EASTMAN

Eastman in the circular economy

Eastman's long history of technical expertise in chemical processes and polymer science positions us to provide innovative solutions to some of the world's most complex problems, including the challenges of plastic waste in our environment.

Our unique platform of solutions can significantly reduce plastic waste and support the evolution of the circular economy, delivering value to our stakeholders and the global community.

Eastman in the circular economy

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What is the circular economy?

Historically, the world has operated in a linear economy where raw materials were extracted or harvested to make products. Those products would be used and disposed of as waste. A circular economy focuses on making the most of the world's resources—minimizing waste and maximizing value—by providing end-of-life solutions to reduce, reuse, and recycle products and materials that typically end up in landfills and waterways.

The challenges associated with plastic waste require collaboration between all the players in the value chain. By harnessing our specialized skills and experience, together we can significantly impact the world's recycling capacity, creating real and actionable solutions—particularly for materials that are challenging to recover with existing technologies. Eastman's scientific and technical resources enable a set of circular solutions and create value for plastics and textiles that would otherwise be considered waste. We have developed, operated, and proven technologies that unlock value in plastic waste that cannot be recycled or is difficult to recycle today. We know these solutions need partnerships to develop them rapidly and give them the scale that the challenges demand.

Eastman commends efforts by brand owners and others in the value chain to build circularity into product and packaging design. Our advanced solutions can complement mechanical recycling to help them rapidly achieve their ambitious goals for waste reduction and their commitments to using sustainable materials, including recycled content. Eastman is actively seeking partners to help expand the capacity of our circular solutions and deliver innovative recycling technologies that unlock new value in plastic. More importantly, we can work together to help provide solutions that help address the global waste problem.

We know that sustainable solutions to plastic waste and pollution are in reach, and we are determined to play our part in the world's collective response. Eastman's portfolio of circular solutions includes:

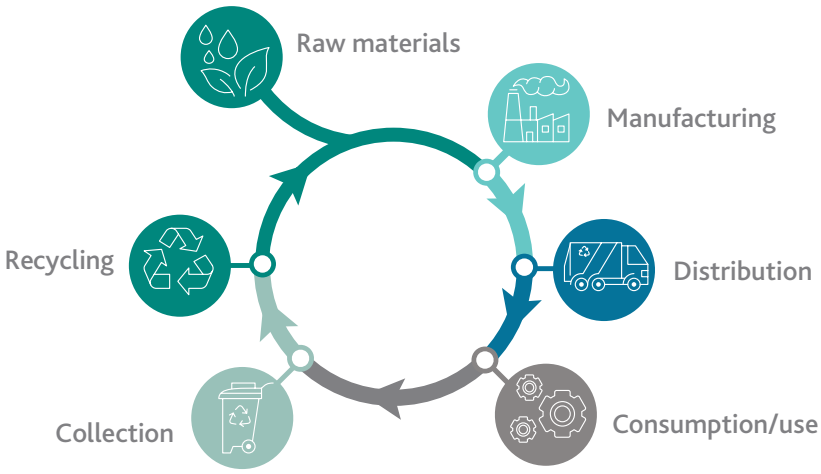
Advanced circular recycling complements basic mechanical recycling. Through methanolysis, polyester materials are taken back to their polymer building blocks. These building blocks can then be reintroduced to the production of new polyester-based polymers, delivering a true circular solution. Advanced circular recycling technology can be an especially impactful solution, as low-quality polyester waste that would typically be diverted to landfills can instead be recycled into high-quality polyesters suitable for use in a variety of end markets, including food contact applications.

Carbon renewal technology is capable of recycling some of the most complex plastic waste, including non-polyester plastics and mixed plastics that cannot be recycled with conventional recycling technologies. With this new recycling technology, materials such as flexible packaging and plastic films, among others, can be diverted from landfills. By modifying the front end of Eastman's cellulosics production stream, carbon renewal technology converts plastic waste back to simple and versatile molecular components. The process partially oxidizes the waste plastic, converting the feedstock input at very high efficiency back into the basic building blocks of Eastman's cellulosics product lines that serve industries such as ophthalmics, durables, packaging, textiles, and nonwovens.

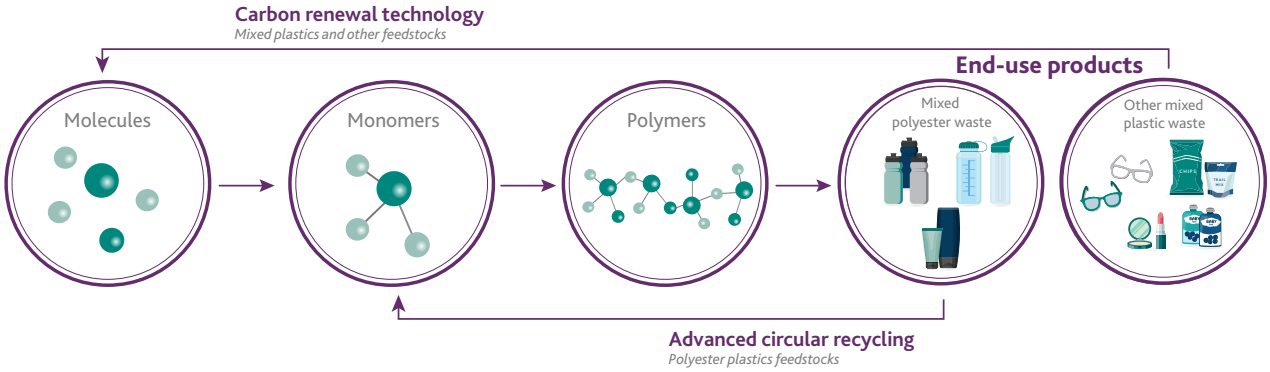
This document includes information on both of these solutions, including recent media releases, frequently asked questions, and infographics. As Eastman continues to develop new innovations that advance the circular economy, we will update this document.

Making the most of the world's resources

A circular economy focuses on making the most of the world's resources—minimizing waste and maximizing value—by providing end-of-life solutions to reduce, reuse, and recycle products and materials that typically end up in landfills and waterways.



Eastman's circular solutions



Advanced circular recycling

Media release: Eastman offers innovative recycling technology for polyesters

Kingsport, Tenn., USA — March 5, 2019 — Eastman (NYSE:EMN), one of the world's leading specialty materials companies, announced today its intention to pursue the launch of an innovative advanced circular recycling technology that uses polyester waste which cannot be recycled by current mechanical methods and, as a result, often ends up in landfills and waterways.

Using the process of methanolysis, Eastman's advanced circular recycling technology breaks down polyester-based products into their polymer building blocks. These building blocks can then be reintroduced to the production of new polyester-based polymers, delivering a true circular solution. Eastman was one of the pioneers in developing methanolysis technology at commercial scale and has more than three decades of expertise in this innovative recycling process. Eastman's experience with methanolysis makes it uniquely qualified to be a leader in delivering this solution at commercial scale. Advanced circular recycling technology can be an especially impactful solution, as low-quality polyester waste that would typically be diverted to landfills can instead be recycled into high-quality polyesters suitable for use in a variety of end markets, including food contact applications.

"We recognize that plastic waste is a complex problem that needs advanced solutions. As we have engaged potential partners, it is clear there is high interest across the entire value chain," said Mark J. Costa, Eastman's Board Chair and Chief Executive Officer. "Our long history of technical expertise in chemical processes, including methanolysis, and our leading position in copolyester chemistry enable us to provide this innovative solution to address the growing challenges of plastic waste in our environment."

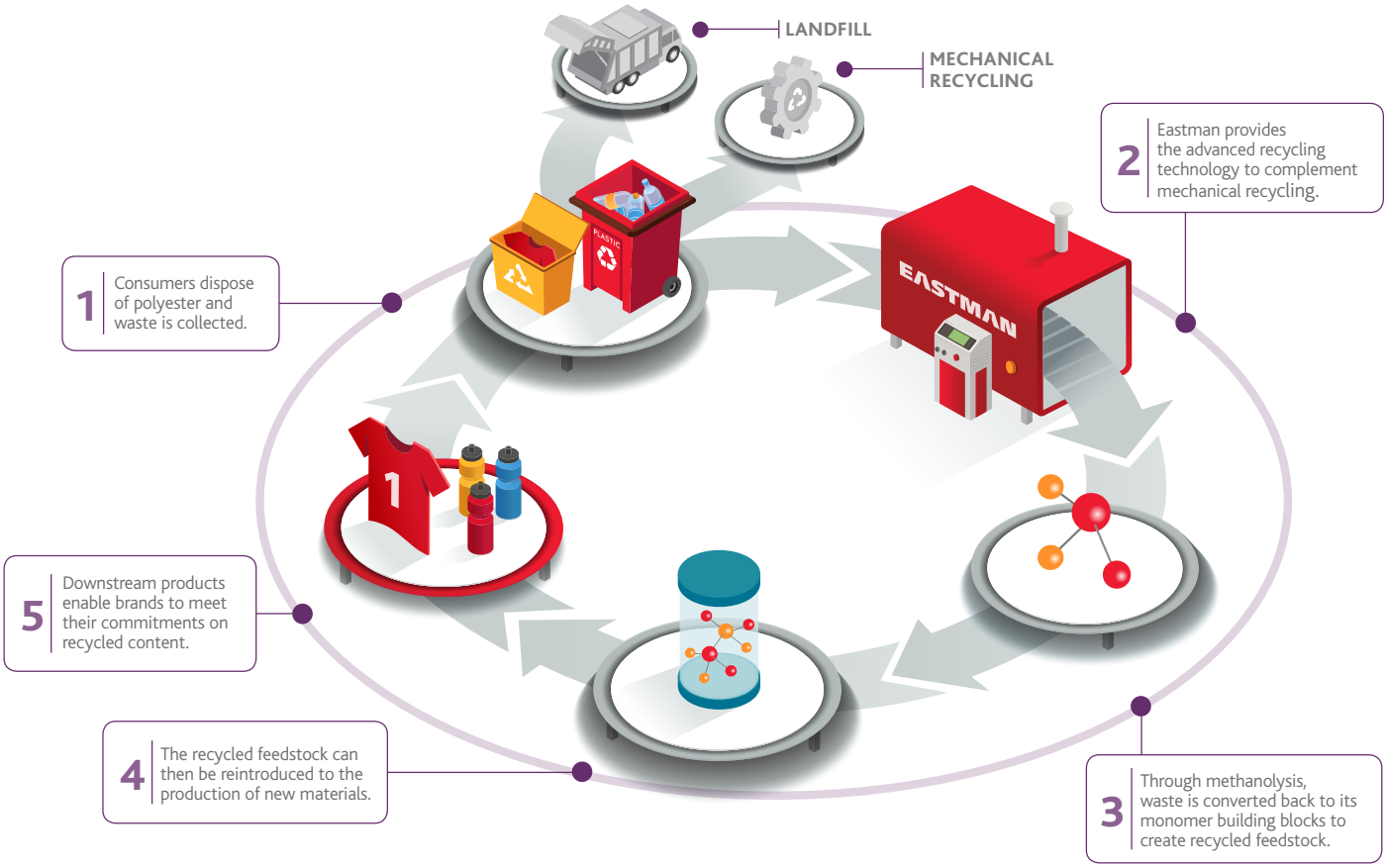
Eastman is currently executing an engineering feasibility study on the design and construction of a commercial-scale methanolysis facility to meet the demands of our customers and has engaged in initial discussions with potential partners across the value chain on the development of such a facility. The goal is to be operating a full-scale, advanced circular recycling facility within 24 to 36 months.

Eastman's efforts to find new end-of-life solutions to advance the circular economy align with the company's innovation-driven growth strategy and commitment to create value though sustainability. With a strong focus on issues and opportunities within the environmental, social and governance (ESG) framework, the company has established goals and strategies to address the world's complex challenges.

"We believe we have an obligation to enhance the quality of life in a material way," said David A. Golden, Senior Vice President, Chief Legal & Sustainability Officer, and Corporate Secretary. "As the desire grows for products that have a sustainable life cycle, Eastman continues to build on its heritage of world-class technology platforms and product innovation to offer solutions at the molecular level. Today, more than ever, the world needs innovation, and Eastman is excited about the possibilities we can achieve by working along the value chain, across industry sectors and with community partners to expand our efforts and make the greatest collective impact."

Advanced circular recycling

Eastman's methanolysis technology
in the circular economy



Frequently asked questions

1. What is advanced circular recycling?

Advanced circular recycling is an innovative technology leveraging methanolysis to take plastic waste back to its building blocks. Waste polyesters are depolymerized using heat, pressure, and methanol to give monomers called dimethyl terephthalate (DMT), ethylene glycol (EG), and other specialty monomers. These monomers can then be reintroduced as recycled polyester raw materials to make new polyesters, delivering a true circular solution.

2. Why is Eastman focused on advanced circular recycling/methanolysis?

Eastman has a strong history in polymer science and has experience with commercializing advanced circular recycling, known in scientific terms as methanolysis. We know this is a technology that works, and a methanolysis facility can be developed at a scale to meet the demands of our copolyester markets. We believe this is a technology that will help close a gap in current recycling capabilities.

3. How does advanced circular recycling/ methanolysis differ from mechanical recycling?

Mechanical recycling refers to the predominant method of recycling practiced in communities around the world today. The process includes collecting, sorting, grinding, washing, separating, drying, regranulating, and compounding. In mechanical recycling, polymers stay intact, which permits multiple but finite reuse of polymers in the same or similar product. Polymers recycled with this method are highly valued but challenging to produce due to the high purity requirements.

Advanced circular recycling is a positive end-of-life solution for polyester materials that might otherwise be discarded in landfills. Through the scientific process of methanolysis, polyester-based products are reduced to their polymer building blocks called monomers. They are then reintroduced to the value chain as recycled polyester raw materials, delivering a true circular solution.

Our technology can complement mechanical recycling by providing a solution for materials that can't be addressed by mechanical recycling.

4. Where does Eastman see itself in the circular economy?

Eastman is committed to working together across the value chain to create real and actionable solutions towards a true circular economy. We believe that sustainable solutions to plastic waste are in reach, and we are determined to play our part in the world's collective response.

Our scientific and technical resources can be a circular economy multiplier for plastics and textiles. We have developed operated and proven technologies that unlock value in plastics and textiles that cannot be mechanically recycled or are difficult to recycle. These scale technologies can complement current mechanical recycling technologies and enable brand owners and others in the value chain to achieve their ambitious goals for waste reduction and commitments on recycled content.

5. Is Eastman part of any global circular economy initiatives—including the Ellen MacArthur Foundation?

Yes. We are in discussions with the Ellen MacArthur Foundation and have an initial focus on membership in the CE100. We are also considering applying for membership in the New Plastics Economy in the second quarter of 2019.

Additionally, we are participating in the Plastic Leak Project, an initiative led by Quantis to guide companies to move from assumption-based to fact-based actions. At Eastman, we believe in leveraging sound science to better understand potential solutions, and the Plastic Leak Project is firmly aligned with that approach.

We are very encouraged to be more closely engaged with organizations who are working to identify and promote technologies that can help to create transformative change.

6. What are Eastman's sustainability goals?

At Eastman, we define sustainability as creating significantly more value in the world than the resources we use. Our sustainability goals have three priorities: steering a sustainable portfolio, driving resource productivity, and delivering focused good for good. These priorities allow us to create value through sustainable products, efficient use of resources, and strategic partnerships that drive social innovation.

We have the technology and expertise to provide innovative sustainable solutions to some of the world's most complex problems. By investing in our portfolio of circular solutions, we can help solve significant global challenges while delivering value to our stakeholders, customers, partners, and the global community.

Visit eastman.com/sustainability to learn more.

Carbon renewal technology

Media release: Eastman offers second innovative recycling solution to global plastic waste problem

Kingsport, Tenn., USA — April 3, 2019 — Eastman (NYSE: EMN) announced today a breakthrough innovation to address the world's plastic waste problem.

Eastman's innovation-driven growth strategy, underpinned by creating value through sustainability and a commitment to enhancing the quality of life in a material way, is driving the company's efforts to advance the circular economy by finding new uses for products or materials otherwise reaching end of life. In March, the company announced plans to launch an advanced circular recycling technology that breaks down polyester waste that cannot be recycled by current mechanical methods into basic polymer building blocks that can be reintroduced as new polyester-based polymers, delivering a true circular solution.

Today's announcement introduces a second Eastman innovation called carbon renewal technology, which is capable of recycling some of the most complex plastic waste, including non-polyester plastics and mixed plastics that cannot be recycled with conventional recycling technologies. With this new recycling technology, materials such as flexible packaging and plastic films, among others, can be diverted from landfills.

By modifying the front end of Eastman's cellulosics production, carbon renewal technology uses plastic waste as feedstock and converts it back to simple and versatile molecular components. The process partially oxidizes the plastic and, at a very high efficiency, converts it into the basic building blocks of certain Eastman products, including Advanced Materials and Fibers segment products that serve ophthalmics, durables, packaging, textiles and nonwovens end-use markets.

Eastman has completed pilot tests at its Kingsport site and plans commercial production in 2019 by leveraging existing assets. This rapid success in developing a new recycling approach is a further example of how Eastman leverages its scale and integration to provide sustainable solutions to the world.

Eastman is exploring commercial collaborations to yield mixed plastic waste to be recycled through carbon renewal technology at commercial scale.

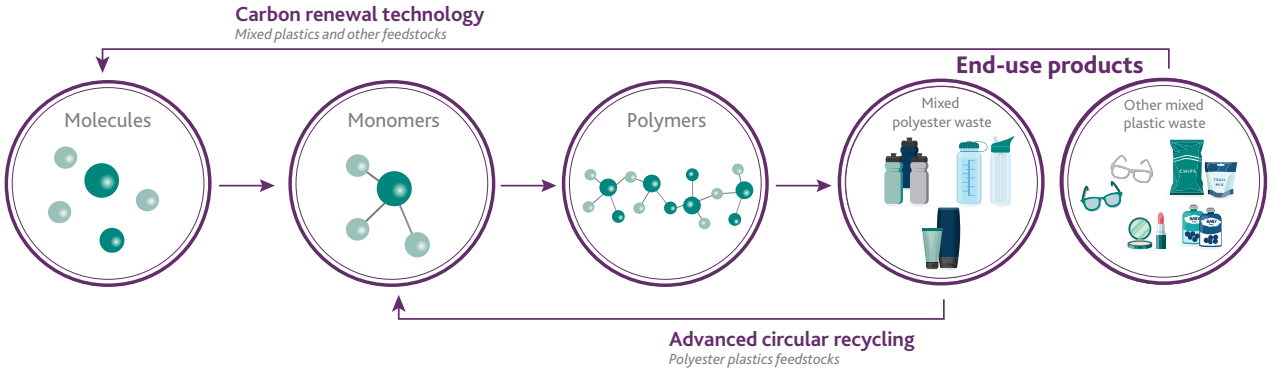
Board Chair and CEO Mark Costa said, "Eastman has the technology, the innovation power and the people to make a difference. Eastman is now uniquely positioned to deliver two powerful innovation solutions that target different plastic waste streams that pose complex challenges. Plastics are used in so many important ways. But because some don't have good end-of-life solutions or are discarded, the world is facing a problem of significant magnitude."

"Eastman is embracing its stated purpose of enhancing the quality of life in a material way for people around the world," Costa added. "This not only translates to producing superior materials for the products consumers use daily but also contributes in a meaningful way to a circular economy—an economy where we reuse and repurpose our resources so they retain their value for as long as possible."

Steve Crawford, Senior Vice President and Chief Technology Officer for Eastman, said the new recycling portfolio is a perfect example of the company's innovation-driven growth strategy.

"As a leader in materials innovation, Eastman can now provide unique solutions that will support our customers and end users in achieving their sustainability goals," Crawford said. "Eastman's circular technologies represent the opportunity for partnerships to provide solutions, including end-of-life options, that will have an impact on the global waste problem."

Eastman's circular solutions



Advanced circular recycling

Polyester materials are taken back to their polymer building blocks. These building blocks can then be reintroduced to the production of new polyester-based polymers, delivering a true circular solution.

Carbon renewal technology

Mixed plastic waste, including non-polyesters or polyesters that are difficult to recycle, is converted back to simple and versatile molecular components. The resulting molecules can then be reintroduced to the production of a variety of materials, not limited to plastics and including the company's cellulosic product family in such market applications as textiles, nonwovens, ophthalmics, and durables among others.

Frequently asked questions

Carbon renewal technology basics

1. What is carbon renewal technology?

Eastman's carbon renewal technology is a large-scale, efficient recycling technology that can recycle mixed plastic waste that is not recycled today, including non-polyester plastics and mixed plastics that can't be recycled with conventional recycling technology. By modifying the front end of our cellulosics production stream, carbon renewal technology now converts plastic waste back to simple and versatile molecular components. In this high-efficiency process, the waste plastic is reacted with water and oxygen at high temperature and pressure back into the basic building blocks for our acetyl and cellulosics product lines—carbon monoxide and hydrogen. Eastman uses these building blocks to make methanol and methanol derivatives, including methyl acetate, acetic acid, and acetic anhydride. These materials are then used for the manufacture of a variety of consumer products people use every day.

Carbon renewal technology is not combustion or incineration. Carbon renewal technology converts plastic waste into building blocks for downstream chemical production.

2. What can be recycled through carbon renewal technology?

Eastman's carbon renewal technology can process a mixed stream of plastic waste that is not recycled today, including non-polyester plastics or mixed plastics that can't be recycled with conventional recycling technology. Examples of mixed-stream plastics that can be recycled through carbon renewal technology include plastics marked with recycle codes four or greater, such as flexible packaging, plastic films, multilayer plastic structures, and various engineering plastics.

3. What materials will be made through carbon renewal technology?

Eastman will use carbon renewal technology to make methanol and methanol derivatives, including methyl acetate, acetic acid and acetic anhydride. These materials are then used to produce a variety of products, not just plastics and Eastman cellulosics products but also products for such market applications as textiles, nonwovens, ophthalmics, durables, and more. The building blocks produced through carbon renewal technology retain the valuable performance properties and quality that customers expect from Eastman products. Examples include cellulosic polymers such as fibers (Eastman Naia™ cellulosic fibers for clothing), performance films (LCD screens), coatings (automotive paint), and durable goods (eyeglass frames).

4. What specific products will be made through carbon renewal technology?

Decisions on which products will benefit from the use of recycled plastic waste from our carbon renewal technology have not yet been made but will be decided based on input from marketing and technology teams as well as our customers. A variety of factors will need to be considered, including strength of market drivers. We will work with our markets and the market leaders within those markets to drive those products to meet unmet needs.

5. How does carbon renewal technology differ from the methanolysis technology that you recently announced?

Both new Eastman recycling technologies are forms of chemical recycling that can help accelerate the circular economy and complement mechanical recycling. Their feedstocks, processes, and resulting outputs are different. Carbon renewal technology recycles all types of mixed or non-polyester plastics, including flexible packaging and plastic films. Advanced circular recycling, or methanolysis, recycles polyester-based plastics that are not suited for the traditional recycling practiced by municipalities around the world.

Product stewardship and carbon footprint

6. Have you discussed these recycling technologies with EU and member state officials? How do they rate it? Did they think this could be counted towards recycling credits?

We have a continual and constructive dialogue on policy initiatives such as those related to the circular economy with EU and member states officials. We believe that recycled polymers from carbon renewal technology should count toward companies' recycling content claims, and we wish to lead the conversation with relevant stakeholders to establish the appropriate framework for this.

7. Have you carried out a life cycle assessment (LCA) on carbon renewal technology?

Eastman has completed a preliminary LCA for carbon renewal technology, which concluded that gasification of recovered plastic waste is expected to have a carbon footprint that is essentially the same or slightly advantaged compared to gasification of coal. A detailed LCA will be completed in the future as supply chains for plastic wastes become more developed and after more operational data is collected.

8. When can we receive samples? Data sheets?

We will begin to engage with customers immediately and make samples and data sheets available as soon as possible.

9. How will recycled content affect food contact clearances and other products certifications? How are quality risks, including contamination, mitigated for our products?

The project team is aware of questions regarding how allocated recycle content relates to certifications and regulatory clearances for products going into such markets as food, food packaging, and medical devices. Eastman's carbon renewal technology is an efficient recycling technology that converts plastic waste back to the simple and versatile molecular components carbon monoxide and hydrogen. These building blocks are used to produce methanol and methanol derivatives that are the front end of our cellulosic production stream. We are confident that carbon renewal technology can produce the high-quality acetyls and cellulosic products suitable for use in a variety of end markets, including food packaging and medical applications. To mitigate impact on our products, Eastman has a robust risk management process that includes analytical methods, management of change procedures, and more. We have confidence that our customers will continue to receive the same high-quality products which meet our existing specifications and quality requirements.

Regulatory and clearances

10. What certifications for recycled content will be provided? By whom?

Eastman intends for claims of allocated recycled content under a mass-balance approach to be verifiable and certified by a credible third party.

For more information, visit eastman.com/circular or contact your Eastman representative.

EASTMAN

The results of **insight**™

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