

TAKING SUSTAINABLE PACKAGING TO THE NEXT LEVEL

Dr Caroline Potter, VP Sustainability, Sagentia Innovation explains how organisations can gain ground

Sustainability has been on the agenda for food and beverage companies for some time, with packaging occupying much of the spotlight. There have been some excellent and exciting innovations in this space. However, their uptake and effectiveness is constrained by wider factors, from the recycling infrastructure to the availability of materials.

The development of truly sustainable food and beverage packaging solutions is a complex

matter and it's not easy to deliver meaningful change. But that is exactly what customers, regulators and investors are starting to demand.

The quest for net zero

With the COP26 Net Zero Summit on the horizon, pressure to devise actionable, dead-line-driven plans to eradicate carbon emissions is mounting. Packaging comes under the net zero banner, as materials derived from fossil fuels contribute to 'scope 3' emissions.

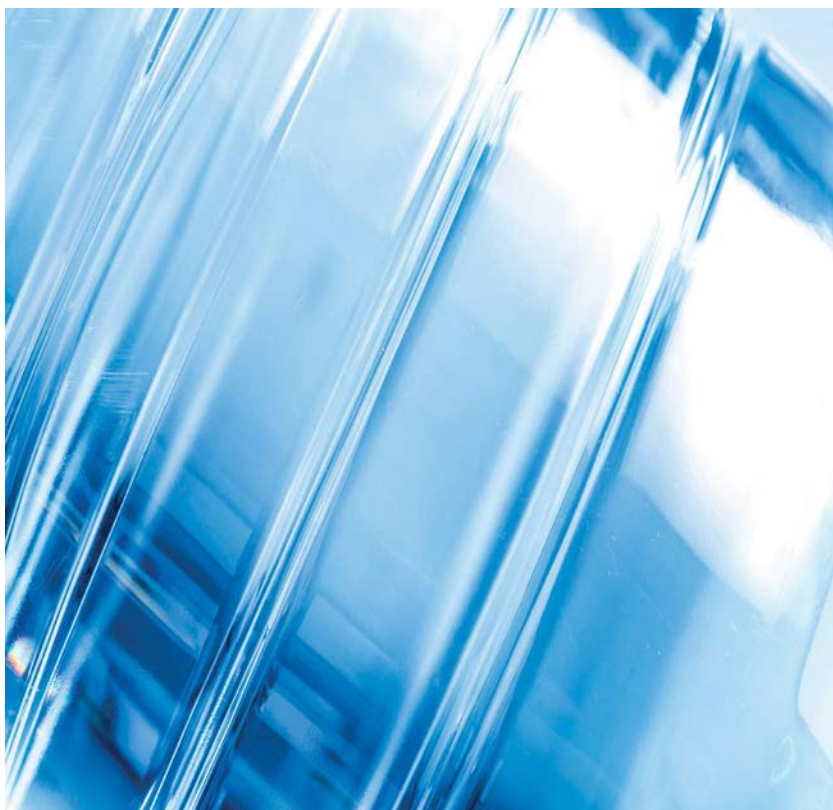
Replacing virgin petroleum-derived polymers with recycled or renewable alternatives is part of the solution. Use of recycled content such as rPET is becoming widespread, and bio-derived materials are also attracting interest. Many organisations are embracing circular economy principles, designing out waste and keeping products and materials in use for as long as possible.

However, progress is hindered by technical limitations and the unique packaging needs of the food and beverage sector. Stringent regulatory requirements for food contact materials bring an additional layer of complexity. This can impact the use of recycled content, and we're not yet at the stage where bio-derived materials can be used in every packaging application. What's more, while recycling petroleum-derived polymers offers some sustainability benefits, they are still classified as a scope 3 emission and can therefore be an obstacle to net zero status.

So, where does the industry go from here?

A hybrid approach to sustainable packaging

There is no simple one-size-fits-all solution to



improve the sustainability of food and beverage packaging. Nevertheless, with many organisations making environmental, social and corporate governance (ESG) commitments we can expect to see marked progress in the coming years.

The Ellen MacArthur Foundation's New Plastics Economy initiative has seen countries including the UK and US launch Plastics Pacts, driving united efforts to change the way plastics are designed, used and reused. Overall, there is a shared goal to make packaging more reusable, recyclable or compostable. In some cases, organisations have pledged to make significant gains by 2025.

The plastics that organisations are looking to eradicate are typically defined as synthetic or petrochemically derived; material that does not degrade or is 'problematic' in some way. Indeed plastic itself is not a particularly helpful term as 'plasticity' is a property rather than a material.

Bioplastics are often presented as a preferable alternative, but the wide scope of these materials can cause confusion. For instance, while some bioplastics are both bioderived and biodegradable, others are chemically identical to conventional plastics (albeit derived from a biobased source rather than a petrochemical one). On the other hand, some materials from petrochemical sources are in fact biodegradable. To confuse matters further, biodegradability isn't always clearly defined, and the term is used interchangeably with 'compostable'. Ideally, these materials should explicitly reference the environmental and time parameters required for them to biodegrade.

Faced with such ambiguity, it's not easy to determine the best sustainable packaging path to take. Which approaches can truly make a difference, achieve largescale viability and dovetail with the wider infrastructure? Right now, nobody knows.

A hybrid approach that maximises what is feasible at present while engaging in shrewd exploration of what might work in the future is the answer. Which means it's useful to understand the technology and capability gaps that need to be surmounted.

Technical considerations

Most challenges for both recycled and alternative food and beverage packaging materials relate to three core factors: supply, functionality and enabling circularity (eg end-of-life route).

In terms of supply, if the industry were to switch to 100 per cent recycled packaging overnight, there wouldn't be enough food grade material to meet demand. Similarly, high quanti-

ties of alternative materials are not yet available, and the sustainability of their source needs to be considered too.

When it comes to functionality and quality, it's well known that mechanically recycled materials tend to degrade with numerous cycles. However, steps can be taken to mitigate this, and breakthroughs in chemical recycling methods that generate plastic of virgin-like quality also hold much potential.

Conventional plastics still have the edge in functional properties such forming effective barriers to prevent spoilage. They've been optimised over many years and alternative materials are behind the curve in this aspect.


End-of-life challenges largely centre on a lack of availability or poor consistency of recycling facilities in different regions. The situation is generally good for PET bottles, but patchy when it comes to other polymers, which in turn impacts the supply of recycled material.

Alternative materials can present additional complexities. Bioderived conventional polymers such as bioPET can enter the same recycling streams as petroleum-derived polymers. However, if they are not disposed of carefully, they result in the same pollution issues as conventional plastics.

Biodegradable and compostable materials also pose challenges. The nature and duration of biodegradability can vary hugely, and industrial composting services cannot always handle these materials. What's more, for organisations that are committed to closed loop principles, there is still some debate over whether composting can be considered a fully circular outcome.

Joining the dots for sustainable packaging of the future

Clearly, there is room for improvement in the use of recycled content and alternative packaging materials alike. However, the two elements are set to remain fundamental to the sustainable packaging equation.

Scientists and engineers continue to break new ground, but to make a meaningful difference, such developments need to be harnessed at scale and fit neatly with the wider ecosystem. This requires a joined-up approach where organisations coalesce on practical matters. It's about finding ways to pool resources, insights and capabilities so that Plastic Pacts make the important transition from words to deeds. It's a big ask. But with the current trend for 'building back better' and investors increasingly targeting a green recovery, I'm confident that the food and beverage industry will deliver. 



Dr Caroline Potter, VP Sustainability, Sagentia Innovation