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Innovative Solutions

>> President's Message

I am pleased to share that Insight Magazine – Volume 74 covers the critical topic of Post-Consumer Plastic Recycling. Responsible waste management is essential for a sustainable future, and this edition explores innovative solutions and collective actions to repurpose plastic waste effectively.

Post-Consumer Plastics Waste: A Call for Responsible Management

The management of post-consumer plastics waste is one of the most pressing challenges of our time. As the global economy continues to expand, so does the consumption of plastics, making sustainable waste management a key priority. Plastindia Foundation remains committed to advocating responsible practices that ensure plastics remain a valuable resource rather than an environmental burden.

Plastics have significantly improved our quality of life, from healthcare to packaging and infrastructure. However, their post-consumer lifecycle requires urgent attention. The focus must shift from a linear 'use-and-dispose' model to a circular economy approach that emphasizes recycling, reuse, and responsible waste disposal. Strengthening infrastructure for efficient collection, segregation, and recycling of plastic waste is crucial. Additionally, consumer awareness and participation in waste segregation at the source can accelerate efforts towards sustainable plastic waste management & recycling.

Industry-led initiatives, policy frameworks, and global cooperation play a pivotal role in addressing this challenge. Technologies for advanced recycling, bio-based alternatives, and extended producer responsibility (EPR) schemes need to be adopted widely. Collaboration between governments, industries, and civil society is the need of the hour to ensure that plastics continue to be a material of utility without becoming an environmental concern.

Current status of post-consumer plastic waste in India and globally:

India generates 3.9 million tons of plastic waste annually, with a 60% recycling rate, but improper disposal and lack of segregation remain major challenges. The government has implemented Plastic Waste Management Rules and a ban on single-use plastics, yet enforcement issues persist. Globally, over 400 million tons of plastic waste are produced annually, with only 9% being recycled and large amounts ending up in landfills and oceans. International initiatives like the United Nations Plastics Treaty and EU Circular Economy Plan aim to curb plastic pollution. While progress is being made, stronger regulations, technological advancements, and public awareness are needed for effective global plastic waste management.



Ravish B. Kamath
President, Plastindia Foundation

Advancing Post-Consumer Plastic Waste Recycling in India

The future of post-consumer plastic waste recycling in India depends on strengthening waste segregation, improving recycling infrastructure, and enforcing stricter regulations. Adopting advanced recycling technologies, such as chemical recycling and biodegradable alternatives, can significantly reduce plastic pollution. The Extended Producer Responsibility (EPR) framework should be further strengthened to encourage manufacturers to take a more proactive role in plastic waste management.

The plastic industry plays a crucial role in this transformation by designing recyclable products, reducing single-use plastics, and investing in sustainable packaging solutions. Collaboration among industry, policymakers, waste management agencies, and consumers is essential for efficient waste collection and recycling. A circular economy approach, driven by innovation, policy reforms, and public awareness, is key to achieving sustainable plastic waste management in India.

A Shared Responsibility for a Sustainable Future

The journey towards sustainable plastic waste management requires participation from all stakeholders – governments, industries, researchers, and consumers alike. Plastindia Foundation remains steadfast in its mission to promote responsible plastic usage, recycling technologies, and environmental stewardship. We call upon all partners and stakeholders to join hands in making post-consumer plastics waste management a global success story.

PLASTINDIA 2026

I am pleased to inform you that preparations for PLASTINDIA 2026 are well underway, promising a global platform to showcase innovations, sustainable solutions, and opportunities in the plastics industry. We invite you to be part of this landmark event. Please visit our website, plastindia.org, for more details.

“ Together, through innovation, commitment, and collaboration, we can turn plastic waste from a challenge into an opportunity for sustainable growth.



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>> Editor's Message

Shaping the future of Plastic Waste Management



Mr. Ramesh Parasuraman
Editor, Plastindia Foundation

India is taking significant strides toward achieving environmental sustainability. Extended Producer Responsibility (EPR) is one of the key mechanisms driving this transformation. Accordingly, producers, importers, and brand owners are liable for the post-consumer waste generated by their products, and are further supposed to manage waste at the end of the product's lifecycle.

The central ministry of environment, forest and climate change notified 'Guidelines on Extended Producer Responsibility for Plastic Packaging' amending the Plastic Waste Management Rules on February 16, 2022. Subsequently, the Central Pollution Control Board (CPCB) developed the centralised EPR portal for plastic packaging in accordance with provisions of the notified EPR guidelines.

Specific Mandates for Recycled Plastic Content

The ministry has mandated that beverage makers use 30% recycled plastic in rigid packaging, like PET bottles, from

April 1st, 2025, followed by annual increments of 10% to reach 60% by financial year 2028-29, that remains to be seen for there is a gap existing towards infra-mismatch for recycling and availability of R-Pet.

This mandate, while specific to beverage makers, aligns with broader efforts to drive investments in recycling infrastructure, the guidelines also set targets for other categories, say Flexible (starting to use 10% to reach 20%) and Multilayered (MLP, to start using 5% to reach 10%) by financial year 2028-29. These targets are subject to infrastructure availability and do not include recycled plastic from imported materials, emphasizing the need for domestic recycling capacity.

The guidelines also allow for the sale and purchase of surplus EPR certificates, enabling stakeholders to offset shortfalls, carry forward surpluses, or trade certificates, fostering a market mechanism for compliance. This is



particularly relevant for entities operating across multiple states, registered with CPCB, while those in one or two states register with State Pollution Control Boards (SPCBs) or Pollution Control Committees (PCCs).

One needs to understand (and accept) EPR is a policy framework that requires producers, importers, and brand owners to take responsibility for the lifecycle of their products, specifically post-consumer waste. The core idea behind EPR is that the producer equally shoulders its responsibility; not only for the manufacturing phase but also for the waste generated once the product reaches the end of its useful life, in the larger interest of the society. In turn the policy incentivizes them to design products that are easier to recycle and promote the use of recycled materials

In Pursuit of a Circular Economy

India's battle against plastic waste and its pursuit of a circular economy is at a critical juncture. While the country faces immense challenges especially in rural areas and smaller cities for the lack of adequate infrastructure, there is a clear momentum behind solutions that promote recycling, waste reduction, and more sustainable business practices.

Cities like Delhi, Mumbai, Pune, Bengaluru, Ahmedabad, Chandigarh, Indore to name some, have made headway in plastic reduction, taking challenges head-on.

Innovations in post-consumer plastic upcycling are revolutionizing waste management; be it bricks to plastic roads, sustainable packaging to 3D printed furniture to sustainable fashion, these innovations demonstrate the transformative power of creative solutions in tackling the plastic waste crisis.

Looking at the ever-rising issue concerning plastic waste and environment, new and improved uses of recycling plastics are being adopted to ensure the recycling process is generic, fast and cheap. All such trends not only help in the fight against the use of plastic waste but also introduce the topic of new opportunities in the management of waste.

The efforts of corporations, grassroots movements, and policy interventions are beginning to create tangible shifts, proving that closing the loop on packaging waste is not only possible but it's already underway.

As India continues to evolve its regulations, the plastic industry's role in ensuring compliance with EPR is crucial to reducing plastic pollution and advancing toward a circular economy.



NEC Chairman Message

Plastindia 2026: Bigger, Bolder, and Ready to redefine the Global Plastics Industry



Mr. Alok Tibrewala
NEC Chairman, PLASTINDIA 2026

India is no longer just a fringe player in the global plastics industry—it is emerging as a leader. With record-breaking exhibitor interest, PLASTINDIA 2026 is set to be the most ambitious edition yet. This world-class exhibition is not just growing in size; it shall strengthen India's reputation as a global hub for plastics innovation, trade, and technology.

A Landmark Expansion

For the first time, PLASTINDIA 2026 will cover a staggering 65,000 square meters of net space, marking a 30-35% expansion from previous editions. This significant upsize demonstrates India's rising influence in the global plastics sector and the growing demand for high-quality industry exhibitions. This expansion isn't just about space—it's about impact. Exhibitors from across the world are seizing the opportunity to showcase cutting-edge technologies, sustainable solutions, and high-performance materials that are transforming the future of plastics.

The Power of Live Machinery Displays

A must-visit attraction of PLASTINDIA are live machinery demonstrations and they continue to generate excitement. Forthcoming edition has an ultra large, 23,000 square meters dedicated space showcasing state-of-the-art automation, robotics, and innovations in manufacturing. Space applications continue to pour in and the organizing committee is working strategically to accommodate exhibitors while maintaining a diverse representation of global technologies to ensure the carefully crafted machinery zone that offers an unmatched live production experience industry experience.

Government Backing: A Driving Force

The Indian Government continues to play a pivotal role in the rapid growth of PLASTINDIA 2026. The Department of Chemicals and Petrochemicals (DCPC), the Ministry of Commerce, and officials from Bharat Mandapam have recognized the event's potential to showcase India's manufacturing strength on a global platform. Their overwhelming support has ensured seamless coordination, international visibility, and strategic collaborations. PLASTINDIA Foundation has the highest appreciation for these authorities for their unwavering commitment, which has been instrumental in shaping the event's mega success.

The Buyer-Seller Meet-Ordering from India to meet global requirements

Beyond showcasing products, PLASTINDIA 2026 is fostering meaningful connections to generate real business. In partnership with the PlexConnect organised by PlexConcil, the event will host an exclusive Global Buyer-Seller Meet, creating high-value networking opportunities. This initiative aims to drive business growth, enabling exhibitors to connect with potential buyers, partners, and industry leaders. For business houses seeking to expand their footprint in India and beyond, this meet offers strategic advantage.

A Pivotal Moment for India's Plastics Industry

India's plastics sector is at a transformational crossroad, encouraged by government incentives, rapid growth in global and domestic demand, and driven by technological advancements in AI & Manufacturing 4.0. Rightfully recognising the immense growth potential the government of India has also introduced a Production-Linked Incentive (PLI) scheme for MSMEs, in Budget 2025.

This growth multiplier endeavours to boost manufacturing, exports, and innovation in the plastics industry, giving small and medium enterprises (SMEs) exciting fiscal incentives to scale up. With policies that encourage acceptance to sustainability and high-tech advancements, India is leveraging itself as a global leader in plastic solutions. India is not just catching up; it is setting new benchmarks. The overwhelming response to PLASTINDIA 2026 is a testimony to this high velocity momentum, serving as an incredible launch pad for future industry innovations and partnerships.

The CEO Conclave: Transforming the Future of Plastics

A key highlight at PLASTINDIA 2026 is the eagerly awaited CEO Conclave. This exclusive gathering will bring together top executives, industry pioneers, and policymakers to discuss trends, challenges, and growth strategies for the ever-evolving global plastics industry. The event team has successfully ensured the participation of some of the biggest industry stalwarts at CEO Conclave & the delegates can look forward to a series of eclectic discussions loaded with insights.

Final Countdown: An Absolute Sold-Out Exhibition

With the event just months away, exhibitor spaces are now sold out, and vendor selections have been finalized. The PLASTINDIA 2026 team is working meticulously to ensure that every detail aligns with the event's ambitious vision. Additionally, digital promotions are set to launch in August 2025, amplifying international outreach and attracting a diverse audience of industry leaders, manufacturers, and buyers.

PLASTINDIA 2026 Matters More Than Ever

With its giant scale, government backing, strategic business initiatives, and focus on innovation, PLASTINDIA 2026 is on its way to redefine industry benchmarks for businesses, investors, and stakeholders in the plastics sector; more than just an exhibition—it's an opportunity to be a part of the future of global plastics manufacturing and trade.





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Plastindia Foundation Makes it's Presence at Trade Show

The Plastindia Foundation participated at various Conventions and trade shows; be it National and International, starting January, this year making it presence felt all over. Some of the prominent shows include ArabPlast 2025, Indplas'25.

Apart from this, Mr. Ravish Kamath, President, Plastindia Foundation made his presence felt representing the Association as Chief Guest, meeting dignitaries and Ministers.

President Plastindia Foundation meets Shri. Pralhad Joshi, Hon'ble Minister

Plastindia Foundation President, Mr. Ravish Kamath, had the honor of meeting Shri Pralhad Joshi, Hon'ble Minister of Consumer Affairs, Food, and Public Distribution, Government of India, in Mangalore earlier on 2nd January, 2025.

During the discussion, Mr. Kamath briefed the Hon'ble Minister about INC-5, PLASTINDIA 2026, and the CEO Conclave. Shri Pralhad Joshi expressed his full support and encouragement for PLASTINDIA 2026, reaffirming the government's commitment to advancing India's plastics industry.



ArabPlast'25

ArabPlast

The 17th edition of ArabPlast, an exclusive event for Plastics, Petrochemicals, Packaging and Rubber Industry was successfully held during January 7 to 9, 2025, at the Dubai World Trade Centre.

Plastindia Foundation participated at the Trade expo representing the Indian Plastic industry making it to the Indian Pavilion a dedicated category.



The Plastindia Booth situated amongst the Indian Pavilion was inaugurated by Mr. Satish Kumar Sivan, Hon'ble Consul General of India, Dubai, at Arabplast 25, marking a significant moment of global collaboration and growth.

Indplas'25

The 10th edition of Indplas'25, the International Plastics Exhibition, was successfully held at Biswa Bangla Mela Prangan, Kolkata, during 28th Feb – 3rd Mar 2025.

The event brought together industry leaders, innovators, and stakeholders from across India and beyond, reinforcing its status as India's most promising plastics exhibition and Eastern India's premier industry event.



The Plastindia Foundation stall at INDPLAS'25 was officially inaugurated, to kickstart an engaging platform for networking and discussions on the future of plastics.

The inauguration was done collectively at the hands of Mr. Ravish Kamath – President, PIF, Dr. Raju D. – Vice President, PIF, Mr. Dharmendra Gandhi – Treasurer, PIF, Mr. Jigish Doshi – Imm. Past President, PIF, Mr. Alpesh Patel Managing Committee Member, PIF, Mr. Anil Reddy Managing Committee Member, PIF along with astalwarts of the Plastic Industry.



International Summit for the Packaging Industry, New Delhi

Mr. Ravish Kamath, President, Plastindia Foundation was invited as the Chief Guest of the 5th International Summit for the Packaging Industry, New Delhi, March 6-8, 2025.



At the summit he had the privilege of addressing thought leaders, innovators, and stakeholders at the 5th International Summit for the Packaging Industry in New Delhi to discuss the growing role of FIBCs in global trade, how they align with the 5S principles;- safe, secure, standardized, smart, and sustainable and how they are driving the future of packaging.

This experience also underscored the critical role that the Plastindia 2026 exhibition will play in advancing the global plastics conversation, particularly around packaging.



Global Plastics Alliance (GPA) Meeting

In line with our commitment to sustainability, Plastindia Foundation actively participated at **Global Plastics Alliance (GPA) Meeting**, held from the 25th to 27th of March 2025, at Shangri-La, The Fort, Manila, Philippines.

Dr. Sameer Joshi and Mr. Haren Sanghavi represented Plastindia Foundation, contributing to the discussions aimed at driving global commitments to reduce plastic pollution and promoting a circular economy.

The event brought together global stakeholders to discuss strategies for plastic waste management, innovation in recycling, and sustainable plastic solutions.

The insights from this meeting will play a significant role in shaping India's approach to responsible plastic usage and waste management.



"India – Leading the Way to The Future"

With the massive growth of the Indian middle class, the vast country is fast becoming Asia's first major 'buy' economy. At a GDP of nearly US\$ 2 trillion, India is the third largest economy in Asia, growing in high single digits and gearing to grow faster. With a population base of 1.2 billion people, a work force of 467 million, and a fast growing, upwardly mobile, consuming middle class of more than 350 million people. India is truly a dream come true for the world's manufacturing sector.

While the world reeled under recession and economic downturn in 2009, India still grew at nearly 5.5% - attracting the label of a 'recession proof economy'. Propelled by liberalization policies that have boosted demand and encouraged trade, India has opened itself up to the world, and is increasingly seen as the most lucrative destination for business and business partnerships. Add to this a highly skilled work force, a huge consumption base and a global outlook, the lure of 'India - the business destination' becomes even stronger.

India will become the world's fourth largest consumer of plastic by 2025, with consequent increase in processing capacity that will offer huge business opportunities. In the same period upstream investment will be in excess of US\$37 billion. The Indian plastics and polymers industry is set to grow explosively and visibly increase its global footprint.

India is poised, ready and welcoming.



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» Transforming Waste: Innovations in Post-Consumer Plastic Recycling in India

Innovations in post-consumer plastic recycling are revolutionizing waste management by utilizing advanced technologies thus significantly reducing plastic waste going to landfills and contributing to a more circular economy.



COVER STORY

In India, where plastic waste has reached alarming levels, the need for effective recycling solutions has never been more urgent. Yet, amid the challenges, India is emerging as a hub for innovative solutions to tackle post-consumer plastic waste. Entrepreneurs, scientists, and activists are rethinking how to manage plastic waste, and their efforts are driving a new wave of recycling technologies and sustainable practices that hold the promise of transforming waste into valuable resources.

The Scale of the Problem

India generates over 3.9 million tons of plastic waste annually, according to the Central Pollution Control Board (CPCB). The country's plastic waste problem is compounded by a lack of widespread infrastructure for efficient waste management and recycling. However, despite that about 60% of plastic waste is recycled.

The challenge, however, is not just the sheer amount of waste but also the type of plastic that often cannot be recycled using traditional methods. Mixed plastics, packaging materials, and single-use plastics are difficult to process and frequently end up in landfills.

On the other hand, across the country, a host of innovative startups and organizations are leading the charge to turn this plastic waste crisis into an opportunity for sustainable development. From advanced recycling technologies to the upcycling of plastic into valuable products, these solutions are reshaping the future of plastic recycling in India.

Mechanical Recycling: Most Preferred Approach

Mechanical plastic recycling transforms post-consumer plastic waste into new products through processes like sorting, washing, grinding, and compounding, without significantly altering the material's chemical structure, enabling multiple reuse cycles. It is the most common and preferred recycling solution for plastic waste if it is ecologically most beneficial, technologically possible, and economically attractive. Plastic waste is collected and recovered from any post-consumer waste stream, including residual mixed waste. The recovered plastic is processed with extensive pre-sorting and purification steps to ensure high-quality results.

Advanced mechanical recycling is a revolutionary new technique that transforms household plastic waste into high-quality recycled plastic content. It is an energy-efficient method of plastic recycling. Unlike chemical recycling or plastic pyrolysis, it requires far less energy and has a smaller ecological footprint.

Advanced mechanical recycling includes: Decontamination and label removal, Flake sorting into polymer types and colour groups, Deodorization, Extrusion and pelletizing.

Chemical Recycling: A Breakthrough Approach

One of the most promising innovations in post-consumer plastic recycling in India comes from chemical recycling. Unlike traditional mechanical recycling, which can only process a limited range of plastics, chemical recycling breaks down plastics into their original chemical components, allowing them to be reused to produce new plastic of the same quality as virgin material. This technology enables the recycling of even the most challenging types of plastics, such as multilayer packaging and mixed plastic waste.

The Indian Oil Corporation (IOC), one of the country's largest state-owned oil and gas companies, has entered the field of chemical recycling. In 2020, IOC launched a pilot project aimed at converting waste plastics into synthetic crude oil through a process called pyrolysis. This approach offers a potential solution for converting plastic waste into fuel, which can then be refined and used for energy. If successful, such initiatives could

reduce plastic waste while providing a sustainable energy source.

Upcycling: Turning Trash into Treasure

Upcycling is another game-changing approach being used in India to address plastic waste. Rather than breaking down plastic into its raw components, upcycling involves transforming waste plastic into new, higher-value products. This innovative process not only reduces waste but also creates new markets for recycled materials.

There are many well-known examples of upcycling in India, that takes discarded plastic and repurposes it into products like furniture, clothes, construction materials-bricks, tiles, pavers to name some and even art among others. These products are used across sectors, providing a sustainable alternative to traditional raw materials.

Plastic waste that would otherwise fill landfills is now being used to build homes and public infrastructure as well. Such innovative process has gained significant traction, particularly in urban areas where the demand for affordable, eco-friendly housing solutions is growing. Similarly, there are enterprises upcycling plastic waste into affordable, clothing, footwear. By using discarded plastic bottles and bags. Such initiatives not only help manage plastic waste but also creates employment opportunities for local artisans.

Biodegradable Plastics: A Green Alternative

India is also exploring the potential of biodegradable plastics as part of its effort to reduce reliance on



conventional, non-degradable plastics. Companies are producing bioplastics made from plant-based materials, which degrade more quickly and safely in the environment. These plastics, which can be used in packaging and other products, offer a promising alternative to traditional plastics that can take hundreds of years to break down.

While biodegradable plastics are still at the nascent stages (of adoption), they present an exciting possibility for the future of waste management. As we know Chhattisgarh, has become a hotspot for the production of biodegradable bags from agricultural waste like corn starch. These biodegradable alternatives are slowly gaining popularity as awareness about plastic pollution grows.

Public Awareness and Policy Initiatives

In addition to technological innovations, the country is gradually making strides in public education and policy to combat plastic waste.

The Indian government has launched the Swachh Bharat Mission (Clean India Mission), which has focused on waste management and cleanliness across the country. Through this initiative, there has been increased awareness about the importance of recycling and proper waste disposal. Furthermore, India's ban on single-use plastics, which came into effect in 2022, has forced businesses and consumers alike to reconsider their plastic consumption habits.

As of 2022, India launched a major push to enforce EPR compliance among corporations, following the amendment of the Plastic Waste Management Rules

(2016). Although implementation has faced challenges, the ban has sparked widespread innovation in alternative materials and recycling methods, forcing industries to think creatively about how to reduce their plastic footprints.

At the grassroots level, organizations like Pollution Control India and many Environmental NGO's / Group are working to raise awareness, mobilize communities, and provide training on how to recycle effectively. These organizations have helped to establish local recycling programs, bringing together waste pickers and residents to increase the collection and recycling of plastic waste.

Looking to the Future

While plastic waste remains a significant environmental challenge in India, the country is making remarkable progress toward transforming waste into valuable resources. Through chemical recycling, upcycling, biodegradable plastics, and policy initiatives, India is developing innovative solutions that not only tackle the plastic waste crisis but also drive sustainable economic growth.

The success of these innovations depends on collaboration across industries, government, and civil society. With the right infrastructure, education, and investment, India has the potential to become a global leader in sustainable plastic recycling, demonstrating that waste, when approached creatively and sustainably, can be transformed into something far more valuable than mere refuse. ■



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“ Post-Consumer Plastics Waste Usage Will See The Upward Trend...



Dr. Sameer Joshi
Vice Chairman, Indian Plastics Institute

The Use of post-consumer Plastics waste will see the upward trend due to the laws and EPR guidelines, however the supply chain has to be developed in this accordingly for, 'post-consumer plastic waste' essentially, refers to plastic items (it's plastic) that has been used by people and is considered a trash, as opposed to plastic waste generated during manufacturing processes.

There are several different types of post-consumer plastic waste, including polyethylene terephthalate (PET), high-density polyethylene (HDPE), Low density poly ethylene, low-density polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS), and polycarbonate (PC), Multilayered plastic waste that are being used across the segment.

According to recent regulations in India, companies are mandated to incorporate from April 1, 2025 at least 30% post-consumer recycled (PCR) content in their plastic packaging, particularly in beverage bottles, with a target to reach 60% by 2028; this means that the current average percentage of PCR content in Indian products and packaging is likely to be around 30% as per current regulations.

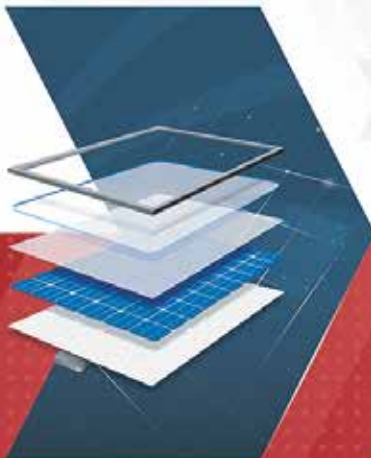
However, India faces several challenges in managing plastic waste, including inadequate infrastructure & facilities, public apathy and littering habits. The EPR policy in India is good but yet evolving. It will take time to mature and yes it will contribute to reduce plastic waste by managing it effectively. EPR is one of the tools and not the end. The policies and efforts are sincere and we are on right path.



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“ By Incentivizing The Plastic Industry, EPR Could Serve One of It's Primary Objectives in The Move Towards A More Sustainable Future...



Abhinav R Lakhmapure
Senior Manager, EPR Compliances
The Shakti Plastics Industries

Plastic consumption is rapidly increasing due to urbanization, industrialization, and the growing demand for packaged goods. I would like to add post-consumer plastic waste refers to plastic packaging waste that have been used by consumers and are then discarded post consumption of the products packed / wrapped into it.

After these items have served their purpose, they are considered waste and are typically sent for recycling, disposal, or further processing for making an innovation. Managing plastic waste in India presents significant challenges due to various factors that primarily includes, inadequate infrastructure and lack of public awareness against littering.

Collaboration among the government, plastic producers, waste management companies, and consumers is crucial for ensuring that EPR does not remain a mere regulatory obligation but a genuine solution for tackling plastic waste. While the implementation of EPR is challenging, it has the potential to be a key element in India's efforts to reduce plastic waste.

Post-consumer plastic waste has significant potential in the manufacturing of new products as well as recycled packaging and utilizing this waste helps reduce the demand for virgin plastic, conserves resources, and lowers the environmental impact of plastic production.

However, challenges like contamination, limited recycling infrastructure, and the quality of recycled plastic need to be addressed for it to be fully effective in manufacturing new, high-quality products.





Post-Consumer Plastic Waste Offers Significant Utility Value...



Haren Sanghavi
Managing Director
GMS Plastic Machinery Private Limited

“Post-consumer plastic waste” refers to plastic items that have been used by consumers and are now discarded as trash, meaning the plastic has reached the end of its life cycle in the hands of the consumer and is ready to be recycled or disposed of; essentially, it’s the plastic waste generated after a product has been used by a consumer.

Post-consumer plastic waste has significant utility value in manufacturing new products, offering a valuable way to reduce environmental impact by diverting plastic from landfills, conserving natural resources, and lowering greenhouse gas emissions by utilizing recycled materials instead of virgin plastic production.

Several Indian states offer subsidies and grants to promote plastic waste recycling, primarily through schemes like the “Plastic Park Scheme” which provides government funding up to 50% of the project cost for setting up dedicated plastic recycling facilities, including common infrastructure and technology support within designated plastic parks; this scheme is implemented by the Ministry of Chemicals and Fertilizers under the Government of India. Various states also offer a Various Specific Subsidies like Maharashtra has 15% or Max 15 Lakhs Subsidy for Recycling.

While one would always look forward to use post-consumer waste there are some challenges say, like Right Testing parameters, Reasonable and quick Testing facilities, sorting and contamination that can limit its application depending on the desired product quality and functionality.



» On Our Way for Becoming Plastic-Neutral in A Phased Manner

Post-consumer recycling has become increasingly popular world over with more and more companies investing in facilities for recycling post-consumer plastic waste.



Packaging is one of the key focus areas to be focused for reducing post-consumer plastic waste. Most of the FMCG companies use plastics for packaging. Under the new Plastic Waste Management (PWM) rules, India will implement mandatory norms for the recycling and reuse of plastic content for producers, importers, and brand owners of plastic packaging (excluding micro, small and medium enterprises, or MSMEs) in a phased manner starting from FY25.

India is the among the few largest plastic producer globally. While these new norms will put India ahead in the global league, they will also impact packaging costs for consumer companies.

According to experts the new mandatory norms for plastic recycling and reuse of plastic packaging will impact consumer goods companies for most of the consumer companies, on average, spend 5-8 per cent of their revenues on packaging, while still heavily relying on plastics. Their assessment is based on relative overall revenue-based exposure of companies to five key variables: plastic, transparent plastic, food-grade plastic, flexible plastic, and multi-layered plastic (MLP).

On the other hand, consumer companies are already working to reduce plastic packaging. A growing number of consumer goods firms are claiming to be “plastic neutral” in India. Many among the FMCG leaders have stopped using plastic for all promotional material since 2020 in their efforts for adhering to the PWM.

Many of them over the years have increased the use of environmentally friendly packaging materials, collaborating with independent plastic recyclers to manufacture recycled packaging materials and reduce the use of virgin materials. Others have established separate subsidiaries to secure packaging components. Plastic, one of the most lightweight protective materials, is widely used for wrapping and encasing products.

An official on the condition of anonymity said, “We have undertaken several measures on this front, including optimising current packaging by reducing size, initiating the use of recycled content in secondary packaging, and moving towards easy-to-recycle packaging material.”

Experts are of the view that plastic recyclers and innovative packaging companies such as EPL, Uflex, and ITC can provide solutions for making plastic recyclable.

What is Post-Consumer Plastic Recycling? Advantages and Solutions

Plastic is one of the most widely used materials worldwide, found in everything from food packaging to car parts. As a result, the amount of plastic waste produced is enormous, creating an environmental problem. Post-consumer recycled materials, often referred to as PCR, are reprocessed plastics from household or commercial waste.

Post-consumer plastic products close the loop by diverting waste from landfills and allowing it to be recycled into something else.

At times it is quite challenging to recycle post-consumer plastic. There are financial concerns (collection, cleaning, sorting, reprocessing, distribution) as well as physical issues (color and grade irregularity, contamination). After the wastes are recycled, the plastic pellets are to be manufactured into various recycled products according to different physical properties. This is where mechanical recycling has become a popular solution among plastic producers and recyclers.

Post-consumer plastic recycling involves several steps in its process, including: Sorting, Shredding, Washing, Drying, Pelletizing.

Advantages of post-consumer Plastic Recycling

Post-consumer plastic recycling not only brings advantages to the environment but also to humanity. Among the advantages of mechanical recycling, we have:

- **Reduction of waste**

It reduces the amount of waste that is sent to landfills and that typically takes centuries to decompose (due to the characteristics of different plastics). By

recycling plastics, materials will be given another life, and we will avoid them ending up polluting the environment.

- **Reduction of natural resource use**

With mechanical recycling, pellets that can be put back into production lines will be obtained, thus reducing the use of virgin raw materials. This reduces the environmental impact produced when new materials are extracted.

- **Job creation**

Mechanical recycling involves different stages, in which a large number of jobs are generated; two stages generate more jobs, one is the collection of plastics and the other is their sorting. Along with mechanical recycling, a positive impact on the economies of countries is obtained.

- **Energy savings**

In the production (extraction) of virgin materials, large amounts of energy are required, meaning that by recycling mechanically, companies will reduce their costs for pellets as well as electricity consumption.

- **Sustainable development**

Mechanical recycling leads us to a circular economy, helping to conserve natural resources and care for the environment. This will provide a better and more efficient life for plastics, both waste and virgin materials. ■



» Recyclable Packaging and The Rise of PCR Bottles in Sustainable Packaging

Major consumer brands are encouraging the use of recycled plastics, and PCR is the real recycled plastic that the plastic value chain must rely on to achieve sustainable development goals.

In recent years, the use of Post Consumer Recycled (PCR) plastics has become a major trend in the packaging industry and India is no different. India has seen a notable shift toward sustainability, driven by growing environmental concerns and increasing consumer demand for eco-friendly products.

A key component of this movement is the rise of Post-Consumer Recycled (PCR) bottles in the packaging sector, which is revolutionizing industries from food and beverage to personal care/ Toiletries, and pharmaceuticals Industrial and Household Chemicals, Paints and Coatings, and Other End-User Industries), and Geography across the world.

PCR bottles, made from recycled plastic waste, are gaining popularity as an environmentally responsible alternative to virgin plastic packaging, which has long been a significant contributor to pollution.

PCR technology involves collecting post-consumer plastic, such as discarded bottles and packaging, which is then cleaned, sterilized, and reprocessed to create new packaging products. The adoption of PCR bottles marks a significant step in reducing plastic waste, as they help close the loop in plastic recycling, ensuring that plastic waste doesn't end up in landfills or the ocean.

Environmental Impact and Consumer Demand

The environmental benefits of PCR bottles are substantial. India, with its burgeoning population and rapid urbanization, also faces a serious plastic waste crisis. According to a report by the Central Pollution Control Board, India generates around 39, 01, 780 tpa million tons of plastic waste annually with a Recycling Capacity of 9,35,290.005 tpa across the country.

The widespread adoption of PCR bottles can significantly reduce the need for virgin plastic production, which requires

substantial energy and resources. Additionally, it curtails the volume of plastic waste that clutters landfills and pollutes rivers and oceans. Consumer awareness and activism have played a pivotal role in driving the demand for sustainable packaging. Indian consumers are increasingly favoring brands that prioritize eco-friendly practices.

Recyclable packaging has become a tangible action plan rather than an empty slogan. As one of the 3R elements (Recyclable, Reuse, and Reduce) in plastic packaging recycling, recyclable packaging plays an increasingly critical role.

This shift in consumer preferences is forcing companies to rethink their packaging strategies. Companies that embrace PCR bottles not only contribute to environmental conservation but also appeal to a growing segment of environmentally conscious consumers.





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PCR Packaging Bottles in Different Countries

To combat plastic pollution, many countries and regions have developed strategies and policies to promote plastic recycling and encourage the use of PCR. These initiatives have encouraged technological advancements and market expansion in the industry.

In the United States, the demand for PCR packaging bottles has been growing steadily in recent years. This is due to the increasing concern among consumers and businesses about the environmental impact of packaging waste. Additionally, many states in the US have implemented recycling policies that mandate the use of PCR materials in packaging. As a result, many companies have started to use PCR bottles for their products, including leading brands such as Coca-Cola, PepsiCo, and Nestle.

In the European Union, there is also a growing demand for PCR packaging bottles. The EU has set ambitious targets for reducing plastic waste, and PCR materials are seen as a key solution to achieving these targets. The EU's Single Use Plastics Directive, which came into effect in 2021, bans several single-use plastic products and requires member states to collect and recycle at least 90% of plastic bottles by 2029. This has led to an increase in demand for PCR bottles and other sustainable packaging options.

In addition to the United States and the EU, other countries are also showing a growing demand for PCR packaging bottles. Japan, for example, has set a goal to achieve a 50% recycling rate for PET bottles by 2025, and PCR materials are expected to play a significant role in achieving this goal. China, which is one of the largest consumers of plastic in the world, has also started to focus on sustainable packaging options, including PCR bottles.

Overall, the future looks bright for PCR packaging bottles, as more and more countries are recognizing the importance of sustainable packaging solutions. As demand continues to grow, it is expected that the production of PCR materials will increase, making them more accessible and affordable for businesses of all sizes.



Regulatory Support

In recent years, India's government has taken steps to promote sustainable packaging solutions. The Plastic Waste Management Rules 2016, amended in 2018, encourage the use of recycled plastic in packaging, making it easier for companies to adopt PCR bottles.

According to CPCB reports as per the Guidelines on Extended Producer Responsibility for Plastic Packaging notified by MoEF&CC on 16 February, 2022 in Schedule - II of 4th amendment of Plastic Wastes Management Rules, 2016, Standard Operating Procedure (SOP) as well as the Centralized EPR Portal for registration of Producers, Importers & Brand Owners (PIBOs) & Plastics Waste Processors (PWPs) have been developed.

2,107 Brand-Owners (BO), 3,330 Producers and 23,687 Importers have been issued registration having Extended Producer's Responsibility (EPR) target of 30.72 Lakh tonne. Additionally, the government has initiated campaigns to reduce single-use plastics and promote recycling, which directly supports the use of PCR materials.

Corporate Commitment and Challenges

Many Indian companies are stepping in assuring to contribute their share in transforming the post-consumer plastics waste. Leading consumer goods brands such as Hindustan Unilever, Tata Consumer Products, and Amul have committed to increasing the use of recycled content in their packaging. Hindustan Unilever, for instance, has made a public commitment

to ensure that 25% of its plastic packaging comes from recycled plastic by 2025. Similarly, Amul has started using PCR plastic for some of its packaging, marking a positive shift in the dairy sector.

Despite the promising rise of PCR bottles, challenges remain in scaling up their use. One of the primary concerns is the availability of high-quality recycled plastic. Ensuring that PCR plastic meets safety and quality standards, especially for food and beverage packaging, requires advanced sorting, cleaning, and processing infrastructure. Moreover, while PCR bottles are gaining traction, they still represent a small portion of the total plastic packaging market in India.

According to experts in the industry, India faces several challenges in managing plastic waste, including a lack of infrastructure (segregation at source), and littering at large by public.

However, with the combination of continued investment in recycling infrastructure & technology, regulatory support, and corporate commitment following the demand, will likely drive further innovation in the sector. The adoption of sustainable packaging solutions like PCR bottles will play a pivotal role in fostering a greener, more sustainable future. ■



» Recycled Plastics Leading The Infra Development

Plastics have increasingly become a vital component in infrastructure development, contributing to innovation, durability, and sustainability in construction projects.

The Multi-Layered Plastics (MLP), for its various properties presents the most viable and cost-effective packaging options for FMCG companies. Thus, MLP recycling is essential to reduce plastic waste, conserve natural resources, and protect the environment. There are many an example of enterprises that collects discarded plastic and repurposes it into products like bricks, panels, tiles and alike. These products are used in construction, providing a sustainable alternative to traditional building materials.

The growth prospects of plastics in infrastructure development are influenced by several factors that align with the industry's evolving needs. Recycled plastic can be utilized in virtually any part of the building: for flooring, concrete., roof covering, landscaping, formwork, water & waste management etc. Also, whereas conventional materials degrade and succumb to environmental stressors over time, recycled plastic stands unyielding. Resistant to water, insects, and atmospheric degradation, recycled plastic construction materials are virtually impervious to the ravages that often afflict materials like wood and metal.

And so, if the nearly 400 million tonnes of plastic waste produced annually around the world with most of it ending up in landfills, then this massive amount of plastic waste represents a gold mine for the construction industry.

A 2022 Report from Strategy &, a consulting division of international services firm PwC, says the global building materials sector contributed about 10 per cent of all greenhouse gas (GHG) emissions in 2019. They say increasing the use of recycled plastic in building materials could have a large environmental benefit.



MLP Stand a chance

The future of MLP recycling looks promising, with advances in technology and infrastructure that make it possible to recycle MLPs efficiently. Several companies are investing in the development of new recycling technologies that can separate the different types of plastic in MLPs and produce high-quality recycled plastic.

Addition of MLP based waste plastic improves stability value of mix which results in increase in strength of the mix. Due to addition of plastic waste the flow value increases, resulting in improvement in the workability.

Additionally, governments are implementing regulations and policies that promote the recycling of MLPs and encourage companies to use more recyclable materials.

“Recycled plastics can help reduce emissions in two ways. First, they can support enhanced recycling and reuse of existing materials — for example, plastic waste can be used as an ingredient to make ‘green’ concrete. Second, recycled plastics can be a substitute for high-emissions materials such as brick or steel.”

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The 'Namma Mane' Project Using MLP waste for Building House



The 'Namma Mane' (meaning My Home) Project is a dual-intervention initiative that combines environmental sustainability with social impact building sustainable houses using recycled MLP waste across Karnataka and Tamilnadu. The project focuses on converting hard-to-recycle plastic waste into building material - used to construct low-cost house. This innovative method involves recycling MLP into housing panels, which serve as a sustainable replacement for cement. This not only diverts plastic waste from landfills and oceans but also provides affordable and durable housing solutions for those in need.

The use of plastic in construction materials has several important advantages, the report continues. "Plastics are easier to transport, handle and install than other materials because of their light weight. They preserve their required mechanical properties for use in construction applications. Building materials made of recycled plastics also have a long shelf life and are easier to recycle than mixed plastics and many other materials." Plastic has potential beyond being an additive for concrete and a substitute material for bricks.

Experts in the industry say there are researchers who have invented a "structural plastic lumber made from recycled plastics like milk containers and coffee cups." The material is reportedly "lighter than steel, longer-lasting than lumber, and strong enough to support 120-tonne locomotives."

In fact, plastic lumber has been used world over in several Army applications, including bridges and docks. According to reports from a Construction management software firm more than 1.5 million plastic lumber railway ties have been used across the United States, diverting about 300 million pounds of plastic waste otherwise bound for landfills.

The negligible maintenance demands of recycled plastic construction materials mean that once installed, the costs associated with their upkeep are virtually eliminated. This advantage is particularly advantageous in high-stress applications where materials are subject to substantial wear, such as in outdoor installations or areas with high humidity. As a result, recycled plastic products emerge as a preferred choice for builders and developers seeking to optimise operational budgets and reduce long-term maintenance expenditures.

The Shakti Plastic Industries is one of the enterprises leading the way in sustainability with its patented MLP Recycling Technology, a ground breaking solution designed to convert difficult-to-recycle Multi-Layered

Plastics (MLP) into valuable finished products. By repurposing plastic waste, the company is not only addressing the growing plastic pollution issue but also creating high-quality products like benches, furniture, and floor tiles that contribute to a cleaner, more sustainable environment.

Company Spokesperson says, "Our innovative approach has already made a significant impact. Over the past few years, we've successfully manufactured and installed more than 2,000 benches and 75,000+ floor tiles, all made from recycled MLP plastics.

Using Plastics waste in Construction of Roads

The effective use of plastic in road construction in India began in 2015 when the Union Government instructed the use of waste plastic with hot mixes. Plastic roads are a prime example of how humans can make treasure from trash. One of the most viable "end-of-life" applications of difficult-to-recycle plastic waste is the time-tested use in construction of road. India is a pioneer in development of this technology which allows us to consume discarded, post-consumer, non-recyclable flexible packaging films in building roads by substituting 10% of bitumen with plastic waste, thus creating a value addition to non-recyclable plastic.

In order to encourage the use of plastic waste, Ministry of Road Transport & Highways decided that bituminous mix with plastic waste shall be the default mode for periodic renewal of highways falling within the 50 km periphery of an urban area, having population of more than 500 thousand.

Under the Pradhan Mantri Gram Sadak Yojana, nearly 40,000 km of rural roads have been built using sustainable technique, with 13,000 km completed in the last two years alone. The performance of these roads has been rated as excellent. ■

» Recycled Plastics Making A Sustainable Fashion

Sustainable Fashion has become a new trend in the fashion industry. It serves as a way to be mindful of the environment and keep your style statement intact.



Clothes and merchandise made from recycled plastic bottles and ocean bound plastic waste is an emerging trend. Plastics are one of the essential materials to produce the textile; also, they are used in every step of textile product such as fibers manufacturing to textile coloration and finishing. Amongst the different types of industries, the textile industries are the second largest manufacturing sector after the agricultural.

Sustainable Fashion has become a new trend in the fashion industry. It serves as a way to be mindful of the environment and keep your style statement intact. Sustainable fashion represents a more conscientious and ethical approach. It focuses on minimizing the industry's environmental footprint by employing eco-friendly materials, reducing waste in production, and supporting fair labor practices. Sustainable fashion encourages a slower and more thoughtful consumption pattern, emphasizing the longevity of garments and their potential for reuse or recycling. While fast fashion tends to prioritize speed and low costs, sustainable fashion seeks to create a more harmonious balance between style, ethics, and environmental responsibility.

This eco-friendly fashion offers you a variety of options so that you don't have to compromise your style. At the same time, it also helps save the environment by using fabrics made by the upcycling or recycling ocean and plastic waste. Several enterprises are developing fabrics out of it to lower its impact on the environment. They convert the plastic waste into the fabric and then create beautiful salable products out of them.

Recycled Clothing and Footwears

Clothing can be made from recycled plastic bottles and other plastic waste, such as fishing nets and carpet scraps. Recycled plastic clothing is a more sustainable

alternative to traditionally made clothing.

With the growing demand of synthetic material polyester, acrylic, and nylon in apparel industry there is a huge growth potential. Recycled plastic clothes have similar properties to their non-recycled counterparts. Recycled polyester has a soft, smooth feel and is durable, lightweight, and quick-drying. Recycled nylon is also durable and lightweight, with a high level of elasticity and resistance to abrasion and chemicals.

Recycled polyester clothings, derived from post-consumer plastic bottles epitomizes versatility and comfort. From recycled polyester t-shirts to sweatpants, these pieces are adaptable for any occasion, making them a fantastic choice for the environmentally conscious.



For T-Shirt

1. Ideally 6 to 8 large post-consumer PET plastic bottles are collected.
2. The bottles are clinically washed.
3. The plastic bottles are then shredded to flakes.
4. Next, the plastic flakes are melted into tiny pellets.
5. The pellets are extruded and spun into soft yarn.
6. Lastly, the yarn is woven into modern, sustainable clothing.

Loafers



Old PET bottles are recycled and broken down into small chips. These chips are further processed and later spun into yarn. This yarn is used to make leading fabric which is then used to line the outside of the loafers.

The sole of the shoe is designed to provide comfort and extra grip, featuring rubber-pad soles that extend up to the back of the heel. Strategically placed studs on the sole provide better traction and gives unrestricted wear and flex suited for walking style whereas the

bamboo fabric lining the insole is highly breathable and possesses anti-microbial properties, meaning sweat-free and odour-free feet all day long.

To name some brands that use recycled plastic in fashion; Goya Swim Company, Ecoline , Polycycle, Everlane, Patagonia, Madewell, Bata India, Liberty, Neeman, Addidas, and Nike and many more.

While market price developments can be volatile, the increasing demand for sustainable fashion is expected to drive continued growth in the market for recycled plastic clothes.

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Step 2 - Wash, clean and sort the microplastic

Step 3 - Mix plant-based epoxy resin

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Step 5 - Let dry

Next, we let the resin with ocean plastic dry. It's very similar to watching paint dry. ■





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» Enforcing EPR – Is The Industry Ready to Deal With It

EPR

Extended Producer Responsibility

India's evolving regulatory landscape plays a central role in shaping the future of plastic waste management; however, compliance and enforcement of these rules continue to face challenges.



India is taking significant strides toward achieving environmental sustainability. Extended Producer Responsibility (EPR) is one of the key mechanisms driving this transformation. This policy holds producers, importers, and brand owners responsible for the post-consumer waste generated by their products, which includes managing waste at the end of the product's lifecycle.

The central ministry of environment, forest and climate change notified 'Guidelines on Extended Producer Responsibility for Plastic Packaging' amending the Plastic Waste Management Rules on February 16, 2022. Subsequently, the Central Pollution Control Board (CPCB) developed the centralised EPR portal for plastic packaging in accordance with provisions of the notified EPR guidelines.

The Plastic Waste Management Rules (PWMR) focuses on managing plastic waste and encourages producers to reduce plastic packaging. It mandates that producers take responsibility for collecting and recycling plastic waste.

The ministry has mandated that beverage makers use 30% recycled plastic in rigid packaging, like PET bottles, from April 1, 2025, followed by annual increments of 10% to reach 60% by financial year 2028-29.

EPR is a policy framework (Government mandate) that requires producers, importers, and brand owners to take responsibility for the lifecycle of their products, specifically post-consumer waste. This policy encourages manufacturers to design their products in a way that minimizes waste and promotes recyclability. The core idea behind EPR is that the producer of a product should be held accountable not only for the manufacturing phase but also for the waste generated once the product reaches the end of its useful life.

According to CPCB as per the Guidelines on Extended Producer Responsibility for Plastic Packaging notified by MoEF&CC on 16 February, 2022 in Schedule - II of 4th amendment of Plastic Wastes Management Rules, 2016, Standard Operating Procedure (SOP) as well as the Centralized EPR Portal for registration of Producers, Importers & Brand Owners (PIBOs) & Plastics Waste Processors (PWPs) have been developed. 2,107 Brand-Owners (BO), 3,330 Producers and 23,687 Importers have been issued registration having Extended Producer's Responsibility (EPR) target of 30.72 Lakh tonne

According to an officer (name withheld on request), those who have registered in the EPR portal are already aware of the rules and they are bound to follow them from April 1, 2025. "The CPCB has trained officials on carrying out the auditing.", he added.

Beverage Companies Oppose Deadline

The mandate, issued over two years ago by the Ministry of Environment, Forest & Climate Change, applies to manufacturers of soft drinks, water, and juices that use PET bottles. As the April 1 deadline looms, beverage companies are intensifying their efforts to seek relief.

While the move to promote recycled PET is seen as a positive step toward reducing virgin plastic consumption, industry argue that the current recycling infrastructure is inadequate to meet the 30% target with the deadline fast approaching,

The beverage industry cites a lack of infrastructure, insufficient recycling capacity, and increased costs as major challenges in meeting the deadline and insists that a more phased approach is necessary to ensure a smooth transition.

A senior executive from a major beverage company emphasized that capacity expansion for recycling facilities is a long-term process, taking two to three years, and the timing of the mandate is particularly challenging ahead of the peak summer season.

Sourcing rPET a Major Challenge

According to the sources, beverage industry faces significant hurdles in sourcing food-grade recycled PET (rPET). Currently, only five plants in India are approved by the Food Safety and Standards Authority of India (FSSAI) to produce rPET suitable for food contact, with a combined capacity meeting just 15% of the average demand.

Earlier Industry representatives, during a December meeting with the Central Pollution Control Board, argued that the 30 per cent threshold is too stringent due to the scarcity of rPET and urged the government to adopt more realistic targets, suggesting an initial 15 per cent obligation with gradual 5 per cent annual increases.

Rising cost

The Industry fears that bottling costs will surge by nearly 30 per cent, a portion of which may be passed on to consumers. Smaller companies, lacking resources to procure certified rPET, may resort to lower-quality recyclers, raising safety and regulatory concerns.

Another challenge is that plastic bottles account for 70 per cent of beverage packaging, making them the most widely used option due to lower transport costs compared to glass and affordability over aluminium cans. The sudden shift to higher rPET content without sufficient infrastructure could disrupt supply chains.

Experts Say

Experts in the Plastics industry opine that the incorporation of post-consumer recycled (PCR) content in products and packaging fluctuates across materials and industries, with percentages influenced by a range of factors including geographical location, product category, and the specific standards set within each sector.

Says, Dr Sameer Joshi, Vice Chairman Indian Plastics Institute "India faces several challenges in managing plastic waste, including infrastructure, public apathy and littering habits but then government gave over two years' time to them to develop facilities."

Adds, Haren Sanghavi, MD GMS Plastic Machinery Private Limited, "EPR by itself is a very good policy but the onus of the same at any given stage should be purely on the brands owners that put the products and packages in the market with their packaging. Small and Micro enterprises / Producers should not be troubled to support this activity."

"While EPR holds great promise, its success in India depends on addressing several challenges and one of the biggest hurdles is the lack of effective enforcement of EPR regulations. Many producers are either unaware or reluctant to take responsibility for plastic waste management, and local authorities may lack the resources and capacity to monitor compliance.", says, Abhinay Lakhmapure, EPR Compliances, The Shakti Plastics Industries

There are currently no direct subsidies or grants specifically for promoting plastic waste recycling in Maharashtra. However, the state government does encourage plastic waste management through regulations and incentives for companies adhering to Extended Producer Responsibility (EPR) guidelines.

Recyclers

According to plastic recyclers, the Centre's mandate of 30% recycling is a boon for them as the demand for recycled plastic granules will go up. "We are expecting a boom in demand once this is implemented. The present cost of recycled plastic granules is low and now the demand is going to jump.

One could say, India's battle against plastic waste and its pursuit of a circular economy is at a critical juncture. The country faces immense challenges, but there is clear momentum behind solutions that promote recycling, waste reduction, and more sustainable business practices. ■

» FM Nirmala Sitharaman Announces The Union Budget 2025 for A Viksit Bharat

The forward-looking document aims to further enable India's industry with spurring and innovative initiatives to drive investment, generate income for the economy, train and employ human capital, and create value for the future of the country.



Finance Minister Nirmala Sitharaman announced the Union Budget 2025 on Saturday, February 1, 2025. The budget aims to boost consumption and 'Make in India' initiatives, leading to notable fluctuations across different industries. Quoting Telugu poet and playwright Shri Gurajada Appa Rao's famous saying, 'A country is not just its soil; a country is its people.' – the Finance Minister presented the Union Budget 2025-26 with the theme "Sabka Vikas" stimulating balanced growth of all regions.

In line with this theme, the FM Nirmala Sitharaman outlined the broad Principles of Viksit Bharat to encompass the following: a) Zero-poverty; b) Hundred per cent good quality school education; c) Access to high-quality, affordable, and comprehensive healthcare; d) Hundred per cent skilled labour with meaningful employment; e) Seventy per cent women in economic activities; and f) Farmers making our country the 'food basket of the world'.

Viksit Bharat

The Union Budget 2025-2026 promises to continue Government's efforts to accelerate growth, secure inclusive development, invigorate private sector investments, uplift household sentiments, and enhance spending power of India's rising middle class.

The Budget proposes development measures focusing on poor (Garib), Youth, farmer (Annadata) and women (Nari).

The Budget aims to initiate transformative reforms in Taxation, Power Sector, Urban Development, Mining, Financial Sector, and Regulatory Reforms to augment India's growth potential and global competitiveness.

Engines of Development

Union Budget highlights that Agriculture, MSME, Investment, and Exports are engines in the journey to Viksit Bharat using reforms as fuel, guided by the spirit of inclusivity. The Union Budget 2025-26 has set

the stage for India's economic growth with a strong focus on manufacturing, MSME support, and domestic production incentives.

For the Plastic (processing) industry, these announcements bring both opportunities and

challenges. With policy shifts aimed at boosting industrial capabilities, reducing import dependencies, and promoting sustainability, the sector must align itself with the evolving landscape.

Some prominent announcements in the Budget 2025 includes:

- **Self Sufficiency**

Bringing self-sufficiency in edible oil pulses, vegetables & fruits, formation of 'Makhana board', scheme for enhancing seafood processing & exports, etc. Untapped regions such as Bihar and sectors such as seafood processing would provide significant opportunities to build & nurture efficient food supply chain.

- **Cotton and Fertilizer supply chains**

'Mission for Cotton productivity' and Urea plant in Assam a quantum boost to the logistics & warehousing infrastructure & business.

- **MSME as a powerful engine**

The Budget announcements are flooded with series of initiatives and schemes to boost the MSME sector.

- **Shipping & Maritime industry**

The Budget 2025 provides much needed relief to the ship building industry through exemption of BCD on key raw materials, components, consumables & parts for 10 years . Maritime Development Fund would further enhance logistics support infrastructure for the maritime industry.

- **Indian post into a large logistics organization**

India Post will be revamped into a major public logistics entity, enhancing its role in the rural economy with its vast network.

- **Warehousing and Air Cargo**

The Announcement for facilitation of infrastructure and warehousing for air cargo and stream lining of screening & customs protocols would provide strong traction to the air cargo traffic, reducing delays, additional costs and potential damages / wastages of perishable goods.

- **PM Gati Shakti**

The Government plans to provide access of country wide storage logistics information to the private sector assisting in project planning and improving efficiency in the PPP projects.

- **Bharat Trade Net ('BTN') as a complement of Unified Logistics Interface Platform**

BTN would serve as an important digital infrastructure for international trade. This would provide a unified platform for import – export trades, with a repository of trade documentation and financing solutions. BTN would be aligned with the international practices.

- **Support for Integration with Global Supply Chains**

Facilitation by the Government for development of domestic manufacturing capacities for our economy's integration with global supply chains. Specific sectors to will be identified based on objective criteria.

Key Takeaways for the Plastics Industry

- **National Manufacturing Mission:** One of the most significant announcements in the budget is the launch of the National Manufacturing Mission, which aims to: i) Create 2.2 million jobs in the manufacturing sector; ii) Achieve a ₹4 lakh crore turnover; iii) Facilitate ₹1.1 lakh crore in exports. This will act as Boost for Domestic Production for processors, this would mean presenting a huge opportunity to expand operations, adopt advanced manufacturing technologies, and tap into export markets.

Also, with increasing demand for lightweight, high-performance plastics across industries like automotive, packaging, and healthcare, the polymer sector can play a crucial role in this initiative.

- **Basic Customs Duty Adjustments:** The budget has proposed adjustments in customs duties to encourage domestic production and reduce reliance on imports. With respect to the Plastic Industry only the 2 changes in Customs Duty (HSB 3920, 3921) have been done wherein the duty is reduced from 25% to 20% in both cases.

While specific details for the polymer sector are yet to be fully disclosed, potential changes could impact the cost of raw materials such as polyethylene (PE), polypropylene (PP), and engineering plastics along with the pricing of imported polymer additives, masterbatches, and machinery components used in processing.

Understanding these duty revisions will be critical in cost planning and supply chain management.

MSMEs - The Second power-engine

Finance Minister described MSMEs as the second power engine for development as they constitute for 45% of our exports. To help MSMEs achieve higher efficiencies of scale, technological upgradation and better access to capital, the investment and turnover limits for classification of all MSMEs enhanced to 2.5 and 2 times, respectively. Further, steps to enhance credit availability with guarantee cover have also been announced.

The Finance Minister also announced the launch of a new scheme for 5 lakh women, Scheduled Castes and Scheduled Tribes first-time entrepreneurs. This will provide term loans up to Rs. 2 crores during the next 5 years.

Smt. Sitharaman announced that the Government will also implement a scheme to make India a global hub for toys representing the 'Made in India' brand.

She added that the Government will set up a National Manufacturing Mission covering small, medium and large industries for furthering "Make in India".

Stronger Support for MSMEs: A Growth Catalyst

Micro, Small, and Medium Enterprises (MSMEs) form the backbone of the polymer processing industry. Recognizing their importance, the budget includes:

- Enhanced credit guarantees for easier access to capital.
- Incentives for technology adoption to improve productivity.
- Tax relaxations and regulatory simplifications for small manufacturers.

With a large number of polymer processors operating in the MSME segment, these policies could drive modernization, improve competitiveness, and open doors for new investments.

'Make in India' Push: Encouraging Local Polymer Processing

The 'Make in India' initiative remains a key priority in the budget. The focus on domestic manufacturing and self-reliance will:

- Encourage investments in local polymer processing units.
- Reduce dependency on imported raw materials and equipment.
- Support the development of indigenous polymer technologies for various applications.

With India's increasing focus on sustainability and circular economy, polymer processors can leverage this initiative to develop recyclable, biodegradable, and high-performance plastic solutions for both domestic and global markets.

Fiscal Discipline & Economic Stability: A Positive Business Environment

According to economists, the budget aims for fiscal consolidation, setting the fiscal deficit target at 4.8% for FY25 and further reducing it to 4.4% by FY26. This approach will help:

- a) Enhance investor confidence, paving the way for fresh capital inflows.
- b) Ensure a stable economic environment that supports long-term industrial growth.
- c) Encourages foreign and domestic investments in high-value polymer products and machinery.

Thus, for processors those planning capacity expansion and infrastructure upgrades, a stable economic outlook strengthens the business case for long-term investments.

According to stalwarts in the Processing Industry, the Union Budget 2025-26 presents a roadmap for growth, but success will depend on how effectively industry players adapt and capitalize on policy changes, for they need to optimize supply chain strategies, invest in automation and advanced polymer processing technologies to enhance efficiency, expanding into new application areas such as sustainable packaging, medical plastics, and automotive lightweighting. Further they need to leverage government incentives (for MSMEs) to drive growth and innovation.

While some say tax incentives for eco-friendly materials, subsidies for advanced recycling units, and stronger incentives for meeting Extended Producer Responsibility (EPR) targets would have significantly boosted the transition toward sustainability. Additionally, encouraging investments in recycling infrastructure through CSR provisions, interest subvention for loans, and increased funding for R&D in sustainable packaging could have provided a much-needed push for the sector.

However, with strong policy support, the polymer processing industry is poised for growth and transformation. ■

Key amendments include:

- i) Reliefs in Personal Taxation,
- ii) International Tax – SEP related, FII Taxability, etc.,
- iii) Transfer Pricing,
- iv) Rationalisation of TDS / TCS rates,
- v) IFSC related amendments,
- vi) Clarity on certain provisions including that of Trusts,
- vii) Changes to Custom duty rates.

Additionally, the budget has its focus on infrastructure development, healthcare, education, green initiatives, and the digital economy.

It also announced a new export promotion mission aimed at enhancing the competitiveness of MSMEs in both domestic and global markets.



» Achieving Ultra-Low Benzene Levels in Recycled PET: The Critical Role of Washing Lines

The Growing demand for high-quality recycled PET (rPET) in the beverage industry has led brand owners like Coca-Cola, PepsiCo, and Nestlé to impose stringent specifications on post-consumer recycled PET chips.



One of the most challenging specifications is maintaining benzene levels below 20 parts per billion (ppb) in the final rPET chip. Given its health risks, achieving below 20 ppb is crucial for food-contact safety, driving brands to enforce this specification. Achieving this requires advanced washing and decontamination processes, making the selection of the right PET bottle washing line critical.

Understanding Benzene Contamination in rPET

Benzene, a known carcinogen, can be introduced into PET recycling streams through various sources, including:

- **Residual contaminants in PET bottles:** Some post-consumer PET bottles may contain residues of non-food-grade substances.
- **Thermal degradation:** Inadequate temperature control during washing or extrusion can cause PET degradation, leading to benzene formation.
- **Cross-contamination:** PET flakes mixed with other materials during collection and sorting can introduce contaminants that generate benzene during reprocessing.

Importance of Selecting the Right PET Washing Line

A well-designed PET bottle washing line is the first and most crucial step in ensuring the final rPET chips meet stringent benzene limits. The key components of an effective washing line include:

1. Advanced Pre-Sorting System

The Efficient separation of contaminants is critical. Optical and near-infrared (NIR) sorting systems remove non-PET materials, while manual sorting eliminates colored bottles and foreign objects.

2. High-Performance Label and Glue Removal

Labels and adhesives can introduce unwanted contaminants into the process. Hot caustic washing systems are essential for complete removal, reducing the risk of chemical contamination.

3. Optimized Washing and Flake Cleaning

- **Pre-wash:** Removes loose dirt and residues.
- **Hot washing with alkaline detergent:** This is Essential for removing residual adhesives, oils, and organic contaminants.

- **Friction Washing:** Further purification to ensure high purity, crucial for food-grade applications.
- **Multiple rinsing cycles:** This ensures the removal of any chemical residues that could contribute to benzene formation.

4. Flotation and Density Separation

Ensures that PET flakes are effectively separated from polyolefins and other lightweight contaminants,

which can cause process inefficiencies and introduce unwanted chemicals.

5. High-Efficiency Drying and Dedusting

Proper drying and dedusting prevent organic residues from accumulating, reducing the risk of thermal degradation and benzene formation during further processing.

To illustrate, here's a comparison of washing line features for standard vs. food-grade rPET:

Feature	Standard Washing Line	Food-Grade Washing Line
Automation Level	Moderate, manual sorting possible	High, with online inspection systems
Washing Stages	Pre-washing, basic hot wash	Pre-washing, hot wash, flotation, friction
Chemical Decontamination	Limited, focuses on physical impurities	Advanced, targets chemical contaminants
Water Recycling	Partial, higher consumption	Extensive, Utilise only 1.3 liter per Kg or rPET produced.
Output Quality	Suitable for non-food applications	Meets FDA/EFSA standards for food contact

This table highlights why food-grade lines are essential for benzene control, ensuring compliance with brand specifications.

Additional rPET Specifications Imposed by Brand Owners

Beyond benzene content, major beverage brands impose other critical specifications on rPET quality, including:

1. Intrinsic Viscosity (IV) Retention

- The rPET must maintain an IV of at least 0.72-0.84 dl/g to ensure mechanical strength and processability.
- Washing systems with gentle mechanical treatment prevent IV degradation.

2. Acetaldehyde (AA) Content

- Must be below 1 ppm to avoid taste and odor issues in beverages.
- Proper temperature control during drying and extrusion minimises AA formation.

3. Heavy Metal Content

- Strict limits on contaminants like lead, cadmium, and antimony.
- Advanced filtration and sorting prevent heavy metal contamination.

4. Haze and Optical Clarity

- Beverage-grade rPET requires high transparency with minimal haze (<10%).
- Effective washing removes residual contaminants that can cause cloudiness.

5. Odor and Organic Residue Removal

- Any residual odors in rPET affect beverage safety and taste.
- A combination of hot washing and vacuum-assisted decontamination removes volatile compounds.



Future-Proofing rPET Production Through the Right Washing Line

Given the evolving regulations and increasing demand for high-purity rPET, investing in the right washing line is essential for long-term sustainability. Key considerations include:

- **Modular and Scalable Design:** Allows for future upgrades to meet even stricter specifications.
- **Automated Quality Control:** AI-driven sorting and real-time monitoring ensure consistent quality.
- **Energy and Water Efficiency:** Reduces operational costs and improves sustainability.
- **Compliance with EFSA and FDA Standards:** Ensures acceptance by global brands.

Conclusion

Maintaining benzene levels below 20 ppb in rPET chips is a major challenge that requires precision in every stage of the PET recycling process.

The selection of an advanced washing line plays a crucial role in ensuring compliance with brand-owner specifications. Investing in the right technology not only meets today's stringent standards but also prepares recyclers for future regulatory and industry demands.

Brands' insistence on below 20 ppb benzene likely stems from health safety concerns, with research showing migrated benzene levels in rPET bottles as low as 0.06–0.44 µg/L, suggesting achievable targets with proper processing. ■





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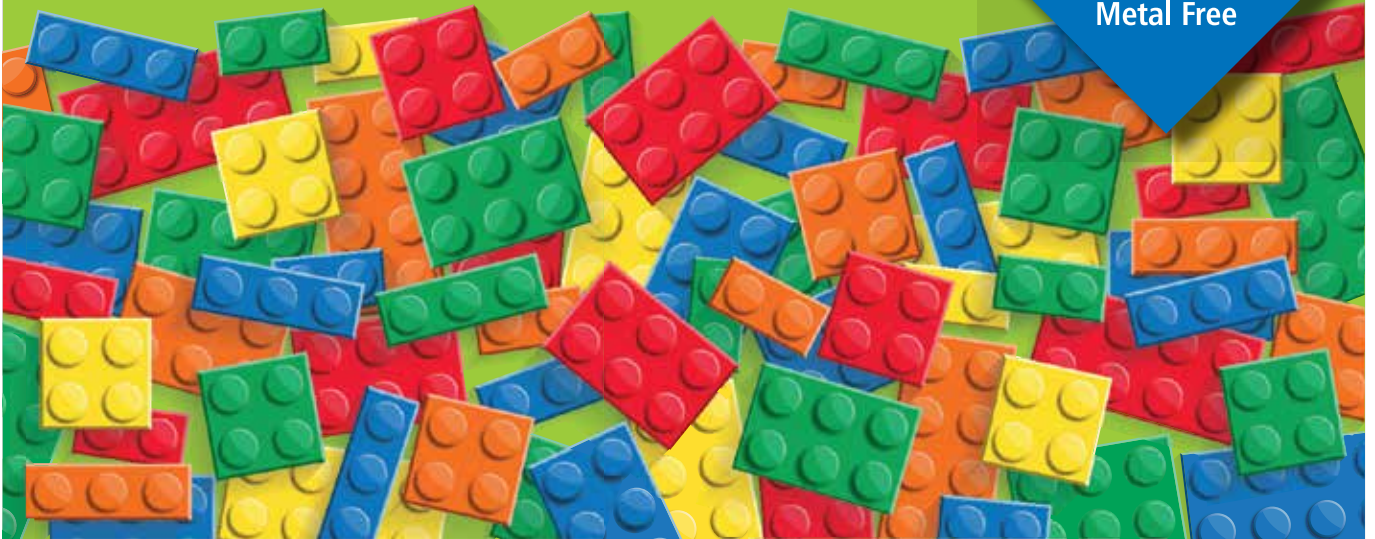
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» Medical Product Packaging & Medical Polymer Films: Developments & Innovations

Packaging material and design based on its usage and specific purpose in packaging a medical device requires expertise and focused model for it can influence the quality, safety, compatibility, traceability and activity of a product.

- D L Pandya



Medical Device Packaging plays a vital role in safety and quality of Medical Devices. The package has to undergo harmful conditions during distribution chain, including extreme temperatures, humidity, contact with water and exposure to contaminants and microbes.

The stringent regulatory requirements for effective packaging of medical devices have led to development and innovations in the medical polymer films which can prevent protect against outside influences and cause deleterious effect on the product.

Role of Regulatory Compliance

Packaging is subject to stringent regulations, including the EU Medical Device Regulation (MDR), US Food and Drug Administration (FDA) regulations and other regulatory requirements, in different countries.

Medical Product packaging can influence the quality, safety, compatibility, traceability and activity of a product, accentuating the role of regulatory affairs, which not only advises on the regulations but also understands and helps in implementing continuous updates during the development of the product.

Regulatory experts help packaging companies in procedural compliance, translating regulatory requirements into actionable items and balancing compliance within the regulatory timeline, failure to which can result in severe consequences.

Importance of Barrier Systems in Medical Device Packaging

One of the most crucial components of medical device packaging is the sterile barrier system, which is designed to maintain the sterility of a product from the time it is sterilized until it is used by healthcare professionals. The choice of material and design of this barrier system directly impacts the safety, usability, and regulatory compliance of medical devices.

Packaging material and design based on its usage and specific purpose in packaging a medical device; requires expertise and focused model. To select and design it requires regulatory insight, flexibility, and comprehensive validation study. These will deliver compliant solutions that ensure quality and efficiency in packaging engineering output.

The Sterile barrier systems are specifically engineered to:

- **Protect the device from contamination:** These systems safeguard medical devices from microbial contamination, dust, moisture, and physical damage throughout storage, handling, and transport.
- **Preserve sterility:** The primary function of sterile barriers is to maintain the sterility of the device until it is used, preventing any microbial ingress.

- **Facilitate easy access and usability:** The design of the packaging should allow easy opening without compromising the integrity of the sterile barrier.

Medical Packaging: Innovative Features

With more and more advancements in the healthcare and medical device industry, medical packaging with innovative features will transform the way medical products are packed and distributed.

Some of the important advancements are:

- Smart Packaging Technologies
- Anti-Counterfeiting Measures
- Sustainable Packaging Solutions
- Personalized Packaging for Patient Adherence
- Nanotechnology in Packaging
- Interactive Packaging for Improved Patient Education
- 3D Printing for Customized Packaging Solutions
- Improved Accessibility and Ease of Use
- Integration of Biometrics for Authentication
- Regulatory Considerations and Standards

Developments in Medical Packaging Films

Many of the new developments in medical packaging films have taken place by better understanding and subsequent modification of molecular structures to improve the properties. This is done by introducing new manufacturing techniques for flexible films as well as use of newly developed additives including those with properties to give protection against radiation.

Film structures combined with additives can be designed to be self-supporting and flexible, allowing them to be folded or creased without inducing a structural weakness in the film. Many of the newer film structures comprise fluoropolymers that are

modified polychlorotrifluoro-ethylene. This material is converted to a film by melt extrusion, which requires special handling procedures because of its very high melt viscosity. Properties of such films include good tear strength, superior dimensional stability, and resistance to water vapor and to most chemicals. The films can stand up to steam, ethylene oxide, or radiation sterilization without being degraded.

Film Structures

Among the types of film products available are single films, laminations, and co-extrusions. Properties that can be manipulated include barrier characteristics, clarity, stability in hot and cold environments, tensile strength, thermo formability, seal ability, and radiation and chemical resistance. Compliance with new environmental regulations for disposal and recycling is also an important consideration.

Plastics that can now tolerate radiation sterilization have created a market for a multitude of polymer formulations for products such as rigid and semirigid thermoforms and films with thicknesses from 0.5 to 10.0 mil.

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>> Knowlton and Clarion Group Forms JV in India

Knowlton Development Corporation Inc (“kdc/one”), a global leader in custom formulation, packing design and manufacturing solutions for many of the world’s leading beauty, personal care and home care brands, and the Clarion Group (“Clarion”), a premier contract manufacturer of beauty, personal, home care and food products and decorative tin packaging, have announced a new strategic joint venture in India. The agreement was signed by Sandra Wisniewski, Global President Beauty & Personal Care at kdc/one and K N Lakshmanan, Chairman of the Clarion Group, in Chennai, India. The agreement will establish kdc/one Clarion Beauty Pvt Ltd to support the growth of beauty and personal care brand owners in the rapidly emerging Indian market by offering best-in-class and cost-effective solutions in beauty packaging manufacturing and formulation innovation designed to enhance the customer experience.

kdc/one beauty and personal care global president Sandra Wisniewski said: “We are delighted to join forces with Clarion Group and combine our individual and collective strengths to enable brand owners to grow their global business in the fast-developing Indian marketplace “We look forward to bringing the bespoke packaging design, quality and development credentials of both kdc/one and HCT, and benefitting from Clarion’s significant track record in India, highly strategic personal care manufacturing footprint and deeply experienced local management team.” As part of the JV, the partners will build a new manufacturing facility in the Indian state of Gujarat over the next year. This facility will be dedicated to the production of injection-moulded and metallised beauty packaging to meet the growing demands of the domestic market. Clarion Group chair K N Lakshmanan said, “Our two companies not only have complementary manufacturing, formulation and packaging strengths in the beauty and personal care products sector, but we also share a commitment to providing the highest level of innovation, quality, service, agility and regulatory compliance. “We are excited by the huge potential of this joint venture and believe that together, we will be the partner of choice for brand owners, and I believe the dream for brand owners, whether they are already operating in the Indian market or looking to enter the region, we aim to help bring their vision to life.” The venture will address the region’s packaging needs for colour cosmetics, skincare, and personal care, combining Clarion’s expertise in the local market with kdc/one’s global innovation and formulation capabilities. ■



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» OMV and ADNOC Agrees on Key Commercial Terms for Polyolefins

OMV and ADNOC have agreed on the key commercial terms for a combination of their polyolefins businesses. The agreement foresees a combination of Borealis and Borouge under a new, jointly controlled joint venture company. The new company shall be a joint platform for OMV and ADNOC for potential growth acquisitions in the polyolefins sector and it is envisaged to be named Borouge Group International. OMV and ADNOC have also agreed on the key terms and conditions for a purchase by the joint venture company of all shares in NOVA Chemicals for a purchase price of USD 9.377 bn from Nova Chemicals Holding GmbH, a wholly owned subsidiary of Mubadala Investment Company PJSC, pursuant to a purchase agreement agreed between Mubadala and ADNOC which shall be entered into by ADNOC as purchaser and, subject to certain regulatory and other conditions being met, be novated to a subsidiary of the joint venture company, resulting in the subsequent acquisition of NOVA Chemicals by the joint venture company. OMV and ADNOC shall have equal shareholdings and joint control in such joint venture company. According to reports the joint venture company shall be listed on the Abu Dhabi Securities Exchange with the intent for a later listing also on the Vienna Stock Exchange. The joint venture company shall have its seat and headquarters in Austria. The right to appoint the chairperson of the supervisory board of the joint venture company shall vest with ADNOC. The Executive Board shall be appointed unanimously by both parties based on merit. ■

» BENZ Packaging Set for Global Expansion

BENZ Packaging is set to enhance its global presence with a significant investment aimed at expanding its production capabilities and technological advancements. According to reports the Indian packaging giant plans to invest Rs1.5bn (\$17.1m) over the next five years, with a focus on augmenting production facilities, upgrading technology, and strengthening its position in the international market. This investment is likely to further strengthen its leadership in the industrial and export packaging sectors. The company has recently established a new 90,000 sq ft domestic facility in Jhajjar, Haryana, which houses a fully automated corrugation unit, new extrusion and printing machinery, and the capacity for hardwood box and pallet manufacturing.

According to inputs, this move is part of BENZ Packaging's strategy to serve its international customers better and increase its global business reach, with expansions into new regions such as Vietnam and Japan. In addition to its new Indian facility, BENZ Packaging will construct plants in Vietnam, ensuring that modern technology is implemented and monitored across all regions to maintain the highest quality standards. The investment will also concentrate on strengthening the company's eco-friendly policies within its production processes. Also, training and development of staff will be a key focus to ensure outstanding quality and operational standards at all BENZ Packaging centres. ■

» ALPLA Enters HDPE Recycling With Clean Bottle in Brazil

ALPLA is entering the South American recycling market with a majority stake in the Brazilian joint venture Clean Bottle an HDPE recycling company with the plant, located in São José dos Pinhais in the state of Paraná having an output capacity of 15,000 tonnes of rHDPE. While the joint venture has been contractually agreed by the parties the conditions were not disclosed. The competition law approvals are still pending.

‘Demand for sustainable packaging solutions made from recycled plastic is growing on all continents. Our customers want to reduce their CO2 consumption and we support them in doing so. By investing in Clean Bottle, we are securing the long-term supply of our plants in Brazil with our own high-quality post-consumer recycled material (PCR),’ explains Dietmar Marin, Managing Director of ALPLArecycling.

With this strategic investment, the company is setting the course for the future and for achieving its own global recycling goals. ALPLA already uses around 32 per cent

PCR material in the production of HDPE packaging in Brazil – and the trend is rising. ‘Brazil is the beginning of our recycling activities in South America and therefore the choice of partner is of key importance. Clean Bottle is an established manufacturer and, as a long-standing supplier, shares our quality standards,’ emphasises Christoph Schneider, Regional Managing Director South America (SOAM).

Clean Bottle’s recycling plant boasts a modern infrastructure, self-sufficient rainwater treatment and the highest quality standards. Around 120 people are employed on the 15,000 square metre site. The company’s founders, Leandro Tanaka, Adriano Tanaka and Jadir Voltoline Junior, will also contribute their experience to the management of the joint venture. The cooperation is also bolstered by the collection centre of their Clean Plastic Group in Curitiba, which will be further expanded in the future. ■



» Balrampur Chini Mills to Set Up PLA Manufacturing Plant in Uttar Pradesh



Balrampur Chini Mills has announced to set up a Polylactic Acid (PLA) biopolymer manufacturing unit at Kumbhi, Uttar Pradesh with an investment of Rs 2,850 crore. This plant will be India's first industrial-scale biopolymer facility and will set a new global benchmark in sustainable manufacturing. It will be powered entirely by 100% renewable energy throughout the production process and will be the first location where sugarcane is transformed into PLA in a single, integrated site, showcasing a truly closed-loop sustainability model. With an annual production capacity of 80,000 tonnes, the plant will produce 100% industrially compostable and bio-based PLA (Poly Lactic Acid), a versatile material ideal for replacing banned single-use plastic (SUP) items such as straws, disposable cutlery, food trays, bottles, curd cups, and carry bags. The project is expected to generate 225 direct jobs in manufacturing, R&D, and operations, with over 2,000 indirect jobs created across the value chain. The facility will strengthen Uttar Pradesh's industrial economy, positioning it as a hub for biopolymer production and exports. It is expected to attract both foreign and domestic investments, promoting advancements in green chemistry, sustainable manufacturing, and India's circular economy while reducing reliance on imported plastics. ■



» Amut SPA Sets Up Facility in the Philippines

AMUT is leading the way to sustainability in South East Asia, setting up a recycling facility thus helping the beverage industry deploying circular solutions along with NS SUSTAINABLE SOLUTIONS INC, a subsidiary of Nature's Spring Water, the largest producer of 'Drinking & Mineral Water' in the Philippines. The plant including the hot washing and sorting of r-PET flakes bottle to bottle, which after extrusion will be used to produce preforms and bottles for mineral water and nonmineral water containing up to 100 per cent r-PET. The line, will be installed closed to Cebu Philippines, scheduled to go in operation by the end of December 2025 and will produce around 16,000 tonnes/year of r-PET bottle to bottle grade.

Amut in its release said, "Thanks to cutting-edge recycling machinery, we're seeing real progress in creating a true circular economy. Providing Solutions in sorting and recycling is making it possible to turn post-consumer plastic into high-quality raw material—again and again." This means less reliance on virgin plastic materials, reduced waste, and a more sustainable manufacturing future. As regulations tighten and consumer demand for sustainable products rises, businesses invest in advanced recycling technology. The lack of recycling infrastructure and a fragmented recycling ecosystem have resulted in poor recycling of plastic waste, especially in emerging markets like APAC. Regulation is set to accelerate change on minimizing plastic's environmental impact. ■



» Zavenir Daubert Opens Specialty Chemicals Plant in Haryana

Zavenir Daubert, a leading manufacturer of specialty chemicals, focusing on corrosion protection and metalworking fluids, recently in February this year inaugurated its state-of-the-art manufacturing facility located at Binola in Haryana.

Esteemed dignitaries from Daubert, USA, and Nihon Parkerizing, Japan along with key Indian executives of Zavenir Daubert inaugurated the plant.

Peter Fischer, Chairman of Daubert Group, Zavenir Daubert India Pvt Ltd said, "This facility embodies our commitment to technological advancement, a core value guiding us toward Vision 2030. It serves as a hub for adapting global technologies to Indian needs, ensuring rigorous evaluation and measurable value creation for our partners. With this initiative, we are making significant strides in technological innovation, sustainability, and operational excellence".

With an investment of ₹100 crores (10 million USD), this new facility strengthens Zavenir Daubert's commitment to innovation, sustainability, and India's industrial growth. Notably, 10% of this investment has been allocated to advanced software technologies, ensuring seamless integration of Industry 4.0 capabilities. Employing over 100 employees, the facility is spread across ~2 acres of land comprising end-to-end production capabilities. The new facility is ISO 9001, ISO 14001, and ISO 45001 certified, will not only cater to a fast-expanding domestic market but also certain overseas markets. Saket Bhartia, MD, Zavenir Daubert India Pvt Ltd, said, "This new integrated future-proof facility is an expression of our full commitment to our vision of "Global Technologies, Made in India".

Elaborating further he said, "There are many aspects of our new integrated facility which are not only India first but first in the industry too. At the forefront of smart manufacturing, our plant is designed to rely on advanced haptic technology. Our 10,000-square-foot Technology and Experience Centre at the plant will serve as the hub of our innovation. With highly advanced equipment and cutting-edge facilities for corrosion testing, tribology, microscopy, and chemical analysis, we offer Indian industries access to globally benchmarked technologies." ■



Autotech-Sirmax Doubles it's Haryana Capacity to 30 kTPA

Autotech-Sirmax India Pvt. Ltd. (ASIPL) a leading manufacturer of Thermoplastics Compounds, Bio-Degradable Compounds, Elastomers, and Circular Economy materials, has completed its expansion at the Palwal plant, Haryana (NCR region).

With this expansion, the Palwal plant has doubled its production capacity from 15 kTPA to over 30 kTPA, reinforcing the company's commitment to supporting the increasing demand for high-performance thermoplastic compounds across various industries including automotive, EV, electricals & electronics, white goods, and industrial applications.

The expansion included a comprehensive upgradation and modernization of the existing plant, along with significant investments in new machinery, advanced manufacturing technology, and infrastructure development. It has also expanded the production area with an additional 65,000 sq. ft. of new shop floor space to accommodate future capacity expansion with provision for four additional high-output extrusion lines.

Speaking about this milestone, Mr. Achal Thakkar, Managing Director of Autotech Sirmax India, said, "We are proud to announce the completion of our Palwal plant expansion, which reflects our dedication to delivering world-class materials and solutions to our customers. This investment enables us to meet the rapidly growing demand for high-performance compounds in India and international markets, while also strengthening our capability to drive sustainable innovations." This expansion not only strengthens Autotech-Sirmax India's footprint in the Indian market but also reinforces its commitment to delivering innovative, high performance thermoplastic compounds to customers in India, South-East Asia, and global markets.

The Palwal expansion also aligns with Autotech-Sirmax India's broader growth strategy, which includes its greenfield expansion near Bengaluru-Hosur, South India, further reinforcing its presence in key manufacturing hubs across India. With the completion of this expansion, Autotech-Sirmax India now operates with a total installed capacity of over 60 kTPA across its facilities in Valsad (Gujarat) and Palwal (Haryana), making it one of the leading manufacturers of engineering thermoplastics and polypropylene-based compounds in India. ■



Colorado's EPR Program Slated Fully to Roll Out in 2026



With Colorado's EPR program slated to fully roll out in 2026, the Circular Action Alliance submitted its initial extended producer responsibility plan to Colorado's advisory board, taking another step on the state's path to implementation. The plan proposal lays out the details of program operations, including producer compliance tracking methods, the minimum recyclables list, targets for minimum PCR content, collection and recycling rate targets, dues setting methods, reimbursement formulas, composting expansion and reuse and refill plans. Juri Freeman, executive director of CAA Colorado, said in a release that collaboration was critical in developing the plan. "While there are several steps yet to reach a finalized plan, we look forward to driving Colorado's circular economy through continued collaboration," he said. The state Producer Responsibility Advisory Board has 90 days to review the plan and provide feedback. Following that feedback, CAA gets 60 days to respond, after which the plan will be sent to the Colorado Department of Public Health

and Environment with the board's recommendation for either approval or rejection, and a public comment period will open. Colorado's EPR program is slated to fully roll out in 2026. Current budget estimates show costs of up to \$267 million through 2026, up to \$298.9 million in 2027, up to \$353 million in 2028, up to \$380.8 million in 2029 and up to \$397.2 million in 2030. ■



Juri Freeman
Executive Director of
CAA Colorado



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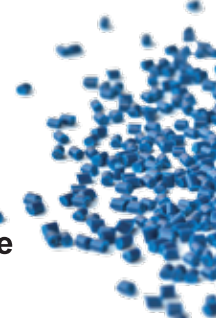
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» South Africa's Push for Greener Packaging

In recent years, South Africa has witnessed a significant shift towards sustainable packaging, reflecting a global trend to minimise environmental impact. Sustainable packaging involves using materials sourced from renewable resources, designed for recyclability or compostability, thereby reducing their ecological footprint. According to reports between 2018 and 2023, South Africa's sustainable packaging market experienced notable growth. According to a report by leading data and analytics company GlobalData, the market's total revenues reached \$5.8bn in 2023, representing a compound annual growth rate (CAGR) of 4.5% during this period. Additionally, market consumption volume increased with a CAGR of 3.8%, reaching 11.3 million tonnes in 2023. Several macroeconomic factors have influenced this growth.

The increasing global population has heightened demand for consumer goods, necessitating more packaging solutions. The rise in e-commerce activities has further propelled the need for efficient and sustainable packaging. Moreover, growing concerns about climate change, coupled with strict government regulations and heightened consumer awareness, have pushed industries towards eco-friendly practices. For instance, South Africa's online retail sector grew by 25.3% in 2022, reaching a value of \$785.7m, underscoring the expanding market for packaging solutions. Several prominent companies in South Africa have embraced sustainable packaging practices of the likes of, Woolworths South Africa, Mondi, that focuses on producing packaging materials that are recyclable and sourced from renewable resources, aligning with global sustainability trends. Nampak: As Africa's largest diversified packaging manufacturer produces packaging paper, metals, and plastic, emphasising eco-friendly practices and materials. ■



» British Initiative to Tackle Beauty Products Packaging Waste

The British Beauty Council's Sustainable Beauty Coalition has initiated 'The Great British Beauty Clean Up', a campaign aimed at reducing beauty products packaging waste. The project is supported by over 50 retailers, brands, and industry professionals, responding to research that highlights a significant recycling gap in the sector. Recent findings by the British Beauty Council show that 86% of plastic beauty packaging fails to be recycled. This statistic reveals that only 14% of beauty product containers reach recycling facilities, with a mere 9% actually undergoing the recycling process. Furthermore, despite 79.3% of consumers considering sustainability a key factor in their purchasing decisions, only 23.4% currently opt for refillable skincare items. The campaign, backed by high-street names such as Boots, John Lewis, and Tesco, represents a pioneering collective effort to mitigate the environmental footprint of the beauty industry.

The Great British Beauty Clean Up is committed to educating consumers on effective empty packaging management, promoting the principles of refill and reuse, and providing guidance on domestic recycling practices. To facilitate this, the British Beauty Council is updating its interactive recycling map, which identifies

various beauty business recycling programmes across the UK, offering consumers locations to dispose of their hard-to-recycle packaging.

The initiative encourages beauty shoppers to gather all non-recyclable empties, including items too small, made of composite materials, or crafted from non-recyclable substances. With the support of over 50 entities, the programme aims to engage a broad audience, from fans of mass-market to independent brands, whether they shop in person or online. Boots is contributing to the initiative by promoting its 'Recycle at Boots' scheme, which operates in over 800 UK stores and boasts over 330,000 registered users.

L'Oréal is also participating by highlighting its Maybelline recycling programme, available in over 1,500 UK stores, including Sainsbury's, Superdrug, and Tesco. On the other hand, John Lewis is inviting customers to take part in its BeautyCycle scheme, offering rewards for recycling that can be spent on B-Corp certified beauty products from brands like Medik8 and ELEMIS. The programme, which spans throughout this month, involves a coordinated effort from retailers, brands, and businesses to address the issue of beauty products packaging waste. ■



» Berry Global and Mars Launch 100% Recycled Plastic Jars

Packaging manufacturer Berry Global has expanded its partnership with Mars, a leading snacks and sweets producer, with the launch of 100% recycled plastic pantry jars for brands such as M&M'S, Skittles, and Starburst. This move represents a significant step towards sustainability as part of an ongoing collaboration to reduce plastic waste and increase the use of recycled content in packaging. The new packaging jars, which exclude the lids, are a major upgrade from the previous iteration launched in 2022, which featured 15% recycled plastic. The latest version of the jars is now rolling out across the United States, marking another milestone in the companies' joint efforts to develop more sustainable packaging solutions. According to the partners, the jars are "widely recyclable" and incorporate mechanically processed recycled content sourced from kerbside collection streams, aiming to eliminate over 1,300 tonnes of virgin plastic each year. Berry Global produces the jars using certified food-grade mechanically recycled resin.

» JPFL Films Launches BOPA Nylon Films in India

JPFL Films, a subsidiary of Indian packaging company Jindal Poly Films, has introduced biaxially oriented polyamide (BOPA) nylon films.

With the launch, JPFL Films is said to be the first company in India to release this type of film. The company has reportedly invested Rs1.2bn (\$13.7m) in its facility in Nashik city, within the state of Maharashtra. The newly launched BOPA films boast isotropic properties, offering uniform characteristics in all directions. Produced using exclusive Japanese double bubble film technology, the films are claimed to offer both dimensional stability

and puncture resistance. Furthermore, the films are designed for high-speed printing and act as an effective barrier against aromas and gases, making them a versatile solution for various packaging needs.

JPFL Films Growth division deputy CEO Mahesh Gopalasamudram said: "With the launch of BOPA Nylon Films, JPFL Films has emerged as the first player to bring the innovation to the Indian market. "This unique product offers improved mechanical properties and aroma barrier. This will also play a pivotal role in bringing solutions across pharma, medical, FMCG, and food

applications. It will be noteworthy to point out that 100% of these films were imported till recently. "BOPA films are also produced by our group company Jindal Nylon Films in Italy. This experience will also help us in serving the Indian customers and bringing global innovation locally." ■



The collaboration is driven by a shared commitment to the circular economy, with both companies prioritising sustainability without compromising the quality of the products. Peter Goshorn, Vice President of Food, Beverage & Spirits for Berry Global's Consumer Packaging North America division, highlighted the importance of scaling up recycled materials to meet the growing demand for sustainable products.

"The ability to deliver products made with recycled materials at scale is crucial," Goshorn said, emphasising the need for responsible business growth that does not sacrifice product performance or aesthetics. Mars has also been working on its Sustainable Packaging Plan, which aims to reduce plastic usage, and redesign packaging to ensure it is either reusable, recyclable, or compostable. Since 2017, Mars has partnered with Berry to push the boundaries of sustainable packaging innovation. This initiative aligns with Mars's broader goal of reducing its environmental impact, as outlined in its global sustainability efforts. ■



» Huhtamaki Launches Recyclable Dairy Packaging Cups

Huhtamaki, a provider of sustainable food packaging solutions, has introduced ProDairy, a recyclable single-coated paper cup tailored for yoghurt and dairy products. The ProDairy cups are produced in Europe using paperboard derived from renewable wood fibres via sustainably managed forests. Huhtamaki said that it has conducted extensive testing to ensure the new product meets stringent quality standards. With ProDairy now ready for market deployment, Huhtamaki is poised to offer a more sustainable option for dairy packaging to its customers. The company noted that its new packaging solution features a polymer content of less than 10% across its entire range, making it fully recyclable in Europe's recycling streams. According to the company, one of the primary challenges in the dairy packaging sector is maintaining a perfect seal and lid fit, especially with reduced polymer content. The new dairy rim design and forming process sealing. The company also said technology guarantees robust cup performance. Huhtamaki Foodservice president Fredrik are an important part of our packaging for something as has been a challenge, especially performance standards required is highly functional in terms of properties, and it is a cost-efficient consumer expectations regarding He added "These recyclable our customers address consumer packaging." ■



that ensures superior top rim its proprietary sealing varnish side seam sealing for strong Europe-Asia-Oceania Fiber Davidsson said: "Dairy products daily life and creating recyclable important as your morning yoghurt while maintaining the high-for dairy products. "Our solution product performance and barrier solution which meets customer and our innovation in food packaging. single-coated paper cups help demands for reduced plastic in

» Plastic Waste Management Rules 2025 (Amended) for Plastics Packaging – Labelling & Penalties

On January 23, 2025, The Ministry of Environment, Forest and Climate Change issued the Plastic Waste Management (Amendment) Rules, 2025, making significant updates to the Plastic Waste Management Rules, 2016. These amendments aim to enhance the transparency and accountability of producers, importers, and brand owners regarding plastic packaging and shall be effective 01, July 2025

1. New Requirements for Marking and Labelling (Rule 11)

A major update is introduced in Rule 11, which deals with the marking or labelling of plastic packaging. Starting from July 1, 2025, producers, importers, and brand owners will be required to include specific information in the following ways:

- a) **Barcode or QR Code:** The information can now be provided through a barcode or Quick Response (QR) code printed on the plastic packaging.
- b) **Product Information Brochure:** Alternatively, the details can be provided in a product information brochure that accompanies the packaging.
- c) **Unique Number:** The packaging can also display a unique number issued under any relevant law. However, the provisions of Rule 11 must be fulfilled before this number can be issued.

These changes are designed to improve traceability and allow consumers and authorities to easily identify the details of plastic packaging.

2. Notification to the Central Pollution Control Board (CPCB)

Producers, importers, or brand owners are required to inform the Central Pollution Control Board (CPCB) about their use of any of the above methods for labelling.

The CPCB will maintain and publish a list on its website, showcasing the producers, importers, or brand owners who have adhered to the new labelling requirements. This list will be updated quarterly.

3. New Rule on Penalties for Non-Compliance (Rule 19)

The Amendment introduces Rule 19, which outlines actions for contravention of the Plastic Waste Management Rules: Any person who fails to comply with the provisions of the rules will be liable to a penalty in accordance with Section 15 of the Environment Protection Act. This provision ensures that there is a legal framework for penalizing entities that do not adhere to the new plastic waste management guidelines.

According to officials, The Plastic Waste Management (Amendment) Rules, 2025 bring important changes that will enhance transparency in the plastic packaging supply chain. The new labelling requirements, including barcodes and QR codes, are aimed at improving consumer awareness and accountability for plastic waste. The introduction of penalties for non-compliance further strengthens the enforcement of these rules. These updates reflect the government's continued commitment to tackling plastic waste and promoting sustainable practices in the country. Producers, importers, and brand owners need to prepare for these changes, particularly the new labelling guidelines coming into effect on July 1, 2025. ■



Indian Plastics Federations' INDPLAS' 25 Expo Concludes on A Higher Note

The 10th edition of Indplas'25, the International Plastics Exhibition, successfully concluded at Biswa Bangla Mela Prangan, Kolkata, India Strengthening Eastern India's Plastics Industry.

Organised by The Indian Plastics Federation, during 28th Feb – 3rd Mar 2025, the week-long event brought together industry leaders, innovators, and stakeholders from across India and beyond, reinforcing its status as India's most promising plastics exhibition and Eastern India's premier industry event.

With an impressive footfall of over 110,000 visitors and 350+ participants from 10 countries, Indplas'25 provided an unparalleled platform for business growth, networking, and knowledge exchange.

The exhibition commenced with an auspicious lamp-lighting ceremony, graced by Shri Rajesh Pandey, IAS, Principal Secretary – MSME&T, Government of West Bengal, in the presence of industry leaders, exhibitors, and dignitaries.

The formal inauguration in the evening featured a prestigious launch function and the highly anticipated Invest Bengal Seminar, attended by Dr. Sashi Panja, Hon'ble Industry Minister, Government of West Bengal.

The seminar provided valuable insights into investment opportunities in the plastics sector and highlighted West Bengal's commitment to industrial growth and sustainability.



Adding to the event's significance, Janab Firhad Hakim, Hon'ble Mayor of Kolkata & Urban Development Minister, Government of West Bengal, visited the exhibition, emphasizing the critical role of plastics in urban development and infrastructure.

Indplas'25 witnessed enthusiastic participation from professionals, manufacturers, suppliers, and policymakers, making it a key hub for industry networking and business expansion.

A series of knowledge-sharing seminars and panel discussions covered topics such as advancements in plastics technology, sustainable solutions, and emerging market trends. Experts from across India shared their insights, making these sessions highly engaging and informative.

A major highlight was the Gala Night on Day 2, where exhibitors, delegates, and industry professionals connected in a relaxed setting. With entertainment, networking, and celebrations, the evening added a festive dimension to the business-driven event.

Indplas'25 reinforced its position as a leading plastics industry event in India, reflecting the optimism and growth potential of the sector in Eastern India, especially West Bengal. With high-quality exhibitions, insightful seminars, and influential attendees, the event was a resounding success.

As we conclude this landmark edition, we eagerly look forward to Indplas'27, promising to be even bigger and better!



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» Soaking-up Pollutants The Key to Reducing Greenhouse Gas Emissions

Soaking up pollutants like a sponge, porous organic polymers (POPs) may be the key to reducing greenhouse gas emissions say researchers.

A group of researchers from Tohoku University has developed a method for synthesizing POP using iodine as an oxidant to minimize residual impurities for reducing greenhouse gas emissions -- a major concern amidst a period of rapid climate change.

Earlier POPs were synthesized via oxidation reactions using metal salts as oxidants or coupling reactions using organometallic catalysts. However, these oxidants and catalysts usually remain as metal impurities within the pores of POPs -- decreasing its porosity and overall usefulness. It would be like trying to clean dishes with a sponge that is already dirty.

While using iodine they found that iodine and iodine-derived impurities were completely removed by washing it with ethanol after synthesis, and highly pure POPs (polytriphenylamine derivatives) with no residual impurities were successfully obtained. The

obtained POPs exhibited the highest specific surface area among reported POPs containing triphenylamine. "As expected, reducing the impurities improved the porosity, which lead to better performance in measures such as CO₂ adsorption capacity," explains Kouki Oka (Tohoku University).

"Furthermore, they exhibited their inherent functionalities for the first time, such as proton conductivity and unique gas adsorption behavior accompanied by the gate-opening phenomenon. This is exciting because it indicates the potential for novel applications of POPs as fuel cells and adsorbents." This new finding indicates that synthesizing highly pure POPs enables the realization and development of organic materials with their inherent functionality. As greenhouse gas emissions continue to be a problem, researching innovative and effective solutions such as POPs will continue to be an important endeavor for researchers. ■



Kouki Oka
Tohoku University



Upcoming Events - 2025

Saurashtra Plast Exhibition 2025

23rd - 26th April 2025

Race Course Maidan, Rajkot, Gujarat,
India

Bharat Print Expo 2025

24th - 26th April 2025

BIEC, Bengaluru

Hong Kong International Printing & Packaging Fair 2025

27th - 30th April, 2025

Asiaworld-Expo, Hong Kong

8th Plastasia 2025

9th - 12th May, 2025

Bangalore International Exhibition Center,
Bengaluru, India

Plastics Recycling World Expo India

14th - 15th May, 2025

Bombay Exhibition Centre (BEC), Mumbai,
India , Mumbai - India

PLASTPOL

20th - 23rd May, 2025

Targi Kielce, Kielce, Poland

Biodegradable Expo 2025

04th - 06th June, 2025

India Expo Centre, Greater Noida, India

HanoiPlas 2025

04th - 07th June, 2025

Hanoi International Center For Exhibition
(I.C.E) Vietnam

RosUpack 2025

17th - 20th June, 2025

Crocus Expo, Pavilion 2, 3, Moscow



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