



Opinion:

All the Waste We Cannot See: The Healthcare Industry's Unseen One Health Challenge

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Landfills and incinerators let waste disappear, but its effects keep spreading. We caution the healthcare industry to rethink how it manages waste before its impact impedes a healthy future.

OUT OF SIGHT, STILL OUR PROBLEM

Every day, tons of pharmaceutical and MedTech waste end up in landfills or incinerators worldwide. Expired medicines, chemical sludge, and single-use plastics vanish from company reports with one click: treated. However, waste disappearing from sight does not mean the problem is gone. While the healthcare industry claims compliance and sustainability, the environmental and health risks continue quietly, leaching into landfills and spreading through emissions. In the sector built on healing, it is striking how easily its toxic byproducts are hidden. This article looks at the industry's reliance on landfills and incinerators, the limits of sustainability reporting, and why we need a different approach to accountability and waste management.



QUICK FIXES, LONG-TERM FALLOUT

The healthcare industry's waste is hazardous. It contains active ingredients, solvents, carcinogens, cytotoxic drugs, and plastics. Disposal usually falls into two legal but problematic methods: landfills and incineration.

Landfills take expired drugs, packaging, and contaminated Personal Protective Equipment (PPE). Before disposal, waste often undergoes some processing like autoclaving or partial incineration to meet regulations, especially in Europe where direct dumping is banned. Yet, landfills are not built to neutralise pharmaceutical compounds. Studies show active ingredients can leak into soil and water, affecting wildlife and fueling antimicrobial resistance.¹ This is where existing healthcare solutions inadvertently create the next One Health challenge, undermining the very systems they were meant to protect by threatening human, animal, and environmental health alike.

Incineration is used for high-risk waste like solvents and cytotoxic drugs. Even under ideal conditions, it releases toxic gases and particles. In low- and middle-income countries, incomplete burning and weak monitoring increase the risk to nearby communities.² Often, ash from incineration ends up in landfills.

Both methods hide the waste without stopping its impact. They are end-of-pipe solutions, merely one step up from direct waste discharge. Yet, it still happens that waste enters the environment with no treatment at all. In 2017, Pfizer's Kalamazoo facility in the U.S. discharged untreated pharmaceutical wastewater, exceeding safe limits.³ This handling of waste certainly does not fit a circular economy or sustainable health model reminiscent of the industry's vision and mission. More worryingly, if such incidents happen in the Global North, what happens in countries with weaker oversight?

INDIA: EXPORTING MEDICINE, IMPORTING WASTE

India makes over 60% of the world's vaccines and a large share of active pharmaceutical ingredients. But while it exports life-saving drugs, it also takes on a huge part of the industry's environmental burden. In Hyderabad's Patancheru-Bollaram belt, decades of unchecked pharma production have made rivers toxic and aquifers into chemical sinks.⁴

Larsson et al. (2007) found that treated wastewater from Hyderabad drug factories had levels of ciprofloxacin higher than those in patients' bloodstreams⁵. Waste does not vanish, it becomes an invisible threat entering water, food, and ecosystems. This is not just a problem in the developing world or emerging economies; global supply chains export risk while profits flow elsewhere.

In Goa, Cipla faced community complaints about chemical smells and health issues linked to waste dumping and incineration. The company denied wrongdoing, but environmental and reputational damage was done. Landfills and incinerators act as a cloak, letting companies tick compliance boxes while local communities bear the cost.⁶

LANDFILLING AND BURNING IS AGAINST SUSTAINABILITY

Sustainability reporting is now a key requirement and tool for the industry, but it often only tells part of the story. Terms like "treated waste" or "incinerated material" rarely explain the processes involved and the resulting downstream effects of treatment and incineration. Incinerators may shrink waste, but they release toxins. Landfills hide waste but do not stop long-lasting chemicals from leaching. Both reinforce a linear model: consume, discard, repeat.

Sustainability frameworks, and especially inconsistent financially driven ESG benchmarks, need to move beyond numbers to measure real environmental outcomes. The industry needs to close the health gap created by its waste and shift from cradle-to-grave to cradle-to-cradle, i.e. transitioning to making waste a circular solution.

BREAKING THE LOOP: BETTER WAYS FORWARD

Sustainability cannot rely on containment alone. Given its embedded mission to improve health, the pharma and wider healthcare industry has responsibility but also the resources to prevent, recover, and reuse waste.

For example, GSK's Montrose facility in Scotland cut hazardous waste by over 80% with solvent recovery systems.⁷ Advanced oxidation processes can break down active ingredients in wastewater without creating new pollution. On-site modular treatment units help offshore facilities. Green chemistry⁸, as well as Green engineering principles⁹ are slowly being integrated into drug design, starting in R&D labs and continuing all the way through to manufacturing. Digital platforms and tools to support effective waste management such as Chemishield already exist. These tools provide organisations with solutions to track, categorise, and control waste streams across their entire lifecycle

Adoption of such waste minimisation and management practices is slow, often due to short-term thinking and cost. Yet the examples above show: they are available, possible and impactful. Getting waste experts involved can actually help companies shift from reactive disposal to proactive waste strategies and transforming waste from a problem into a solution.

EXPERTS OVERVIEW: FROM OVERSIGHT TO FORESIGHT

As a first step, the pharma and healthcare industry needs to see the full picture of its waste, far beyond regulatory reporting. Mapping waste from generation to disposal exposes inefficiencies, leakages, and unmonitored risks. Next, benchmarking against best practices then helps companies move from reaction to strategy.

Closed-loop systems like in-line solvent capture, source segregation, and predictive analytics help embed sustainability strategy into practice. For example, AstraZeneca's Södertälje site in Sweden tracks active ingredients to ensure no untreated waste leaves the facility.¹⁰ This shift from oversight to foresight protects both the environment and industry's legitimacy.

IT'S TIME TO STOP BURNING WHAT WE DON'T WANT TO SEE

The pharma and MedTech industry markets itself as a guardian of human health, but its past and current waste practices tell a different story. Landfills and incinerators hide waste but do not stop their impact, ranging from antibiotic resistance in rivers to chemical exposure in communities. Sustainability reporting and monitoring must evolve to address what waste does, not just how much of it is managed and outsourced.

The path forward is transparency, circularity, and accountability. The industry must see waste as a reflection of ethical and environmental responsibility, not a problem to hide. Radical accountability, visibility over volume, long-term impact over cost, and community engagement over legal compliance are essential.

Burning what we do not want to see risks poisoning the future of medicine itself. A healthy society cannot thrive on a poisoned planet, and the healthcare industry should understand that first and act accordingly.

WHAT ARCONDIS CAN DO TO HELP?

Arcondis supports pharmaceutical manufacturers in developing strategic, compliant, and sustainable waste management frameworks, including wastewater, that align with both regulatory and sustainability objectives. By combining engineering expertise, data analytics, and regulatory knowledge, Arcondis helps clients identify contamination sources, assess effluent composition, and evaluate technology options such as Advanced Oxidation Processes (AOPs), Supercritical Water Oxidation (SCWO), and membrane-based treatments. Through process mapping, risk assessment and with digital tools, we enable our clients to implement scalable, modular and smart solutions that minimise environmental impact while maintaining operational efficiency.

Additionally, our Sustainability Solutions Team develops Lifecycle Assessment (LCA) models, implementing sustainable lab practices with My Green Lab cer-

tifications, benchmarking technologies against e.g. cost metrics, and designing data-driven dashboards to monitor discharge compliance and performance in real time. By integrating sustainability into core operations, such as labs and manufacturing, Arcondis helps turn regulatory requirements and the healthcare industry's native necessity for environmental protection into long-term opportunities for innovation, resilience, and One Health benefits.

By integrating sustainability into core operations, beyond technical solutions, Arcondis provides end-to-end project management, stakeholder alignment, and change management support to ensure smooth adoption of sustainable practices.

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Floriane Leseur is a Sustainability Consultant and Sustainable Lab expert with eight years of experience in research and life sciences. At Arcondis, she combines her scientific background in molecular biology and environmental science with her passion for sustainability to help organisations adopt greener lab practices, reduce product environmental footprints, implement circular waste-management approaches, and align their strategies with the OneHealth initiative.

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Samantha Gordine, an environmental scientist with a PhD in Marine Biology, is a sustainability professional in the healthcare sector. At Arcondis, she leads the Global Sustainability Solutions Team, managing the service portfolio and working with major healthcare organisations to develop sustainable solutions and enhance environmental practices.

About Arcondis

Arcondis is a global professional services company exclusively focused on the life sciences and healthcare sector. Owned by a Foundation and committed to healthcare improvement, we accelerate value creation for our clients in R&D, Manufacturing & Supply Chain, Marketing, Sales & Services, to ultimately benefit patients.

Our solutions and services include Digitalisation, Data, IT & Infrastructure; Product Lifecycle Management; Industry Compliance & Managed Services and People & Culture. As an independent solutions and Managed Service provider, we have the flexibility to prioritise our clients' best interests without being constrained by exclusive partnerships. We follow an outcomes-based approach – from strategy to hands-on delivery and beyond.

With a well-established reputation built over two decades, we have earned the trust of leading companies in Pharma, Med-Tech, Healthcare and Start-ups. Headquartered in Switzerland, we employ more than 250 specialists and professionals, with offices in North America, Europe and APAC.

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