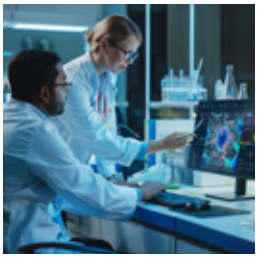
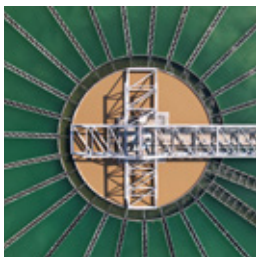
efpia

European Federation of Pharmaceutical Industries and Associations

White Paper on Circular Economy







Executive Summary

- The European Commission's Circular Economy Action Plan[1], their Roadmap[2] and the European Green Deal[3] have established direction for the future approach to a sustainable business model based on circularity.
- Transitioning to a more circular economy requires changes throughout value chains, from product design, manufacturing and supply, to new business and market models. Designing products for low environmental impacts, identifying new ways of turning waste into resources, prolonging the life of products and changes to consumer behaviour are also important considerations.
- EFPIA, the research-based pharmaceutical industry is supportive of the principles of the Circular Economy Action Plan and sees synergies with our aspiration to safeguard the future supply of pharmaceuticals for patients and improve human health. Implementation of a circular economy is fundamental to help limit global warming[4] and we welcome the opportunity to be part of the solution by working collaboratively with the EU in shaping the legislative framework and within our organizations to mitigate our impacts.
- The pharmaceutical industry's approach to circularity builds on efforts to decarbonise the healthcare sector[5] and aligns with the EU's approach, whilst recognising the constraints, especially on speed of transition, from operating
- As a significant global market for the pharmaceutical industry, the approach that the EU takes will influence the approach that other countries and jurisdictions take to this issue. It is therefore essential that due care is taken to understand the consequences to extended medicines, vaccines, and therapeutics supply chains both into and out of the EU. Shared sustainability objectives must be reached in a way that continues to safeguard international supply of these vital products.

1 The European Commission, 2020 Circular Economy Action Plan https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_ plan.pdf

2 The European Commission, 2019, Annex - Roadmap and key actions https://ec.europa.eu/info/files/annex-roadmap-and-key-actions_en

3 The European Commission, 2020, Communication on The European Green Deal https://ec.europa.eu/info/files/communication-european-green-deal_en

4 United Nations, 2015, Paris Agreement http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

5 https://www.sustainable-markets.org/taskforces/health-systems-taskforce/

Glossary

Circular Economy	The principle of which is often also referred as "circularity" in short. Circular economy refers to models of production and consumption that minimize waste and reduce pollution, promote sustainable uses of natural resources, and help regenerate nature.	The Climate Dictionary[6]
Eco-design principles	Eco-design is a way of creating products or services that have minimal environmental impact throughout their life cycle. Eco-design considers environmental aspects at all stages of the product development process, from conception to recycling.	European Commission: About the energy label and ecodesign[7]
Safe and Sustainable by Design (SSbD)	The safe and sustainable by design framework is a voluntary approach to guide the innovation process for chemicals and materials. It aims to steer the innovation towards the green and sustainable industrial transition, while avoiding or minimizing harmful impacts to human health and the environment.	Safe and sustainable by design (europa.eu)[8] JRC Technical Report (2022) Safe and Sustainable by Design; accessed at EU Science Hub homepage (europa.eu)[9]
Sustainability	Meeting the needs of the present without compromising the ability of future generations to meet their own needs. Term encompassing human rights, gender equality in a balance of economic, social and environmental concerns.	UN, Department of Economic and Social Affairs Sustainable Development[10]
Product/ Chemical/Material Environmental Sustainability	The ability of a product/chemical/material to deliver its function without exceeding environmental and ecological boundaries along its entire life cycle, while providing welfare, socio-economic benefits and reducing externalities	Lovsin Barle, E., Whitford W.G. (2023), Sustainability Definitions for the Pharmaceutical Industry, Pharmaceutical Engineering[11]
Facility/ Operation/Process Environmental Sustainability	Design of a facility/operation/process to conserve resources, use renewable energy sources and deliver its function without exceeding environmental and ecological boundaries	Lovsin Barle, E., Whitford W.G. (2023), Sustainability Definitions for the Pharmaceutical Industry, Pharmaceutical Engineering

6 https://www.undp.org/publications/climate-dictionary

7 https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about_en

8 https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/key-enabling-technologies/chemicals-and-advanced-materials/safe-and-sustainable-design_en

9 https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/key-enabling-technologies/chemicals-and-advanced-materials/safe-and-sustainable-design_en

10 https://sdgs.un.org/2030agenda

11 https://ispe.org/pharmaceutical-engineering/march-april-2023/sustainability-definitions-pharmaceutical-industry

1. Circular Economy – An overview

The EU Circular Economy[12] is a key priority pursued by the European Commission since 2015[13], that outlines the steps and measures needed to transform the EU economy towards a higher degree of circularity, where waste is prevented, and materials maintained and recycled for as long as possible. This paper provides the view of EFPIA members on the Circular Economy and confirms members' support to transition towards a circular economy based on the Final Circular Economy Package of the European Commission[14], The European Green Deal[15], the principles of the Ellen MacArthur Foundation[16] and in line with the UN Sustainable Development Goals[17].

Details on the approach of EFPIA on Climate Change, Chemicals and Pharmaceuticals in the Environment are discussed in separate papers which can be accessed on the website of EFPIA (Annex 1).

We see circularity as a complementary opportunity to energy efficiency for the pharmaceutical industry to ensure access to sustainable supplies of raw materials and energy in a resource constrained world, while also providing protection against price volatility and building a more sustainable and competitive business model.

The starting point is a responsible approach based on the Ellen MacArthur Foundation principles to:

- Design out waste and pollution (design for circularity)
- Keep products and materials in use (at their highest value)
- Regenerate natural systems

The innovation to enable circularity will drive new opportunities for growth, greater resource security and sustainability and a more competitive economy. However, this cannot be achieved by sectors in isolation and therefore will require cross-industry and authority co-operation and collaboration globally to establish the economic and legislative framework and realise synergies.

A true circular economy employs reuse, refurbishment, remanufacturing and recycling to create closed-loop systems by embedding circular principles in the design phase and by minimising the use of resource inputs and the creation of waste, pollution and carbon emissions. In the circular economy 'waste' from one process would be the input for another.

12 For more details, see this overview of concepts with the circular economy: https://www.ellenmacarthurfoundation.org/circular

13 The European Commission, 2015. Communication from The Commission to The European Parliament, The Council, The European Economic and Social Committee and The Committee of the Regions, Closing the loop - An EU action plan for the Circular Economy. Available at: https://eur-lex.europa.eu/ legal-content/EN/TXT/?uri=CELEX:52015DC0614

14 The European Commission, 2019. Final Circular Economy Package. Available at: https://ec.europa.eu/environment/circular-economy/

15 The European Commission, 2019. Communication on the European Green Deal. Available at: https://ec.europa.eu/info/publications/communication-european-green-deal_en

16 The Ellen MacArthur Foundation (launched 2010). Available at: https://www.ellenmacarthurfoundation.org/our-story/mission

17 The United Nations, 2015. The Sustainable Development Goals. Available at: https://sustainabledevelopment.un

The existing linear economic model of 'take, make, use, dispose' is neither innovative, nor sustainable. Current estimates are that we are using the world's scarce and non-renewable resources as if we have several planets at our disposal. In 2023, six of the nine planetary boundaries were transgressed, which suggests that Earth is now well outside the safe operating space for humanity[18].

For EFPIA, circular economy is a value chain model in which we maximise the lifetime of resources across value chains and reduce unnecessary waste and minimise environmental impacts. So, moving towards a circular economy offers opportunities for entirely new business models, where products are designed to have a longer or multiple lifecycles. It also offers opportunities within pharmaceutical value chains, example giving through working on suppliers' partnerships focusing on circularity.

So, it is not just about recycling products when they have reached the end of their life or usefulness, it is about designing for circularity. Whilst we aim towards safe and sustainable closed-loop recycling within our industry, where this is not yet feasible, we need to ensure these valuable materials are circulated as secondary raw materials for other sectors wherever possible and for as long as possible. The circular economy is driven by design and its aim is to create value within all phases of a product life cycle shown in the diagram below: identifying opportunities and guaranteeing continuous improvement in each phase.

In the healthcare industry, those opportunities could be centered around eco-design of products, packaging & devices, and end of life; circulation of products and materials to maximise the value of resources; reduction on reliance on single use plastics, regeneration of natural systems by preserving finite materials and exploring renewable resources and associated services; suppliers and customer engagement for equipment return.

Indicative circular economy opportunities available to the pharmaceutical industry

	RAW MATERIALS	DRUG PRODUCT	DEVICES	PACKAGING
1. Raw Material	• Non-Hazardous Materials	• Non-Hazardous Materials	• Avoid the use of substances within the device that negatively affect the re-use and recycling of the materials • Certified, Renewable or Recycled Materials	• Avoid the use of substances within the packaging that negatively affect the re-use and recycling of the materials • Certified, Renewable or Recycled Materials
2. Design	• Biodegradable • Green Chemistry Principles • Use approved schemes e.g., Palm Oil	• Biodegradable • Green Chemistry Principles • Dosage optimisation • Maximise Shelf Life	• Reusable or refillable • Use less different materials • Maximise life of the device • Build LCA/DfE into Design Process	• Optimise Packaging Size • Use less different materials • Design to minimise secondary & tertiary packaging • Design for recyclability
3. Production	• Green energy at production facilities • Minimize carbon footprint of production • Maximise mass production efficiency. • Secondary raw materials	• Green energy at production facilities • Minimize carbon footprint of production • Maximise API vs raw material efficiency. • Minimise API emissions	• Suppliers to meet sustainability criteria • Minimise environmental footprint of production • Local sourcing of parts	• Suppliers to meet sustainability criteria • Minimize environmental footprint of production • Local sources of packaging materials
4. Distribution	• Apply Green Logistics • Minimize carbon footprint of distributor(s) • Manufacture at point of use	• Apply Green Logistics • Minimize carbon footprint of distributor(s) • Manufacture at point of use	• Apply Green Logistics • Minimize carbon footprint of distributor(s)	• Local Sourcing • Apply Green Logistics • Carbon footprint of distributor(s) • Reduce use of passive shipper boxes for cold chain
5. Consumption, use, reuse, repair	• Recirculation of solvents • Reuse of catalysts	• Dosage & Pack size optimization • 'Personalised' medicines • Promote Patient Compliance (particularly for Chronic conditions)	• Offer repair options • Minimise waste generated over treatment period	• Maximise efficiency on packaging lines • Reuse transport packaging
6. Collection	• Incineration of Drug product waste • Education of Patient	• Incineration of Drug product waste • Take Back Schemes • Education of Patient	• Segregate waste at source to optimise recycling • Take Back Schemes	• Segregate waste at source to optimise recycling • Consider Take Back Schemes
7. Recycling	• Solvent reuse • Re-use of water for primary rinses • Re-use of bi-products and waste streams for other purposes • Recycling of metals (e.g. PGMs)	• Develop certified unused drug recycling programs	• Clear recyclability signs on packaging • Recycle device materials	• Clear recyclability labelling on packaging • Recycle packaging materials

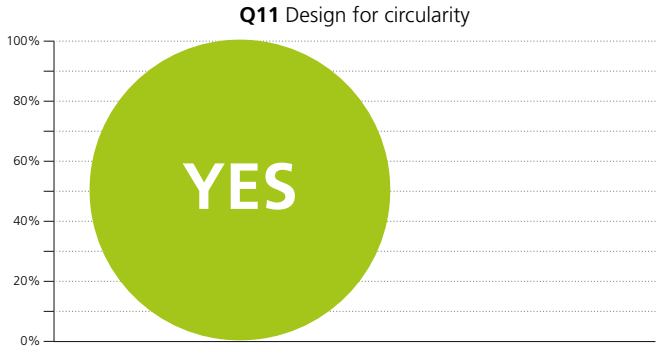
Petri, S., Porkka, M., Rahmstorf, S., Schaphoff, S.,, Thonicke, K., Tobian, A, Virkki, V., Wang-Erlandsson, L, Weber, L, Rockstrom, J., Earth beyond six of nine planetary boundaries, Science Advances, 9(37), doi: 10.116/sciadv.adh2458

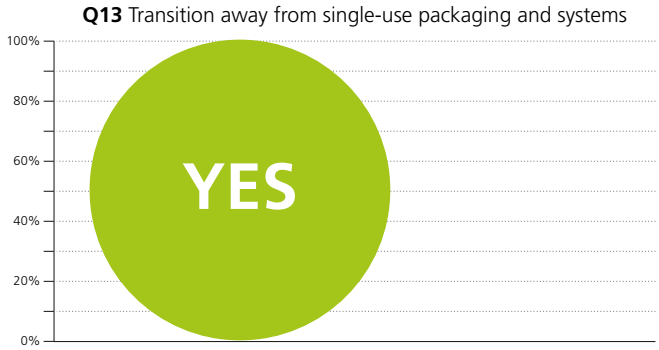
2. Circular Economy is important for the pharmaceutical industry

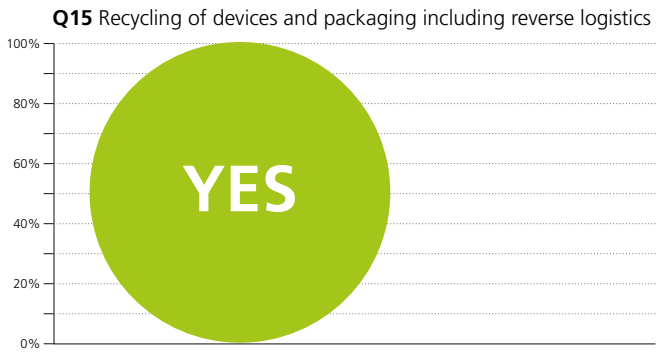
The driving motivation of the pharmaceutical industry is to improve human health and well-being[19]. Environmental protection and human health are interlinked. Reducing environmental degradation and pollution of air, water and soil, reducing the use of scarce resources, e.g. as water in water scarce areas, and limiting climate change to 1.5oC are all goals that will underpin health in the 21st Century[20]. Continued adoption of circular economy principles into the pharmaceutical sector can reduce materials extraction and operational waste, contribute to a reduction in greenhouse gas emissions and the regeneration of nature[21], and safeguard the future supply of medicines essential for patients.

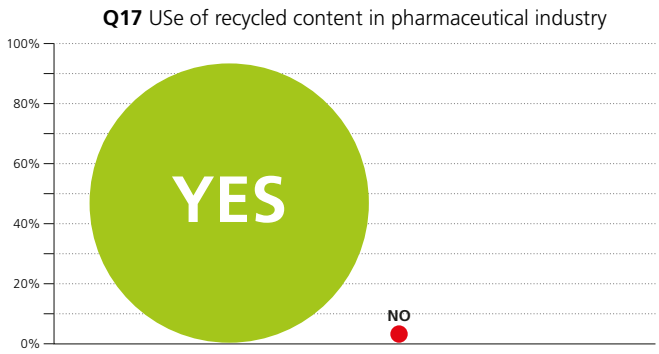
The pharmaceutical sector can adopt circularity at different levels throughout the value chain, such as product design, production process, product use, and end-of-life management.

An EFPIA Survey on circular economy in 2023 indicated that 100% of the respondents are willing to collaborate within areas such as design for circularity, transition away from single-use packaging and systems, recycling of devices and packaging including collaboration on reverse logistics. EFPIA members believe that transitioning to a circular economy cannot be achieved by a single company alone.Instead, we can only drive necessary changes and overcome the barriers through industry collaboration.





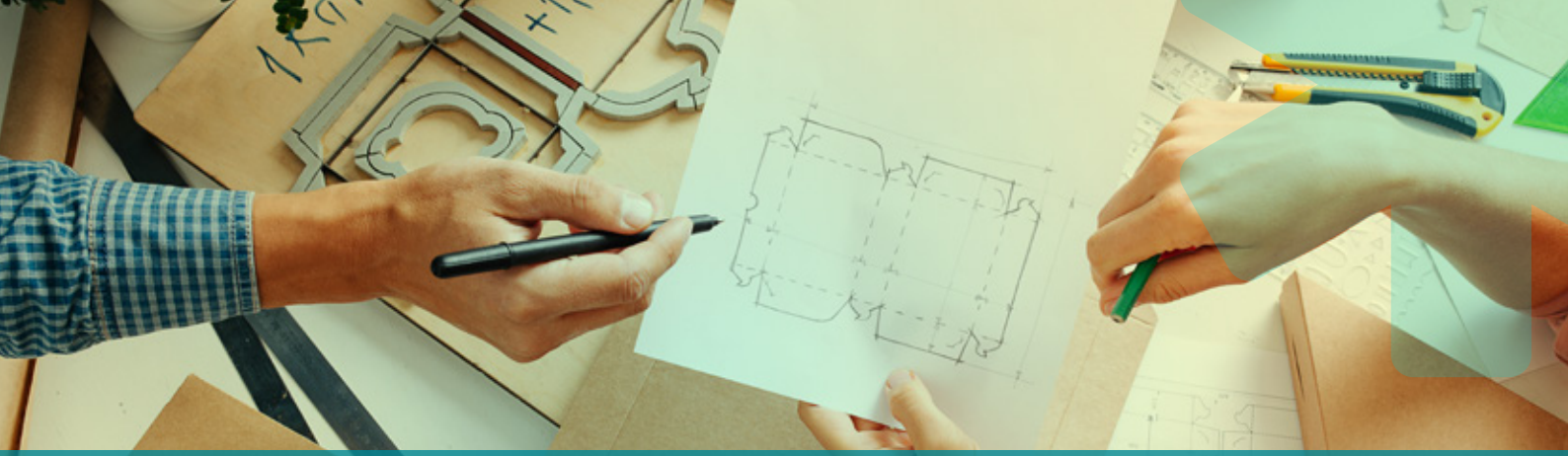




19 EFPIA, The European Federation of Pharmaceutical Industries and Associations, 2018. Building a healthier future for Europe. Available at: https://www. efpia.eu/manifesto/

20 The Ellen MacArthur Foundation, 2019, Completing the Picture https://www.ellenmacarthurfoundation.org/assets/downloads/Completing_The_ Picture_How_The_ Circular_Economy-_Tackles_Climate_Change_V3_26_September.pdf)

21 European Commission, 2020, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions - A new Circular Economy Action Plan For a cleaner and more competitive Europe



Design of products, processes and packaging

In the design phase, minimising input resources, designing products and manufacturing processes to maximise re-use and recycling, selecting materials with lower environmental impact, such as responsibly sourced renewable or recycled materials to preserve virgin resources and maximising product lifetimes is an integral part of the process. For example, EFPIA members already actively apply the principles of green chemistry to select the least environmentally damaging materials and maximise process efficiency. Eco-design principles are also fundamental to drive the development of more sustainable formulations, devices and packaging.

UCB -Green Product Scorecard

The Green Scorecard[22] is a holistic eco-design & continuous improvement approach to score UCB products' environmental performances based on a Cradle-to-grave lifecycle analysis.

With this approach, UCB is looking at all opportunities through the medicines' journey, from early development to commercial production, thriving to minimise its environmental impact.

As of 2023, UCB has deployed the Green Scorecard on medicines covering more than 95% of net sales. Each medicine has its customized environmental target to reach in the next 3 to 4 years.

A few concrete examples of initiatives on different segments of UCB medicines' lifecycle include:

An **Active Pharmaceutical Ingredient** under development demonstrated a decrease of the climate change impact of its manufacturing process by 45% compared to the initial route of synthesis ($kgCO_2e$ per kg API – using Process Mass Intensity metric). This was achieved through reusing and in-house recycling of solvents waste.

- UCB new **biologics plant** in Belgium will consume 22% less water and emit 21% less CO_2e compared to an average biologics plant, on a campus using 100% electricity from renewable sources (mix of produced and purchased) and aiming to substitute 100% natural gas for biomass from waste only by 2030. To date, 100% of our contract manufacturing organization for **devices** have Science Based Targets.
- **UCB laboratories** are undergoing My Green Lab® certification, with the intent of covering all UCB laboratories.
- UCB is increasingly moving its **distribution** from Air to Ocean and is looking at transporting biologic active substances with wider temperature excursion to reduce the weight of the shipments.
- The latest upgraded **packaging** for Cimzia® US reduced its size by 13% and weight by 15% and improved its recyclability by cutting plastic content by 85% - recognized through an eco-design PHARMAPACK Award.

22 https://www.ucb.com/our-company/health-of-the-planet/co2e

Merck - commitment to smaller footprints with Slim Pack - A example of innovation driven by continuous improvement

Slim Pack as a convincing proof point of our commitment to minimising the ecological footprint of our operations. Launched in 2021, requires fewer raw materials, reduces transport volumes and is more convenient for customers and patients as it requires less storage space.

Born through a cross-functional collaboration between Global Healthcare Operations, the Global Fertility Franchise and other functions, Slim Pack is a new innovative package format for Fertility pens used in several Merck healthcare products.

Slim Pack is a compelling example of how continuous improvement can drive innovation and result not only in more efficiency but also in enhanced sustainability.

Slim Pack was designed to reduce the packaging box from 96 x 45 x 215.5 mm to 77.5 x 42 x 157 mm. So, Slim Pack is 40% smaller than its predecessor and it is 100% free of plastic components. Plastic trays holding the pens were replaced by a paper carton alternative.

BioLife Plasma Services, part of Takeda

Plasma donation relies on the use of single-use plastics to ensure a sterile collection process. To keep these plastics out of landfills, BioLife has implemented pilot programs to collect and remediate (i.e. treatment of medical waste to render it non-hazardous prior to recycling it into new products) medical waste in order to create new, useful plastics and products from what previously would have been a waste stream. By remediating this waste, BioLife not only keeps these plastics out of landfills but can also help reduce the amount of resources extracted to make new plastics.

Production process

Optimizing resource efficiency and waste management can be achieved through the use of renewable or recycled energy and water and implementing industrial symbiosis or turning waste into secondary raw materials for other industries is an option for the pharmaceutical industry to minimize the environmental impact of its activities across the entire value chain while also reducing costs in the long run. This approach is already widely adopted across the industry, especially for solvents, water and packaging materials. However, due to the high quality and purity requirements for medicines[23], use of secondary raw materials presents more of a challenge.

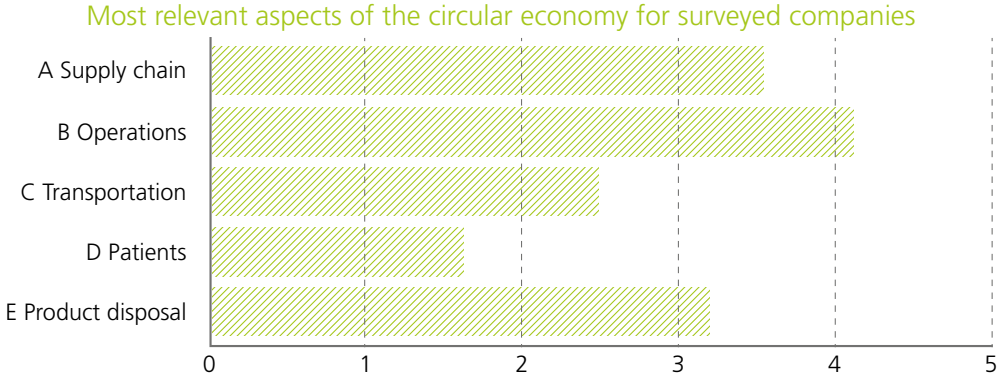
Development of a market for secondary raw materials ensuring materials of adequate and consistent quality and availability is a key area for future industry collaborations. Investment in recycling infrastructure by EU member states and engagement with the EMA is necessary to facilitate this.

Moving to a more sustainable waste management also leads to a reduction of carbon dioxide emissions and negative externalities, by focusing foremost on preventing and reducing waste; promoting recycling of materials, and at last minimising waste on landfills and ending in incineration without energy recovery.

SANOFI - Recycling egg-waste

To produce flu vaccines, the most common method is using an egg-based manufacturing process. In Val de Reuil production site (France), we recycle egg waste as compost for agriculture, generating electric and thermal energy: The egg waste is first sterilized then passed through methanisation process, the residues are then converted to compost, used as an organic amendment in agriculture benefitting to 20 farms in spring & summer. A similar approach has been implemented at our Swiftwater site (US) where our waste vendors are using composting technologies to circumvent landfilling.

The EFPIA Survey in 2023 indicated that nearly half of the companies ranked their own operation as the priority in terms of transitioning to circular economy, but supply chain and end-product disposal were equally important as the second highest ranked aspects.



23 The European Medicines Agency, Quality guidelines. Available at: https://www.ema.europa.eu/en/human-regulatory/research-development/ scientific-guidelines/quality-guidelines%20s

Novo Nordisk - Recycling ethanol on-site

At Novo Nordisk's two largest active pharmaceutical ingredient (API)production facilities ethanol is being recycled on-site to reduce the use of resource and ultimately reduce the environmental impact of the API production.

Ethanol is an indispensable solvent in the production of API at Novo Nordisk. Used ethanol from the API production is being regenerated in distillation columns at the production sites and returned to the API processes after a quality control.

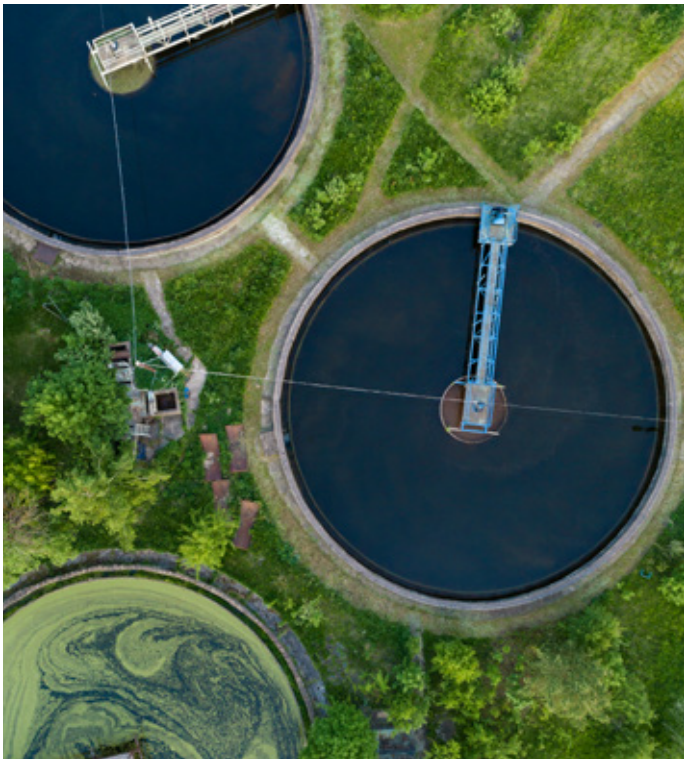
By recycling ethanol at the production site, the amount of new ethanol needed for the API production is reduced by almost 90% (ca. 89% in 2022), which also reduces the environmental impact of using this solvent. Recycling ethanol leads to an annual reduction of approximately 175.000 tons CO_2-eq from the production of API.

In addition, the ethanol waste which is a small amount of left over and the bleed-off from the regeneration process is for the most part sent to Kalundborg Bioenergy for use in the gasification process.

AstraZeneca - Circularity in Facility Water Systems

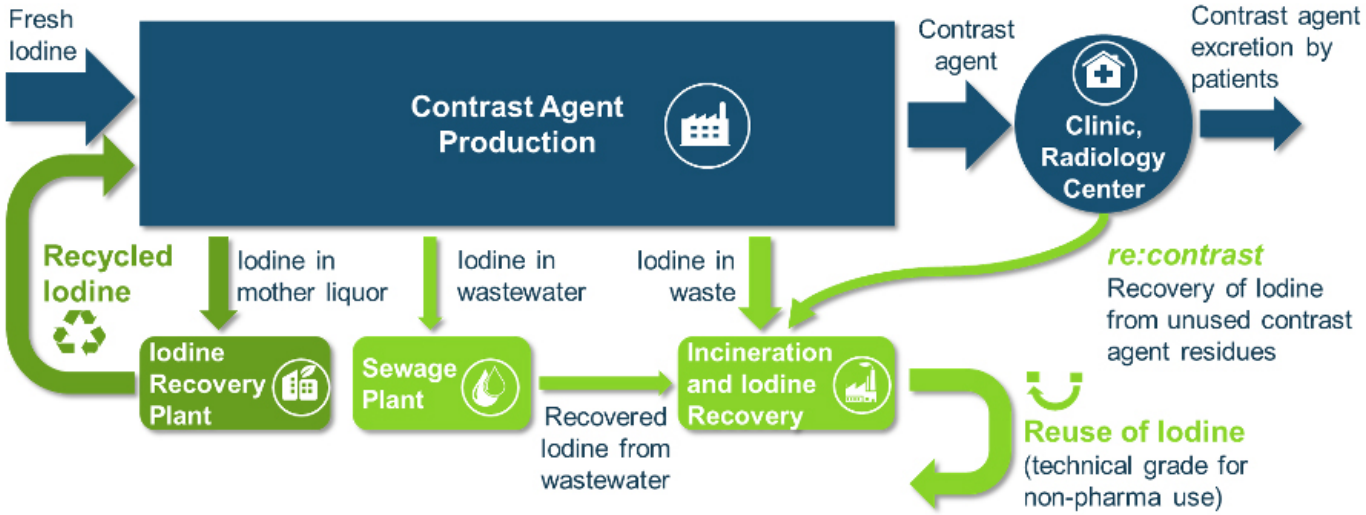
AstraZeneca recognises that adopting circular business approaches and implementing efficient processes to develop and produce their medicines is key to reducing natural resources used in their value chains.

AstraZeneca has identified multiple opportunities to maximise the resources needed within large facilities by applying the circular economy principles, including reuse of treated or rejected purified water for use elsewhere, such as within cooling towers or toilets. In a major Operations facility in Sweden, the condensate and rejected purified water is recycled to produce steam, minimising reliance on the municipal supply. In addition, the heat generated from the onsite wastewater treatment processes is recovered using heat pumps for use elsewhere at the site[24].



24 https://www.astrazeneca.com/content/dam/az/Sustainability/2023/pdf/Sustainability_Report_2022.pdf

Bayer - Circularity at Bayer's contrast agent manufacturing



Circularity offers great potential for reducing wastes in active pharmaceutical ingredients manufacturing, where complex syntheses and highest quality requirements yield large waste streams in relation to product volume.

Iodine is a central element in Bayer's contrast agent in a high-volume product. A responsible use of the resource Iodine has been in focus at the Supply Center Bergkamen in Germany since the 1990s, when an Iodine recovery plant has been established. Since then, the Iodine recovery was continuously extended, from direct Iodine recycling within the production to recovery from Iodine residues in production wastes. The recovered Iodine from wastes cannot be reused in the contrast agent production due to regulations for pharmaceutical manufacturing. Therefore, these technical-grade Iodine recoveries are passed on for external, non-pharmaceutical use.

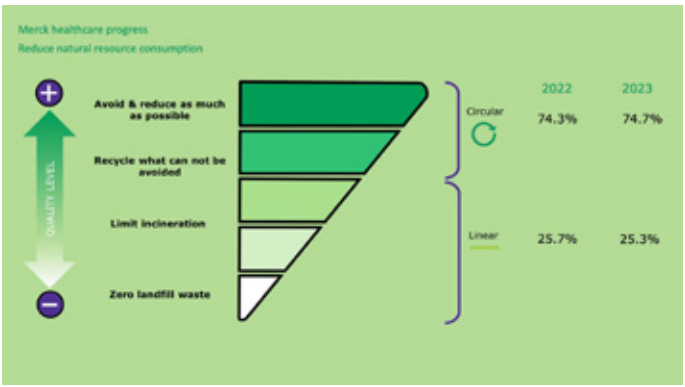
Thus, more than 300 tons of Iodine per year can be recovered from production streams and wastes and introduced to circular value streams. In addition to Iodine recycling from production wastes, the recontrast program offers customers such as radiology centers a return scheme for unused contrast agent residues, closing cycles up to the end consumer. Technical-grade Iodine for non-pharmaceutical use is then recovered from the returned residues in the same facilities where the recovery from production wastes is performed.

The different recycling paths not only improve the ecological footprint of contrast agent manufacturing but also minimise the impact on Iodine resources. Furthermore, a large portion of the solvents used in contrast agent production are recovered at the supply center's own solvent recycling plant.

Merck – say no to landfilling

Merck is actively working on transforming to circular solutions and moving to more sustainable waste management disposal treatments. A few years ago, they have launched Slimpack for their fertility pens. This is a 40% shrink in secondary packaging that is optimized for recycling and that does not contain any plastic.

Since 2022, they have executed zero landfilling programs in their global Healthcare manufacturing network. This has driven landfilling well below 1% (measured as % of overall waste generated).



AMGEN - Circularity in Labs - Turning Plastic Filters and Tubes into Outdoor Furniture

Amgen's Cambridge Massachusetts site, with support from Unity Lab Service (ULS), began participating in supplier's "Filter/Tube Recycling Program", which collects plastic filters and tubes used in labs for recycling[25]. These materials are usually difficult to recycle and are not accepted by many recycling programs, so they have been going into landfills after use. By participating in this programme, we can divert those materials from landfill. After collection, those filters and tubes are processed into recycled material that can be used to produce new products, such as outdoor furniture and decking.

Their participation in the program began as a pilot, in a limited number of labs, in Q3 2023. After only two months we submitted 2 boxes filled with plastic filters, weighing about 7 Kg each. Based on this, they expect to divert approximately 82 Kg. of filters from disposal from the labs currently participating in the program annually. Amgen plans to expand the programme site wide in the near future and to continue their efforts to making our lab operations more sustainable.

25 https://www.cytivalifesciences.com/en/us/news-center/cytiva-and-terracycle-expand-first-of-its-kind-recycling-program-10001

Value chain collaboration

In the circular economy, opportunities are considered to create greater value and align incentives through business models that build on collaboration across sectors, e.g. between products and services. EFPIA members operate global manufacturing, supply and distribution chains and the circular economy will have limited impact if not implemented in collaboration with global partners and stakeholders in the healthcare sector including the point of care. By working together across the sector and within our manufacturing and supply chain, we believe we can advance human health and ensure our use of natural resources is efficient, sustainable and affordable. Hospitals, medical staff, public health bodies, patients and supply chains have an important role to play.

SANOFI – collaborating to recycle Single Use Plastics

Sanofi is building a tripartite project with waste vendor and supplier to implement circular solutions for Single-Use Technologies (SUT) which consumption is sky-rocketing in Biomanufacturing, putting at stake our Pharma trajectory to reduce waste emissions. First historical proof point: together, we have proven the feasibility of mechanically recycling specific SUT used in pharmaceutical production without causing additional environmental impact. The secondary materials hence produced meet high-quality standards and can be reincorporated into SUT manufacturing, advancing sustainability across our supply chain. Next step is to complement with other exploratory innovations & ideally implement closed-loop solutions to reduce incineration[26].

26 https://www.mdpi.com/2071-1050/14/23/15557

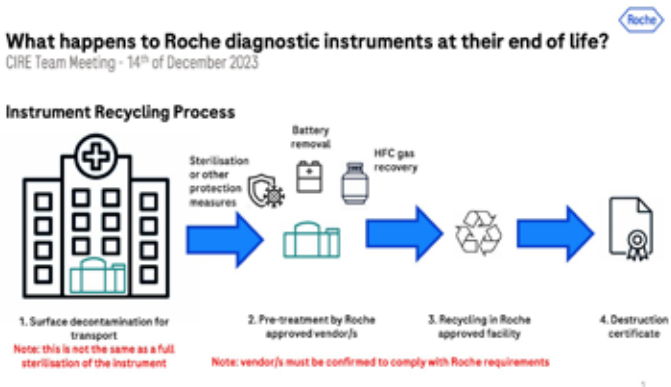
End-of-life management

In the circular economy, no resources end up as "waste", and a number of EFPIA members are actively working with collecting or retrieving products or materials, recycling or recovering value from products or materials, regenerating or repurposing products or materials, preventing or reducing environmental pollution. One of the successful example is the pilot scheme of industry-wide take-back scheme for medical devices.

SANOFI – Blister-free packaging to reduce post-consumer waste volumes

Sanofi designed vaccines packaging by replacing PVC-Alu-blister by a simple card box. This reduces the packaging volume by 50% compared to previous packaging version, avoiding blisters at all. The benefits are manifold: Safe packaging for vaccines in 100% recyclable folding boxes and no plastic waste. This change will be fully implemented by 2027. Currently, we are investigating opportunities to apply this optimized packaging for non-vaccines products using similar devices.

Roche Diagnostics End-of-Life Instrument Recycling Program



Roche places most of its diagnostics instruments with customers via lease agreements, rather than selling them outright, which means that the majority of Roche Diagnostic instruments are returned to Roche affiliates for responsible disposal.

As the average Roche instrument contains roughly 70% easily recoverable metals, such as steel, aluminium and copper, a programme has been established to define a standardised

decontamination/sterilisation and recycling process to ensure worker safety, and environmental protection and support local recycling markets.

Recycling rates of Roche end-of-life instruments currently stand at 73% with the aim is to further increase this percentage over time.

Novo Nordisk, Eli Lilly, Sanofi and Merck - Solving end-of life product challenge calls for collaboration across the industry

Each year millions of injections pens are produced worldwide. After use many end up as waste.

In September 2021 discussions were initiated in the EFPIA Circular Economy Network (EFPIA CEN) on how to collaborate on "solving end-of-life product challenge". Earlier take-back efforts had been discontinued due to lack of partnerships and funding, hence collaboration across the industry is pivotal to succeed.

Based on the take-back pilot returpenTM launched by Novo Nordisk in Denmark, December 2020, discussions were initiated to expand this pilot project into an industry pilot. EFPIA CEN was used as a platform to convene the industry, and transparency was important, while keeping in mind that some of the partners were direct competitors in the market. Hence, legal considerations needed to be in place to ensure compliance.

After careful preparations and analysis across Novo Nordisk, Eli Lilly, Sanofi and Merck the partners signed a cooperation agreement leading to the world's first pharmaceutical take-back industry pilot, which was launched 1st May 2023.

Now, 13 partners spanning from patient organisations to the recycling partner collaborate on recovering injections pens from the Danish market. The ambition level after 1 years pilot is a return rate of 25%, and early return rates are promising.

Together as four industry partners, we want to demonstrate that it is possible to:

- Achieve high return rates
- Achieve economies of scale and lower cost per pen
- Establish back-end process that can recycle partner devices
- Align on shared collaboration and scaling approach

Overall, this case has demonstrated that EFPIA CEN is a strong platform to convene the industry, and that we can perceive the sustainability agenda as pre-competitive across the industry.

Lundbeck - Recycling of Palladium

In the production process of the Active Pharmaceutical Ingredient for one of our products, Lundbeck uses a palladium catalyst to ensure the correct chemical transformation . Palladium is a rare earth metal with a huge climate footprint. In collaboration with an Italian specialist company, Lundbeck has developed a recovery process. More than 75% of the palladium is expected to be recovered and reused in the production process ensuring a CO^2e reduction of more than 142 tons CO^2e/year. A spin-off effect is the possibility of recovering more than 200,000 liters of toluene equivalent to a CO^2e reduction of 300 tons CO_2e/year.[27]

27 Sustainability_Report_2021.pdf.coredownload.pdf (lundbeck.com) page 19

Lundbeck - Recycling of Organic compounds

Recycling of chemical solvents for production of active pharmaceutical ingredients (API) is a strategic effort under Lundbeck's Health Safety and Environment Strategy. In the 2021 Lundbeck recycled 65% of solvents in their own production process of active pharmaceutical ingredients. This not only saves costs but also has an impact on Lundbeck's carbon footprint. If comparing to a similar volume of purchased solvents, the recycling of solvents from Lundbeck's Danish production sites, saves 19.200 tons of CO_2 on a yearly basis[28].

About ten years ago, Lundbeck decided to invest in recycling of solvents and designed a distillation plant for that purpose. The plant was specially engineered to adapt to Lundbeck's production processes. Seven different types of solvents are currently recycled and some of these require additional preprocessing. The solvents are recycled separately to obtain the necessary quality so they can be used in the re-generation of new substances (API).

IN THE 2021 LUNDBECK RECYCLED

65%

OF SOLVENTS IN THEIR OWN PRODUCTION PROCESS OF APIS

28 Sustainability_Report_2021.pdf.coredownload.pdf (lundbeck.com) page 18, 19

Johnson and Johnson SAFE RETURNS program for self-injectable devices

In 2021, Johnson & Johnson relaunched the SAFE RETURNS program in the United States for home-administered immunology products[29], following a full redesign of the program to improve convenience and sustainability for patients. A significant feature of the redesigned program is the removal of the hazardous material classification due to the needle-safe authorisation, thereby eliminating the need for patients to prepare special paperwork for handling by mainstream postal services. Additionally, the new system uses paper envelopes to return the devices after use, instead of bulky plastic containers that were previously used. This program expanded to Europe in 2022 and was successfully launched in Switzerland in April. In parallel, we are developing our capability to disassemble the collected devices from the SAFE RETURNS program to close the loop and reuse or recycle the materials and components, something that has not yet been fully achieved in the pharmaceutical industry.

29 https://safe-returns.ch/home

Chiesi – Take back pilot- Take Action for Inhaler Recycling

Chiesi launched the Leicestershire Take AIR (Take Action for Inhaler Recycling) pilot scheme in January 2021, to enable inhaler users to recycle their empty, unwanted or out of date inhalers safely and effectively through the post[30,31,32]. Any inhaler, brand and type, is accepted. The pre-paid, pre- addressed envelopes are provided by community pharmacies within the area.

The scheme is funded by Chiesi and supported by University Hospitals of Leicester NHS Trust and Leicestershire and Rutland Local Pharmaceutical Committee (LPC).

Inhalers are sent through the postal system, directly to a waste management company, where the component parts of pressurised metered dose inhalers are recycled, and non-recyclable inhalers are disposed of using the most environmentally appropriate process.

Through the scheme, the aluminium canisters are crushed and recycled. The plastic components are recycled into the plastic supply chain and any remaining propellant gas is extracted and reused in the refrigeration and air conditioning industry. Non-recyclable materials are converted into energy through a process called energy-from-waste by high temperature incineration.

Scheme data as of 11th April 2022:

- 147 pharmacies and 3 hospitals participated
- Patients have returned 6,491 envelopes, containing 24,469 inhalers and
- 144 tonnes of CO_2e have been captured

The results from the pilot are being evaluated including quantitative and qualitative analysis, lessons learnt and recommendations for potential upscale through system-wide collaboration. This enables the findings to be shared with relevant stakeholders to support the development of a future sustainable recovery and recycling process for inhalers.

30 https://www.chiesi.uk.com/environmental-responsibility

31 https://www.chiesi.uk.com/pdf/Take_AIR_scheme_poster.pdf

32 https://www.chiesi.uk.com/pdf/Take_AIR_%20scheme_infographic.pdf

The circular economy approach supports a global, sustainable economy and protects production from increased pressure on resources, but it is important to recognise that there are currently barriers to circularity, such as regulatory requirements and safety and quality concerns. We need to find ways to align the incentives and interests of different stakeholders and sectors, and to ensure a fair and just transition for all. Transitioning to a circular economy should be done in a gradual, flexible, and inclusive way. This will require a systemic change that involves not only technological innovation but also social innovation. It will also require a collaborative effort that engages not only governments and businesses but also civil society as a whole.

3. Regulatory Landscape

As a provider of life-saving medicines to the EU market, the pharmaceutical industry is subject to unique, and often strict regulation which may challenge circular economy initiatives.

Whilst the EU Circular Economy Action Plan has improved clarity, it will take time to address conflicting regulatory expectations and allow the pharmaceutical industry to adapt its operating models. The interplay between industry generic environmental regulations impacting during manufacturing[33] (e.g. the Regulation, Evaluation, Autorisation and Restriction of Chemicals (REACH) Regulation[34], Classification and Labelling of Products (CLP) Regulation[35], Packaging & Packaging Waste Directive (PPWD)[36] under revision), product related regulations (EU Medical Device Regulation (MDR)[37], Directive relating to medicinal products for human use[38]) and waste regulations (e.g. Waste Framework Directive (WFD)[39]) leads to challenges to deliver products to our patients while transitioning to a circular economy. As pharmaceutical products have long development times and making changes to products already approved and on the market can take several years, adapting in this complex and dynamic environment is challenging. Early publication of guidance in delegated acts relevant for the pharmaceutical industry is key to ensure EFPIA members can develop and implement strategies responding to these changes in time.

Pushing for implementing environmentally friendly processes

Legislation to underpin the quality of products is critical to the pharmaceutical industry. A dialogue with the authorities e.g. EMA and US FDA will be needed to give confidence that the use of secondary raw materials, where an appropriate risk assessment has been conducted, will be encouraged and not prevented through incompatible priorities and requirements. The current lack of globally consistent quality standards reduce the potential to find a secondary use for recovered solvents and packaging materials, for example, and present barriers for EFPIA members to make use of recovered materials in manufacturing processes.

If well designed and part of a coherent policy approach, the circular economy principles would benefit the economy and environment, assisting a resource-efficient, competitive, and resilient pharmaceutical industry to continue to deliver innovative medicines to improve healthcare. Any decision for regulatory changes must, though, be evidence-based and consider full product lifecycles to avoid unintended consequences.

In response to the EFPIA circular economy survey, 2023, 70% of the respondents identified regulatory requirements as one of the greatest challenges when implementing circular economy initiatives.

33 REACH Regulation 1907/2006, CLP Regulation 1271/2008, PPWD under revision, EU MDR 2017/745, Pharma legislation, WFD

34 Regulation (EC) No 1907/2003

35 Regulation (EC) No 1272/2008

36 Directive (EU) 2018/852

37 Regulation (EU) 2017/745

38 Directive 2001/83/EC

39 Directive 2008/98/EC

To facilitate circularity in the pharmaceutical industry, it is important that innovation (including post-approval innovation) that improves environmental performance, is encouraged . Statements in the new Circular Economy Action Plan show a willingness to address these challenges.

EFPIA is following the developments of the European Commission Circular Economy Action Plan that is intended to further support and accelerate the transition towards a circular economy

- In **March 2022**, the European Commission adopted package of measures proposed in the circular economy action plan, which included:
  - Sustainable Products Initiative, including the proposal for the Ecodesign for Sustainable Products Regulation[40]
  - proposal for empowering consumers in the green transition[41]
- In **April 2022**, the European Commission adopted proposals for revised EU measures to address pollution from large industrial installations
  - revision of the Industrial Emissions Directive[42]
  - revision of the European Pollutant Release and Transfer Register (E-PRTR)[43]
- In **November 2022**, the European Commission adopted measures proposed in the circular economy action plan
  - revision of EU rules on Packaging and Packaging Waste[44]
  - Communication on a policy framework for biobased, biodegradable and compostable plastics[45]
- In **March 2023**, the European Commission adopted
  - proposal for a Directive on green claims[46]
  - proposal on common rules promoting the repair of goods[47]
- In **May 2023**, the European Commission revises the circular economy monitoring framework[48]

We welcome the plans to strengthen the EU market for secondary raw materials and hope for improvements concerning the safety, quality and performance of these raw materials as indicated in the 2020 Roadmap15. Likewise, we expect that the announced modernization of certain waste laws will facilitate the embedding of the circular principles in the pharmaceutical industry.

40 https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products_en

41 https://commission.europa.eu/live-work-travel-eu/consumer-rights-and-complaints/sustainable-consumption_en

42 https://environment.ec.europa.eu/topics/industrial-emissions-and-safety/industrial-emissions-directive_en

43 https://environment.ec.europa.eu/topics/industrial-emissions-and-safety/european-pollutant-release-and-transfer-register-e-prtr_en

44 https://environment.ec.europa.eu/topics/waste-and-recycling/packaging-waste_en#review

45 https://environment.ec.europa.eu/topics/plastics/biobased-biodegradable-and-compostable-plastics_en

46 https://environment.ec.europa.eu/topics/circular-economy/green-claims_en

47 https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1794

48 https://ec.europa.eu/eurostat/web/circular-economy/monitoring-framework

4. How Pharma has contributed to the transition to Circular Economy

EFPIA members are constantly working towards cost-effective and resource-efficient innovations and a shift to a circular economy will see an expansion and acceleration of innovations already taking place across the industry. It is up to the members of EFPIA to find an innovative circular economy approach based on business model options, current legislation and the circular economy principles outlined by the Ellen MacArthur Foundation.

The EFPIA 2023 survey shows that the circular economy is widely prioritized by the industry, e.g. by setting circular economy targets or defining a strategy. The survey also indicates that more than 85% of the respondents are already engaging with suppliers on circular economy initiatives, such as reducing CO^2 emissions by raw material manufacturing and transportation. About half of the respondents have engaged with the Ellen MacArthur Foundation or other organizations that collaborate and share knowledge within circular economy, when in 2020 only two companies were engaged with these organizations. In addition, 10 out of 17 companies responding to the survey had circular economy case studies to share, in contrast to only 4 companies in 2020, which implies that many EFPIA members have been actively working on circular economy initiatives in the last few years.

Providing a clear vision of a circular pharmaceutical industry and sharing best practices of the circular economy between our member companies will help harness the innovation expertise in our sector, facilitating the design of circular principles into products and supply chains at an early stage. The opportunities available to the pharmaceutical industry are illustrated by the activities listed in this paper which will also showcase to our stakeholders how the pharmaceutical industry addresses the circular economy.

Circular Economy opportunities and activities undertaken by the pharmaceutical industry

A Disease Prevention

The pharma industry is increasing its focus to prevent disease and provide cures rather than long term treatment of symptoms with the associated resources usage. Successful development of vaccines, for example to prevent the virus that causes cervical cancer, not only support health and wellbeing but prevent the need for treatment of the condition and thus saves resources.

B Create awareness

It is vital to engage key stakeholders in the pharmaceutical industry to raise awareness and seek opportunities for circular innovation. Patient behaviours in the use and disposal of prescribed medicines will further enable opportunities.

C Product design

The Circular Economy Action Plan has identified that up to 80%[49] of products' environmental impacts are determined at the design phase and this highlights the importance of circularity in pharmaceutical research and development. Given the long development cycles in the pharmaceutical industry, the design stage is even more critical than for fast moving consumer goods. On average, it takes around 10 to 15 years for a new medicine to go from initial discovery to market launch[50].

49 https://www.mckinsey.com/industries/life-sciences/our-insights/fast-to-first-in-human-getting-new-medicines-to-patients-more-quickly

50 https://peghub.org/lca

Johnson and Johnson - Replacing plastic trays to injection-moulded pulp trays

For all markets, the plastic tray containing the self-injectable device of key brands has been replaced with a Pulp Injection Molding (PIM) tray. Extensive testing and evaluation of the material was required to obtain new material certifications and regulatory approvals, as injection-molded pulp has not been used previously in pharmaceutical industry packaging. This was a significant breakthrough in pharmaceutical packaging, particularly since PIM trays can be disposed of through regular cardboard recycling waste streams, available in most countries. Johnson & Johnson aims to convert all the self-injectable device platforms to PIM trays by 2025.

D Dosage
The pharma industry is increasing its focus to prevent disease and provide cures rather than long term treatment of symptoms with the associated resources usage. Successful development of vaccines, for example to prevent the virus that causes cervical cancer, not only support health and wellbeing but prevent the need for treatment of the condition and thus saves resources.

E Product Lifetime
The stability of the product is key to ensuring that patients receive the optimum dose to support their recovery. The pharma industry has performed extensive research into packaging, to extend the shelf life of a product and minimize waste generation. In general, extending the lifetime of products will lower the environmental impact by reducing in product loss but this must be evidenced for example by the Life Cycle Assessment (LCA).

F Logistics
Transportation and distribution are a crucial part of the pharmaceutical industry. For example, thermal shipping systems are commonly used within pharmaceutical distribution to provide a safe transportation of temperature-sensitive products to patients around the world. The thermal shipping system is composed of insulation material e.g., expanded polystyrene (EPS) and vacuum insulation panel (VIP) and cooling elements to provide adequate thermal and mechanical protection for the product. These shipping systems are qualified to withstand temperature challenges that occur during supply chain processes. However, many of these systems have been single-use, members of EFPIA have been working to transition from single-use practices in logistics to a reusable system model, as seen in the example below

Roche: Successful transition to a multi-use Thermal Shipping System for Clinical Distribution in Europe

Each year, Roche sends thousands of products for clinical trials to hospitals and clinics. The use of single-use thermal shipping systems, results in high energy consumption, waste generation, and greenhouse gas emissions, which have a negative impact on sustainability.

To tackle these environmental issues, Roche transitioned from single-use to reusable thermal shipping systems with the implementation of reusable low volume shipping systems for its clinical distribution in Europe. By investing in durable shipping containers and materials, Roche reduces its carbon footprint, minimises resource depletion, and significantly cuts waste generation without compromising the product quality and patient safety.

As an example, there is a significant reduction in CO_2 emissions based on the use of reusable low-volume shipping systems and efficient return logistics. In 2022, more than 50,000 shipments from one of the main Roche clinical supply sites were performed using a multi-use shipping solution. This resulted in a high reduction of material waste compared to single-use.

Roche's transition to reusable shipping systems also has a global positive impact on the healthcare sector, since it encourages deep collaboration between Roche and its partners, and stimulates the growth of networks of return centers for shipping systems.

In the future, further multi-use solutions will be added to Roche's portfolio, with the aim of developing global circular supply chains for clinical and commercial distribution.

G Life Cycle Assessment (LCA)

LCA is a scientifically robust approach to quantifying the environmental impact of a product or process across its full or partial life cycle. LCA is an existing, well-established, methodology that can help identify where the pharmaceutical industry should invest and innovate to improve the environmental performance of the manufacturing and distribution of medicines. It prevents a narrow view of environmental sustainability and allows the opportunity for product principles like the 4Rs (reduction, reuse, recycling and recovery), green chemistry and eco-design to be applied and understand the environmental impacts of new products at all the stages of their product lifecycles. Both the data collected for the LCA, and the assessment results, can help identify the life cycle stages with the largest improvement potential, and also ensure that a circular economy initiative, such as recycling or recovery, is not working against decarbonization or decreasing climate change impacts.

AstraZeneca, GSK, Johnson & Johnson, Novo Nordisk, Pfizer, Roche, Sanofi & Takeda

Under the banner of PEG and the Sustainable Markets Initiative (SMI) Health Systems Taskforce, these pharma companies works to facilitate a universal approach to assessing the environmental impact of pharmaceutical products. This should enable pharmaceutical companies and their stakeholders, including payers, to make informed choices about product development and patient care. The Consortium's outputs will be freely accessible to all pharmaceutical companies and their stakeholders[51].

51 https://peghub.org/lca

GSK - Use of Life Cycle Assessment for informed decision making towards a circular economy

GSK appreciates the complexity of potential environmental impacts of products and processes - both along end-to-end supply chains, and across various environmental compartments spanning the climate, nature and human health spaces. To prevent narrow perspectives on sustainability, Life Cycle Assessment (LCA) is systematically built into key business functions at GSK. Firstly, as a holistic basis for green chemistry and eco-design in product development which considers potential environmental impacts all the way to product use and after-patient disposal. Secondly, as the environmental buy-better compass in procurement. And thirdly, as the tool for evaluation of best environmental practices in operations such as recovery and recycling options. Examples include the selection of cardboard and paper materials, the design of environmentally optimized product packaging, and the assessment of waste-to-energy vs. recovery solutions from a holistic environmental perspective. All these points connect under the concept of a circular economy and are stepping stones towards increasingly circular business practices.

H. Secondary or renewable raw materials

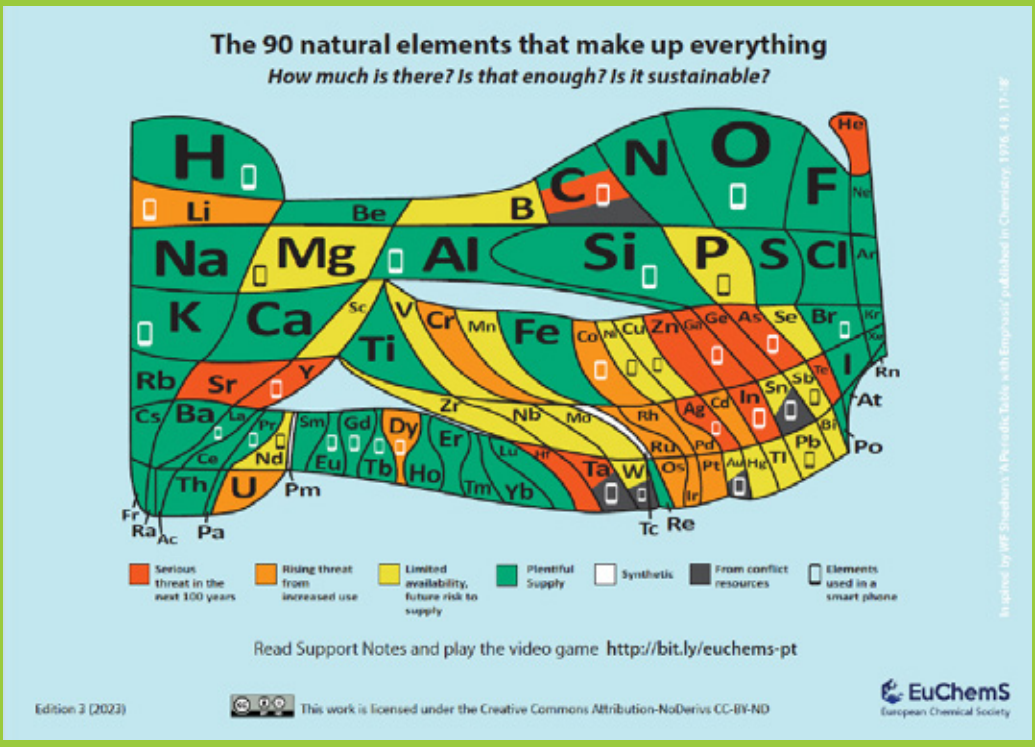
Certain elements that are critical in the manufacture of medicines (e.g. PGMs – the platin group metals) are being consumed at such a fast rate that there is a tangible risk to future supply. These elements are not destroyed but they become widely dispersed and therefore difficult to harvest in meaningful volumes. The pharma industry recognizes that the growing demand for critical elements represents a material risk for the future supply of medicines and that recycling, and reuse are fundamental to expanding the lifetime of raw materials in the value chain.

The periodic table below Is comprised of 90 elements that make everything on Earth. The areas correspond to the number of atoms (on a logarithmic scale) of each element in the earth's crust and atmosphere. The area for some of the elements has been exaggerated otherwise they would not be visible.

The use of secondary raw materials or the re-use of materials directly back into pharmaceutical manufacture can present significant challenges due to the regulatory and safety requirements associated with our products and the technical performance needed from these materials. However, recovery and reuse (which are key principles of green chemistry) of solvents, reactants, intermediates and API is considered acceptable, provided that approved procedures exist for the recovery, and the recovered materials meet specifications suitable for their intended use, for example. Waste materials from the pharmaceutical industry which do not comply with pharmaceutical quality requirements are still often of high quality and these valuable raw materials can be used by other industrial sectors facilitated by strong circular economy partnerships. In certain areas, there are also growing opportunities for the pharmaceutical industry to use secondary raw materials from other sectors, for example, the use of food and farming waste to produce clean heat at some manufacturing sites.

The pharmaceutical industry is committed to maximising opportunities to re-use and recycle materials and to keeping these materials at the highest possible value for use for as long as possible. Collaboration across the industry and with other industrial sectors and, where appropriate, engagement with the EMA and FDA are essential to realise the full potential of this approach. Suitable metrics which focus efforts on re-use and recycling at the top of the waste hierarchy will also help drive improvements.

When choosing raw materials and chemicals it is also relevant to explore if renewable (e.g. bio-based) sources for these materials can be used. Materials of natural origin, especially those on the Science Based Targets Network (SBTN) High Impact Commodity List[52] should be carefully selected and sourced responsibly to avoid any unintended environmental consequences, for example, on biodiversity, deforestation, water use or pollution due to fertiliser use.



52 https://sciencebasedtargetsnetwork.org/how-it-works/assess/

AstraZeneca waste avoidance and plastics: From plastic waste to by-product

At an AstraZeneca manufacturing site in Sweden, several circularity initiatives are improving resource efficiency, including through the recycling of condensate and rejected purified water, heat recovery from a wastewater treatment plant and helium recovery and reuse. In 2020, the operations team at this site also identified an opportunity to turn what was previously viewed as waste plastic into a useful by-product. Previously the use of polyethylene in a respiratory therapy product was categorised as a waste to be recycled. However, the team successfully demonstrated to the regulatory authorities that the residual plastic meets the standards required to be classed as a by-product that can be directly used as a raw material. Following shredding on-site, over 1,000 tonnes of plastic a year is now sold as a high-quality raw material to produce new plastic goods, reducing the need for the production of virgin plastics.

Other opportunities to recycle, re-use or repurpose

waste materials as by-products are actively being progressed across AstraZeneca's site footprint. In 2023, AstraZeneca introduced a new Site Waste Circularity Rate Metric across all sites. Applied together with AstraZeneca's global waste reduction target, this new metric will focus efforts at the top of the waste hierarchy and drive improvements in circularity through increased recycling and the external re-use or repurposing of waste materials[53].

53 https://www.astrazeneca.com/content/dam/az/Sustainability/2021/pdf/Sustainability_Report_2020.pdf

AstraZeneca Developing and manufacturing medicines with clean heat produced from secondary raw materials

The research, development and production of medicines is an energy-intensive process. In 2023, as part of AstraZeneca's transition to net zero, AstraZeneca entered into a series of innovative partnerships, which are decarbonising AstraZeneca's operations, expanding access to renewable energy and contributing to the circular economy. In the UK and the US, AstraZeneca will use renewable natural gas (RNG), or biomethane, to supply clean heat to the company's sites[54].

A partnership with Vanguard Renewables in the US will transform food and beverage waste and dairy manure into RNG. The first-of-its-kind collaboration will deliver the equivalent of the energy required to heat over 17,800 homes – so reducing AstraZeneca's environmental footprint. This partnership is using methane which would otherwise go into the atmosphere and will produce a low-carbon fertiliser, thereby helping to enhance the circularity of the farming sector.

In the UK, AstraZeneca agreed on a partnership with Future Biogas to establish the first unsubsidised industrial-scale supply of biomethane. The plant will contribute to the development of a circular economy and support UK farms with sustainable land management practices by transforming crops grown locally as part of diverse crop rotations into RNG. This supply of green gas will power sites in Macclesfield, Cambridge, Luton and Speke and supply more than 100 gigawatt hours (GWh) of biomethane, equivalent to the heat needs of more than 8,000 homes.

These first-of-their-kind collaborations are providing a blueprint to accelerate emissions reductions in other industrial sectors.

54 https://www.astrazeneca.com/media-centre/articles/2023/powering-emissions-reductions-clean-heat-renewable-energy.html

5. Prospects of circular economy in pharmaceutical industry

In EFPIA, we are already working to transition into a circular economy as seen by examples above, but we need to work together alongside policy makers and other stakeholders of our industry to remove barriers and untap the full potential of the circular economy in the pharmaceutical sector.

It is therefore essential to accelerate building the ecosystem within the healthcare sector to ensure the entire value chain is capable and equipped for the full transition too. We recognise that we have a long road ahead, but circular innovation resulting from the electronics and consumer packaging sectors can help pave the way in front of us. As the pharmaceutical sector, we will continuously leverage valuable learnings from other industries on their circular economy journeys to accelerate our own systemic transitioning towards circularity.

ANNEX 1

Need to know more?

Climate change

With respect to circularity as regards CO_2 emissions and climate changes the approach of EFPIA can be accessed here[55], and survey results here[56]

Chemicals

Likewise, the view of the pharma industry on chemicals, especially hazardous substances in the manufacturing process, can be seen under the heading Chemicals here.

Pharmaceuticals in the Environment

Controlling and eliminating pollution of pharmaceutical active ingredients in the environment has been discussed and analysed thoroughly within the pharmaceutical industry and its stakeholders in recent years. The approach of EFPIA on residues of pharmaceutical products in the environment in general and on antimicrobials specifically can be found here[57].

Take back of unused medicine

In continuation of the discussion on pharmaceuticals in the environment, take-back of medicine is likewise an important issue. Through many years the pharmaceutical industry has participated in unused medicines take- back programs to ensure safety during disposal of unused drugs.

To boost the return of unused medicines, collaboration between medical professionals, pharmaceutical companies and patients is needed to drive behaviour change.

Read more about disposal of unused drugs here[58].

55 https://www.efpia.eu/media/sydk5acr/white-paper-on-climate-change.pdf

56 https://www.efpia.eu/media/gtbncsjc/survey.pdf

57 https://efpia.eu/media/636524/efpia-eps-brochure_care-for-people-our-environment.pdf

58 http://www.medsdisposal.eu/

Disclaimer: This document has been developed under the leadership of the EFPIA Environment, Health and Safety group. The examples included are a non-exhaustive selection which do not represent the full level of activities on climate change being undertaken across our industry.

April 2024

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