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What Packaging

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Pharma Report

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RETHINKING PACKAGING BEYOND SUSTAINABILITY

Dr NC Saha reframes the packaging debate at the Respack Conference in June 2026, calling for a shift beyond sustainability towards a responsibility-led approach rooted in science, regulation, and cross-industry collaboration, as India's packaging ecosystem confronts the realities of scale, safety, and circularity

Dr Saha in conversation with the What Packaging team

The language of packaging is changing. For years, sustainability has dominated boardroom conversations, conference agendas, and marketing narratives. But as the industry grapples with rising material complexity, regulatory scrutiny, and consumer expectations, that word is beginning to feel insufficient.

For Dr NC Saha, founder of Foundation for Innovative Packaging and Sustainability (FIPS), responsibility extends across the entire value chain. This shift is more than semantic. It reflects the reality that packaging today operates at the intersection of science, public health, environmental impact, and industrial economics. Decisions taken at the design stage influence recyclability, compliance, and consumer safety downstream.

The scale of engagement at Respack reflects this broadened scope. What began as a modest initiative in 2022 has evolved into a two-day platform featuring 34 speakers and participation from over 30 brand owners, alongside policymakers, scientists, and global technology providers.

From sustainable to responsible

The shift from sustainability to responsibility is not rhetorical. It reflects a deeper recalibration of how the packaging industry defines its role in society. For years, sustainability has largely been interpreted through material choices or recyclability metrics. But Dr Saha argues that such a view is inherently limited. "Sustainable is a very small word," Saha says, pointing to the tendency to reduce complex challenges into singular solutions.

Packaging outcomes are no longer determined solely by the material selected or the design executed. They are shaped by a chain of decisions that begins with polymer development, moves through conversion and distribution, and ends with consumer use and disposal.

The role of brand owners, in particular, has evolved. Where once material and technology providers dictated possibilities, brands are now setting the agenda. "Today, the brand owner is at the top. They are demanding solutions for society, for the environment, and for compliance," Saha notes.

At the same time, collaboration is replacing fragmentation. Dr Saha points to emerging partnerships between recyclers and FMCG companies as evidence of a more integrated approach.

The science gap

Innovation in packaging is accelerating. New materials, alternative substrates, and recycling pathways are entering the market at a steady pace. Yet, beneath this momentum lies a more fundamental concern. The science underpinning these innovations is often not fully understood or consistently applied.

Dr Saha is unequivocal on this point. "One has to understand science and polymers," he says, cautioning against the assumption that material substitution

alone can deliver sustainable outcomes.

Plastics are not uniform materials but families of polymers with multiple grades and behaviours. "PE has about 150 grades. PP has about 250 grades," Dr Saha explains. When these materials enter the post-consumer waste stream, they are mixed, often without clear identification or segregation. The resulting material may look acceptable, but behave differently in terms of safety and performance.

The implications for food packaging are significant. Packaging is not an inert layer. "There is always a chance that something can go from the material to the food," he says, underlining the importance of migration behaviour.

This is where the distinction between global and specific migration becomes critical. Global migration measures the total transfer of substances, while specific migration focuses on individual elements such as heavy metals. Both require rigorous testing and compliance, yet industry adoption often outpaces scientific validation. The gap is further compounded by a lack of comprehensive data. "We need study and data to guide decisions," Dr Saha emphasises, referring to ongoing efforts such as collaborative research initiatives to better understand recycled materials.

Regulation drives safety

Much of packaging's impact on public health operates out of sight. Consumers rarely engage with standards, test methods or compliance frameworks. Yet, as Dr Saha points out, it is this invisible layer of regulation that ultimately determines whether packaging is safe for use.

At the centre of this framework lies the concept of migration. Packaging materials are not passive. They can interact with the product they contain, especially under specific conditions of temperature and time.

To control this, regulatory systems rely on two key parameters. Global migration measures the total transfer of substances from packaging to food, while specific migration focuses on individual elements such as heavy metals. "Global migration has a limit of 60-parts per million (ppm)," Dr Saha notes, adding that compliance with both tests is essential for food-grade packaging.

The evolution of these standards reflects advances in scientific understanding. What began as a six-element framework for specific migration has expanded over time. "It became eight elements, now it is nine," he says, pointing to the continuous refinement of safety thresholds as new data emerges.

India's regulatory architecture has also matured. The integration of packaging into the food safety framework marked a turning point. "There was a time when it only said food-grade plastics. But what is food-grade? That question led to the development of proper packaging regulation," Dr Saha recalls. The result was a more structured approach that links material performance directly to human health outcomes.

Standards developed by the Bureau of Indian Standards (BIS) further reinforce this system. While not all standards are mandatory, those related to safety and security are enforced. Dr Saha cites examples where standardisation has had a tangible impact, particularly in ensuring consistency across materials used for essential goods.

At the same time, regulation must balance ambition with practicality. "If everything is made mandatory, micro, small and medium enterprises (MSMEs) will be affected," he notes, highlighting the need for a phased approach that allows industry to adapt without compromising safety.

In this layered ecosystem, regulation acts as both a safeguard and a guide. It translates scientific knowledge into enforceable limits, ensuring that innovation does not outpace safety.

Design shapes outcomes

As the industry debates materials, polymers and recyclability, Dr Saha shifts attention to a more decisive lever. Design, he argues, will determine whether packaging delivers on its promise of responsibility. "Design does not mean only graphics. It also means structural design," he explains, emphasising that performance is engineered, not incidental. The way a package is conceived, its layers, form, and functionality, defines how it behaves across its lifecycle. This perspective challenges the tendency to equate sustainability with material substitution. Replacing one substrate with another does not automatically result in a better outcome.

Central to this approach is a deeper understanding of the product itself. He outlines a simple but effective framework. "Ask four questions. Who are you? How are you? Where do you stay? How long?" he says, referring to the nature of the product. These parameters dictate the packaging solution, not the other way around.

The distinction becomes relevant when comparing fresh and processed products. Fresh produce may require breathable, micro-perforated films to manage respiration, while processed foods demand high-barrier materials to prevent moisture, oxygen or light ingress.

For him, this is where the next phase of innovation lies. Not in chasing the next material, but in integrating science, application and context into smarter design frameworks.

Collaboration over silos

If there is a single thread running through Dr Saha's thinking, it is this: packaging cannot be solved in isolation. The complexity of materials, regulations and end-use demands has outgrown siloed approaches.

"There was a time when everyone worked in their own space. That is no longer possible," he says, pointing to the interdependence that now defines the ecosystem. Polymer producers, converters, recyclers and brand owners are co-creators of outcomes.

This shift is most visible in the role of brand owners. Once passive recipients of technological capability, today the brand owners' demand is pushing suppliers, recyclers, and technology providers to align more closely than before. ▸

RESPACK BULLETIN

Respack urges global circularity focus

The fifth Respack conference convened in Mumbai at The Lalit from 1-2 June. Organised by the Foundation for Innovative Packaging and Sustainability (FIPS), the event drew over 450 delegates, including leading polymer scientists, policymakers, and brand owners.

FIPS Chairman Dr NC Saha began the opening session by noting that India's packaging market is on track to hit USD 150-billion by 2030, underscoring responsible design as a critical business imperative. All India Plastics Manufacturers Association (AIPMA) chairman Arvind Mehta emphasised that navigating global trade requires digital traceability and Extended Producer Responsibility (EPR) compliance. Dr Vidya Rakesh from National Institute of Design (NID) Madhya Pradesh advocated anchoring design education in ecological sensitivity, while the Energy and Resources Institute (TERI)'s Rajani Ranjan Rashmi briefed delegates on how Securities and Exchange Board of India (SEBI)'s Business Responsibility and Sustainability Reporting (BRSR) framework will soon dictate industrial investments.

The consensus was clear: packaging must evolve from mere product protection into a tool for resource efficiency.

Current recycling models are failing

Delivering a candid keynote address, Dr S Sivaram, honorary professor emeritus at the Indian Institute of Science Education and Research (IISER) Pune, challenged the industry to overhaul its approach to plastics. Sivaram asserted that conventional collection and mechanical recycling methods remain value-destructive.

"The goal of circularity is not simply to recycle plastics but to restore material quality for demanding applications," Sivaram stated. India consumes eight-million tonnes of polyolefins annually in packaging. Unlike PET, polyolefins comprise distinct material grades, making high-quality separation nearly impossible with current sorting infrastructure.

Dr S Sivaram

Sivaram issued a warning against rushing recycled polyolefins into food-contact applications without data on embedded molecular impurities. Instead of relying on unproven chemical recycling scales, he advocated for industry investment in product-to-product mechanical closed-loops and mandatory digital disclosures of polymer compositions.

Look to agro-waste for future

Chief guest Dr MM Sharma, former director of Institute of Chemical Technology (ICT), delivered a scientific defence of polymers while mapping out a transition toward renewable alternatives. Sharma dismissed the notion of abandoning plastics, arguing they remain indispensable for food preservation, hygiene, and affordable logistics.

"Packaging without plastic is simply not possible," Sharma stated, citing the immense energy lifecycle costs historically associated with glass alternatives. However, he urged the industry to accelerate investments in advanced recycling technologies, specifically pyrolysis, to process low-grade plastics.

For future feedstocks, Sharma pointed to India's agricultural waste reserves as an underutilised resource. The sugar industry generates millions of tonnes of bagasse annually, which could be converted into value-added cellulose. "Time has come to go back to cellulose-based plastics," Sharma urged.

FSSAI unveils single-window portal

The opening technical session, chaired by TERI's Rajani Ranjan Rashmi, focussed on bridging the gap between statutory food safety laws and rapid commercial packaging developments. The session featured FSSAI advisor Dr Alka Rao and UFlex liquid packaging CEO Ashwani Sharma.

Dr Rao announced the launch of FSSAI's new single-window portal for faster risk assessments and approvals of emerging materials. The platform includes an 'others' category designed to fast-track novel plant-based alternatives and advanced barrier coatings that fall outside existing standard frameworks. Rao stated that FSSAI has approved over 3,60,000-metric tonnes of food-grade rPET capacity, enforcing traceability.

Complementing this regulatory roadmap, Sharma showcased UFlex's Asepto brand. He demonstrated how Indian innovation can disrupt global aseptic markets by blending striking shelf aesthetics like holography with aggressive carbon-reduction and carton recovery programmes.

Mono-material must replace multilayer

Dr Ashish Lele, director of the CSIR-National Chemical Laboratory (NCL), delivered a presentation on the current state of FMCG packaging. While India produced 11.5-million tonnes of plastic packaging in 2020, global recycling rates hover around 9%, driven by the unrecyclable nature of traditional multi-material formats.

"The driver today is circularity," he stated. Bonding polyolefins with barrier layers like nylon or PET creates functional packaging that is inherently hostile to traditional mechanical recycling setups, leading to systemic downcycling. To remedy this, Dr Lele highlighted NCL's research into selective dissolution, delamination, and polyolefin chemical recycling.

However, he emphasised that the immediate commercial solution lies in the rise of monomaterial packaging. By leveraging material science breakthroughs, manufacturers can coat single-polymer polypropylene films with ultra-thin layers of silicon or aluminium oxide.

Flexibles shift focus to cost realism

Respack's first plenary session tackled the massive structural shift required as the industry moves away from over-packaging. Moderator, Sumit Basu of Indian Oil Corporation stated that engineering alternative materials must protect products while preserving cost efficiency. Jupiter Laminators CEO Kaushik Nag noted that booming fast moving consumer goods and quick-commerce sectors drive a major shift from rigid containers to large flexible pouches. However, Nag paired these opportunities with realism, highlighting that 70% of businesses find cost to be a primary barrier to sustainable adoption. He stated that sustainability demands real investments in machinery and materials, not just intent, urging supply chain partners to share the financial weight of innovation.

Paharpur 3P perfects retort pouches

NS Sundaram, CEO at Paharpur 3P, detailed the company's breakthrough work in commercialising sustainable retort packaging.

Retort packaging, utilised for ready-to-eat meals and pet food, represents one of the hardest formats to make sustainable due to punishing thermal sterilisation up to 135°C.

Sundaram explained that legacy multilayer laminates are fundamentally misaligned with global recyclability legislation because layering causes permanent material fusion.

To bridge this gap, Paharpur 3P engineered a mono-material retort pouch that matches legacy barrier performance, delamination resistance, and seal integrity without demanding shelf-life compromises from brand owners.

Bobst decouples high-barrier reliance

Nilesh Pinto of Bobst India outlined how the company is decoupling high-barrier packaging from reliance on aluminium foil and metalised films. Bobst has commercialised Alubond, a high-optical-density aluminium oxide coating technology developed in India, alongside plastic-free, recyclable fibrecycle high-barrier paper solutions.

Pinto also introduced a new flexo-based lamination machine designed to replace traditional gravure lamination cylinders. By replacing cylinders with an advanced anilox roller system, the process is guaranteed to use 20% less adhesive and 50% less solvent, driving down production costs and volatile organic compound emissions on a single setup.

Importance of smart manufacturing

A plenary session at Respack showcased how digitalisation and material science are reshaping the food and beverage packaging sector. Pradeep Hada of Krones India presented an AI-driven production platform for an autonomous dark factory environment that automatically adjusts parameters in real time to run high-speed PET bottling lines with minimal human intervention.

Bloom Seal CMD Pradeep Sagar introduced a nitrogen-diluted fluorination process for rigid plastic packaging that improves chemical barrier without requiring unrecyclable multilayers.

Brand owners call for localisation

During the discussion on metal packaging, experts from Nestle India, Britannia, Danone, and Holyland explored balancing unmatched material barriers with supply chain realities. Manish Yadav of Britannia noted that metal provides superior shelf-life extension and premium consumer appeal, but Biswajit Basu of Nestle India highlighted precision tolerances that force brands to book material six months in advance. Basu urged investment in domestic manufacturing for imported easy-open ends, while championing lightweighting initiatives.

Vishal Poojara of Danone argued that procurement must evaluate metal on total cost of ownership over a three-year horizon rather than unit cost.

Metals defend cradle-to-cradle loop

This session mounted a defence for steel as a substrate that naturally eliminates structural waste. Ramanathan Balasubramanian of JSW Steel Coated Products highlighted that natively high barrier properties of steel protect food without cold chains. He announced a new packaging R&D lab with the Indian Institute of Technology (IIT) Bombay.

Kaushal Vora of Massilly India Packaging demonstrated the structural and leak-resistance benefits of two-piece DRD

cans over three-piece welded formats.

While Saket Bhatia of Hindustan Tin Works praised India's informal recycling chain for achieving nearly 100% reclamation of steel cans, noting that metal offers a true cradle-to-cradle loop without losing its original material properties.

Inks and labels drive recyclability

Here, experts highlighted that substrate selection alone cannot achieve circularity. Manjusha Singh of DIC India pointed out that ink chemistry determines whether a package can be successfully recycled, advocating for polyvinyl chloride (PVC)-free systems and de-inkable technologies.

Saurabh Agarwal of Avery Dennison argued that labels are strategic assets for supply-chain traceability.■

Scan to view interviews with the top delegates at Respack by the What Packaging team

"The science is progressing, but translating that science into commercially viable technologies remains challenging."

Dr Ashish Lele, director of CSIR-National Chemical Laboratory (NCL)

"Plastic has proven to be the most economic and versatile choice."

Pradeep Kumar Nathalal Sagar, chairman and managing director of Bloom Seal Containers

"Recycling in the manner that is performed in India is value destructive. We should end the endless carousel of each actor blaming the other."

Dr S Sivaram, advisor to FIPS and honorary professor emeritus at IISER Pune

"India produces a variety of agricultural commodities, but many products struggle to access distant markets due to inadequate packaging standards."

Dr Sudhanshu, secretary of the Agricultural and Processed Food Products Export Development Authority (APEDA)

"When the discussion shifts from unit cost to a three-year horizon, the value proposition of metal packaging becomes much clearer."

Vishal Poojara, senior manager (packaging) at Danone Asia, Middle East, and Africa (AMEA)

"The transition demands investment in machines, processes and materials, not just the intent."

Kaushik Nag, CEO at Jupiter Laminators

"FSSAI does not see any material as a hero or a zero. Whether it is plastic, paper, glass, metal or bio-based materials, our objective is safety."

Prof Alka Rao, advisor, (Science, Standards and Regulation Act) at FSSAI

"As long as there is food, there is agro-waste. I would urge the industry to re-look at cellulose as a starting material for packaging."

Prof MM Sharma, Padma Vibhushan Awardee and former director of the Institute of Chemical Technology (ICT)

"The label and the container are the same polymer family. They become one single structure. One material, nothing to separate, nothing to strip out."

Vikas Khanna, partner at Ajanta Print Arts

"The future of packaging is not about making a bad material slightly better. It's about creating the right materials from the start."

NS Sundaram, CEO at Paharpur 3P