce new polymers. This allows for larger volumes of plastic waste to return back into the value chain as high-quality polymers while accomplishing a lower CO₂ footprint.

- A drop-in solution for all types of applications
- An advanced recycling process is used to convert hard-to-recycle plastic waste into feedstock for the production of **CirculenRevive** polymers, using a mass balance approach
- **CirculenRevive** polymers enable our customers to produce new materials for applications that must meet strict regulatory requirements such as food packaging and healthcare items
- Are similar to virgin polymers while offering an environmental value proposition to brand owners around the world
- LyondellBasell's Wesseling, Germany cracker, Channelview, Texas, USA cracker, and select polymer manufacturing sites are ISCC PLUS certified

LyondellBasell is developing its own advanced recycling technology to improve the ability to transform plastic waste to feedstock for high-end quality polymers while improving the overall CO₂ footprint. LyondellBasell established a molecular recycling pilot plant in Ferrara, Italy, which is processing household plastic waste at a rate of 5 to 10 kg an hour.



CirculenRenew

With renewable-based raw materials, such as used cooking oil, as a feedstock, **CirculenRenew** polymers offer a variety of polypropylene (PP) and polyethylene (HDPE and LDPE) grades that are equivalent to virgin resin quality while reducing fossil feedstock use and helping to reduce CO₂ over the product life cycle. These renewable-based polymers offer the same properties in terms of product performance as well as regulatory approvals. **CirculenRenew** and **CirculenRenew Plus** products (or grades) can therefore be applied, with no restrictions, to the same applications as fossil-based equivalents offering the same properties and performance. This makes these new grades a perfect drop-in solution for applications like food packaging and/or high-quality requirement films such as surface protection films.

- **CirculenRenew** products are sold by issuing mass-balance based Sustainability Declaration Certificates. A third-party certification process provides traceability along the supply chain and verifies that the mass balance accounting aligns to predefined and transparent rules
- **CirculenRenew Plus** products have a measurable renewable-based content which can be determined by C14 analysis. The renewable-based content is measured and stated as a parameter on the Certificate of Analysis (CoA)
- LyondellBasell has select crackers and polymer manufacturing sites in the United States and Europe that are ISCC PLUS certified. A Life Cycle Analysis (LCA) was conducted on the greenhouse gas (GHG) claim of **CirculenRenew** polymers from Europe



ABOUT US

LyondellBasell (NYSE: LYB) is one of the largest plastics, chemicals and refining companies in the world. Driven by its employees around the globe, LyondellBasell produces materials and products that are key to advancing solutions to modern challenges like enhancing food safety through lightweight and flexible packaging, protecting the purity of water supplies through stronger and more versatile pipes, improving the safety, comfort and fuel efficiency of many of the cars and trucks on the road, and ensuring the safe and effective functionality in electronics and appliances. LyondellBasell sells products into more than 100 countries and is the world's largest producer of polymer compounds and the largest licensor of polyolefin technologies. More information about LyondellBasell can be found at www.LyondellBasell.com.

Before using a product sold by a company of the LyondellBasell family of companies ("LyondellBasell"), users should make their own independent determination that the product is suitable for the intended use and can be used safely and legally. LyondellBasell MAKES NO WARRANTY, EXPRESS OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) OTHER THAN AS AGREED TO BY LyondellBasell IN THE PRODUCT SALE CONTRACT.

LyondellBasell prohibits or restricts the use of its products in certain applications. For further information on restrictions or prohibitions of use, please contact a LyondellBasell representative.

Users should review the applicable Safety Data Sheet before handling the product.

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