

Making Progress Toward Sustainable Packaging

Packaging companies serving the pharma sector must turn their attention to sustainability to reduce plastics in packaging design and enhance recyclability

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If any phrase can be aptly applied to these uncertain times, it is 'safety first'. We used to say it to our children playing outside; now we say it to ourselves as we remain inside.

This phrase also sums up the pharmaceutical sector's longstanding approach to eco-friendly and recyclable packaging. Regardless, with the need to minimise our carbon footprint in the worldwide effort to combat climate change, patient safety must be seen as the paramount priority. Understandably, pharma lags behind other product sectors – cosmetics, food, fast-moving consumer goods – in sustainable packaging because its products are often both crucial to health and, from a barrier standpoint, difficult to protect. Maintaining medicinal efficacy is both essential and challenging – a combination difficult to square with sustainability.

It is, then, completely appropriate that non-pharma industries be held to higher sustainability standards. The EU is attempting to do just that. The EU recently announced elevated targets for plastic packaging recyclability, aiming for 50% by 2025 and 55% by 2030. Other geographic areas have introduced similar targets, challenging packaging manufacturers to utilise innovative materials and embrace leaner production and logistics initiatives.

Meeting these targets will require increased cooperation between all actors involved in the lifecycles of plastics. Over the long term, modernising and harmonising systems for waste management is inevitable; in the nearer term, however, eco-minded advancements in the ways plastics are designed and produced are a must to fit actual recycling streams.

Outside pharma, these stricter rules of the road have helped lead to a wellspring of innovation. For example, tubes formerly constructed of conventional metals and plastics are now being developed with novel bio-resins comprising everything from sugarcane to spruce trees and paperboard materials.

When more traditional materials are used, many tube manufacturers are embracing a 'plastics with a purpose' approach utilising milk container materials and other plastics that would otherwise ceaselessly fill our landfills or aimlessly float in our oceans. With non-pharma applications, if you're still relying heavily on virgin plastics... well, you're doing it wrong.

Frustratingly, yet understandably, very little of this currently applies to the pharma sector, which is exempt from the 2025 and 2030 EU recyclability goals for a variety of good reasons.

One issue lies with the logistics of current recycling processes – which, despite being disparate by country (and sometimes even by municipality) across the EU, have commonalities that pose a challenge to sustainability in pharma packaging. Broadly, today's recycling stream utilises a mechanical process that cannot easily handle the sort of oily pharma products generally housed in tubes. In other pharma packaging platforms, residues from active pharmaceutical ingredients (APIs) present a similar challenge.

Another obstacle is that plastics and other packaging materials are held at a higher standard as they must ensure patient safety. Though they may be suitable for cosmetics or other consumer products, recycled plastics cannot currently be classified 'pharma-grade', which automatically omits their introduction into the pharma packaging stream.

Promisingly, the same guidelines that are pushing other industries to up the ante on packaging sustainability could trickle down, albeit gradually, to pharma. For example, advancements in chemical-centric (i.e., solvent-based) recycling have the possibility to yield a purer end-product recycled plastic capable of meeting pharma-grade specifications. We're not there yet, but it's certainly on the horizon for the coming decade.

TUBES DESIGNED for circularity



Image: Neopac

The larger packaging industry is also seeing improvements in the way plastics are designed and produced – a collective mindset of innovation that could positively impact pharma packaging.

But again, the pharma sector (including certain high-performance cosmeceutical products) has higher demands. Therefore, in the near term, making meaningful sustainability progress in that sector will require new, innovative barrier technologies such as highly oriented PE barrier films (MDO), thin film ethylene vinyl alcohol layers, barrier lacquers and ceramic barrier films.

Packaging suppliers are already taking significant strides. For example, a number of these are now offering pharma customers pilot samples for early-stage stability testing with recyclable tubes that meet many pharma packaging specifications. This is helping pharma manufacturers determine whether they can begin transitioning to more sustainable solutions, and also provides packaging engineers with invaluable feedback as they continue to innovate.

It is this type of collaborative, extensive materials research that will help bring the pharma sector gradually

into the sustainable packaging fold. Though pharma packages housing particularly sensitive or caustic medicines will be a significant hurdle for the foreseeable future, many packaging companies have set their sights on creating sustainable solutions for drugs with comparably lower barrier requirements.

For example, research shows that, from a sustainable packaging materials standpoint, it is easier to protect pharma products from oxygen and other gases rather than water, moisture, and humidity. Companies are already seeing promising preliminary results protecting oxygen-sensitive products with the aforementioned mono-material barrier tubes.

Protection from water, moisture, and humidity is a tougher challenge. To date, tubes that protect those products still necessitate an aluminum barrier layer anathema to current recycling processes. Notably, another factor here is that packaging must not only protect the product but sustain its officially stated shelf life.

Still, we must not let perfection be the enemy of progress; though a fully sustainable solution may elude us for some time, improvements can

be made. For example, manufacturers are currently testing different materials and barrier structures against various APIs to gain insight into the precise barrier requirement for certain drugs. Insight from this research could mitigate another common pharma sustainability issue: overpackaging. New thinner-walled tubes that sacrifice neither protection nor shelf life can save pharma companies' revenue on unnecessary packaging overkill, and spare the environment from plastics that weren't truly being put to good use from a patient safety perspective – including extensive secondary packaging.

The process will be, admittedly, a slog. Progress on this front will mean trial and error. Packaging companies committed to sustainability must invest in materials research and be unafraid to stumble along the winding road to engineering breakthroughs. Even while we perpetually place patient safety first, the push to improve packaging sustainability must include pharma solutions as we move toward a truly circular economy.



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