Net Zero Healthcare – Priorities for Decarbonising the Pharma Supply Chain

The climate and our health are inextricably linked. The effects of climate change on global health systems and outcomes are already clear, with WHO proclaiming it to be the biggest health threat facing humanity today.

And it's projected to get worse over time. Every year between 2030 and 2050, climate change is expected to cause an additional 250,000 deaths.

Pharma, as one of the largest global industries, is both part of the problem and the solution for minimising the adverse effects.

A first-of-its-kind study by environmental engineers found the pharmaceutical industry is significantly more emission-intensive (13 percent more) than the automotive industry despite the sector being 28 percent smaller. Over half of these emissions are produced by supply chains.

Given this link and the seriousness of the situation we find ourselves faced with in the near future, the pharmaceutical industry has a unique responsibility to act. And act fast.

So, what progress is being made to decarbonise the pharma supply chain and help combat the negative health impacts of the climate emergency?

Latest Progress and the Health Systems Taskforce

As part of the Sustainable Markets Initiative, the Health Systems Taskforce (HST) was formed in 2021 at the 26th United Nations Climate Change Conference (COP26) in Glasgow, UK.

The HST is a public-private partnership set up with the collective and ambitious goal of decarbonising supply chains to help pharma organisations reach net zero. Taskforce members include senior pharma leaders and experts from NHS England, GSK, Roche, AstraZeneca, WHO and Unicef.

Actions focus on three priority areas: Supply Chain and Patient Care Pathways, Decarbonisation, and the use of Digital Innovation in Clinical Research.

Within these areas, the HST recommends eight levers to create low-carbon, climate-resilient health systems. These include product and packaging redesign to reduce material and energy use, increasing process efficiency to cut emissions and save costs with smarter data use, and cleaner transport, shifting to sea, road and rail freight instead of air and transitioning to electric or bio-based fuels within the fleet.

In November 2022, at COP27 in Sharm El Sheikh there was a call for greater cross-sector partnership to accelerate action on climate as the world faces a critical juncture. Active Pharmaceutical Ingredient (API) supply chains were a key focus, addressing this shared challenge through the newly launched Activate programme.

COP27 also marked a major milestone for the Energize programme and the first buyers' cohort for renewable electricity was announced. By enabling suppliers to reduce their Scope 2 emissions, the programme assists pharma manufacturers to reduce their Scope 3 emissions too. These are indirect emissions that occur in the upstream and downstream activities of an organisation.

It was also an opportunity for Big Pharma to engage with key stakeholders about their personal flagship decarbonisation programmes, and present how they are delivering this in key countries and through partnership.

Towards a whole Lifecycle View

All products and services have lifecycles. The lifecycle refers to the period from the product's first launch into the market until its final withdrawal.

Traditionally, Product Lifecycle Management (PLM) has first and foremost been used to help companies understand and realise its position in the market compared to competitors and a product's success or failure.

But having a unified view of the entire product development lifecycle with the ability to view and trace every detail throughout the entire process can be hugely valuable from a sustainability standpoint.

It's important to consider the whole lifecycle of a medicine, from design and development and production to sale, consumption and disposal, to reduce pharma's negative impact on the environment.

Different stages of the lifecycle produce different levels of carbon and other waste.

Product Development and Manufacturing

Pharmaceutical development and manufacturing require huge amounts of energy to output a comparatively small amount of Active Pharmaceutical Ingredient (API). Like any industrial process, where there is significant energy, there also tends to be significant waste.

Solutions to reduce energy-related emissions in the manufacturing process include on-site anaerobic digestion plants to treat hybrid waste, energy-efficient lighting and solar panels to power facilities using renewable energy.

Firms can also choose to install rainwater harvesting systems, solar panels, inverter driven machinery and reactive lighting designed to maintain a consistent lux output whenever an area is occupied, to robotics which increase production yields and accuracy with reduced input.

Packaging Design

Prioritising waste prevention from the outset of packaging design can also improve pharma's environmental footprint.

3D visualisation and printing technologies are helping manufacturers meet their sustainability goals by being more mindful of waste prevention strategies and improving the quality of design. From the outset, manufacturers can plan and test their products' efficiency to the highest standard, reducing the volume of substandard defunct packaging.

At this stage, packaging designers can also integrate key safety features into the core of their designs to limit the use of multiple packaging materials. In doing so,

packaging is both more efficient and easier to recycle. For example, printing product information directly onto the secondary packaging can reduce labelling materials while QR codes can allow patients to access their private information and specific dosage requirements without the need for excessive labelling.

Manufacturers are also experimenting with more sustainable materials for their packaging, with plant-based plastics becoming more readily adopted by pharmaceutical companies.

Astellas Pharma, for example, made waves switching to sugarcane-derived blister packaging in 2021 – a world first for biomass-based plastic for blister packages. Plant-based materials made up 50 percent of the raw materials used in its development while still providing the same protection function and usability.

The move to biomass-based materials could prove more common in the coming years as technologies evolve and consumer demand for sustainable alternatives grows.

Distribution

While manufacturing carries a large carbon footprint, the distribution of medicines from the factory and into patients' hands also has a significant impact on the environment.

One of the most energy-intensive processes is delivering temperature-sensitive products, like insulin and some vaccines, from the point of manufacture to the patient within the cold chain. Refrigerated vehicles require additional energy to power the cooling systems, known as transport refrigeration units.

The simplest way to reduce the carbon footprint of shipping is to use cleaner fuels and transport types, such as rail, road and sea freight instead of air.

Hydrotreated vegetable oil, a renewable, bio-based fuel that can be used in diesel engines, can reduce greenhouse gas emissions by up to 90 percent compared with diesel. Other alternative fuels include: compressed natural gas, liquefied natural gas, liquefied petroleum gas (LPG), and their renewable counterparts - biomethane and bio-LPG.

Localised manufacturing, or re-shoring, can also reduce the carbon footprint by reducing the miles the final product has to travel to reach the consumer. This approach optimises the amount of time a product needs to be maintained within a storage environment or shipped amongst the different transportation solutions.

Use and Disposal

Once waste and carbon emissions have been minimised in the product's production and distribution, attention should focus on to how it will be used and ultimately discarded by the end consumer.

Currently, most medicine packaging – particularly primary - ends up in a landfill or is incinerated, losing its value as a material resource. So, brands must continue to think about not only innovative recycling methods but upcycling and repurposing materials too.

End users play a key role in the lifecycle of these products and must be committed to act alongside manufacturers. But this requires education initiatives, clear instructions and simple steps to follow to maximise compliance.

If materials cannot be recycled and re-introduced in the lifecycle, manufacturers must invent innovative ways to repurpose the discarded materials.

For example, Novo Nordisk has innovated a way to repurpose its insulin pens. Despite being mostly made of plastic, they cannot be put in plastic recycling bins. In response, Novo created a system that sorts the pens into many component parts and partnered with a Danish design company to make office chairs using the waste plastic and lamps using the discarded glass.

Data-driven Digital Transformation to Unlock Further Gains

Pharma is one of many industries trying to become smarter in collecting, analysing and leveraging the power of data to make decision-making faster, solving inefficiencies and meeting sustainability targets.

Historically, the transition from industrial-age to digital-era operating models has been slow.

Inflexible IT infrastructure is a barrier to digitisation, particularly making old and new systems interoperable. Pharma 4.0 demands the gap between the digital and physical is closed, allowing for a 365-degree view of business operations. In a global supply chain, this can be difficult to achieve.

Supply chains are healthcare's climate Achilles heel - technology that connects the lab to the marketplace is lagging. But recent advancements in big data technologies, machine learning and artificial intelligence are propelling digital strategies forward, unlocking sustainability gains.

Big data and AI have a synergistic relationship. AI requires large volumes of high-quality data to learn and improve decision-making processes. Over time, the more data the algorithm receives, the more accurate and efficient it can become – and so can pharma.

With greater automation and real-time data accessibility, combined with AI, pharma firms can collect, analyse and act on data insights before an issue occurs. It can also minimise human error, provide end-to-end visibility, and protect the integrity of supply chains.

Over time, AI will transform the industry's operating models and help it achieve its sustainability targets. However, full digitalisation takes time and strategic thinking, and involves a fundamental shift from linear supply chains to dynamic, interconnected and open AI-enabled digital supply networks (DSNs).

The workforce will also need further diversification to ensure the industry has the skillsets and knowledge that matches its ambitious digital-driven aims.

Today, manufacturers that want to move into an end-to-end digital supply chain are increasingly leaning on external experts given the lack of dedicated teams with established knowledge on AI design thinking.

Tomorrow, the talent pipeline needs to be agile, digitally literate and open to continuous learning to maximise the opportunities these new technologies present pharma.

Steve Brownett-Gale

Steve Brownett-Gale is a marketing professional with a career spanning both communications and products in B2B and B2C markets across Manufacturing and Services sectors. At Origin, in his role as Marketing Lead, Steve is responsible for positioning the company as a world-leading supplier of innovative and ground-breaking pharmaceutical packaging devices, as well as offering a unique and disruptive supply chain model. Established 60 years ago, Origin offers customers a remarkable range of versatile packaging solutions that respond to the unique needs of the global pharmaceutical marketplace. Origin engages in the design, manufacture, and consolidated supply of pharmaceutical packaging, partnering with licence holders and CMOs.

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