PSCI PHARMACEUTICAL SUPPLY CHAIN INITIATIVE
Building responsible supply chains

Sustainable Packaging

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AGENDA

Sustainable packaging

Packaging basics and the case for action

Sustainable packaging

Packaging disposal hierarchy

Sustainable packaging initiatives

Case Studies

Speaker Bio

Zelia Kranich

Sustainable Sourcing Associate Director, Merck & Co., Inc., (Merck Sharp & Dohme outside the United States and Canada)

- Zelia is the Sustainable Sourcing Associate Director at Merck & Co., Inc, where she manages supplier environmental sustainability engagement and the procurement process globally. Zelia has over 25 years' experience in the Environmental field, including managing Estee Lauder and Pitney Bowes Environmental Compliance and Sustainability programs globally. Together with Rikke, she leads the PSCI Environment sub-team, particularly around supplier capacity building and training.

Speaker Bio

Victor Bell

US Managing Director, Lorax EPI

- Victor Bell is a Lifetime Certified Packaging Professional with more than 25 years of experience with environmental issues relating to packaging and products. He is a founding member of the Sustainable Packaging Coalition (SPC) and has served on its Executive Committee. He was also a member of the Consumer Goods Forum GPPS project team and served on the US delegation for the development of the ISO standards for packaging design. In April 2018, Victor received the SPC Outstanding Person of the Year Award. Victor frequently works with brand owners, retailers and packaging producers to develop their packaging sustainability goals, and he also provides techniques and tools to track their progress towards established goals.

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Speaker Bio

Jacqueline Hollands

Global Manager, Customer Sustainability Solutions, MilliporeSigma

- Jacqueline Hollands leads and develops MilliporeSigma's initiatives and programs that meet the sustainability needs for customers. She has implemented product recycling options, such as the Biopharma Single-Use Product Recycling Program and the ech2o™ Lab Water Cartridge Recycling Program. Currently she is working on developing innovative recycling solutions for the life science industry.

Different types and functions of packaging

Primary packaging

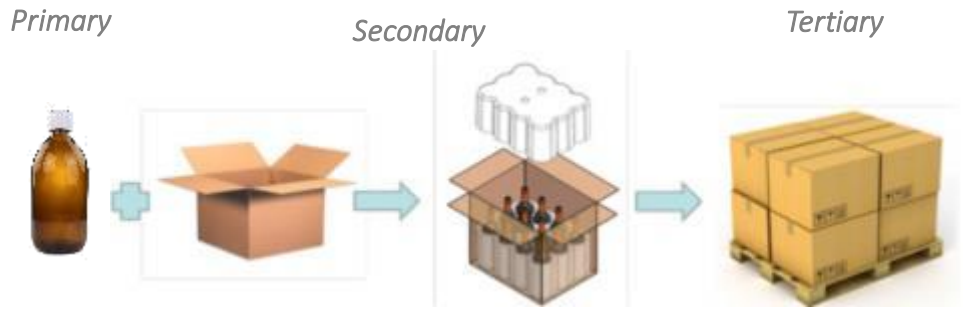
- is the packaging which is in **direct contact with the product**, usually when it is handled by the customer.

Secondary packaging

- encases **multiple quantities** of primary packaging for transit, storage and retail.

Tertiary Packaging

- is used for **transportation and shipping**. Its main purpose is to keep the product safe in transit by protecting the primary and secondary layers of packaging from external influences.



Source (adapted): Packaging system and sustainability (Sustainable Packaging Coalition)

The case for action

Depletion

2x *energy required to produce paper and cardboard, compared to plastic*

42% *of global wood harvest is used for paper products*

324 *litres of water to produce 1 kg of paper*

Pollution

60% *of plastic ended up in landfill or polluting the environment*

8 million tonnes *of plastic escapes into oceans from coastal nations*

400 years *it takes to break down plastic that contain additives to make them stronger and more flexible*

Five actions your business can take now

Step 1:
Check regulatory compliance

Ensure the packaging in your value chain meets the legislative requirements in the countries where it is sourced and disposed. Check all packaging taxes and regulatory filings are up to date.

Step 2:
Packaging sourcing and innovation

Review packaging specifications to determine opportunities for switching to sustainable sources and for recycled and recyclable materials, to develop a more circular flow of packaging.

Step 3:
Waste contractors

Review disposal of packaging waste from your own operations with waste contractors to investigate options for improving recyclability. Set recycling targets and ask for annual reports to track progress.

Step 4:
Eliminate unnecessary packaging

Conduct an audit of packaging used to identify unnecessary packaging used in your processes (including transit packaging) and plan how to avoid its use

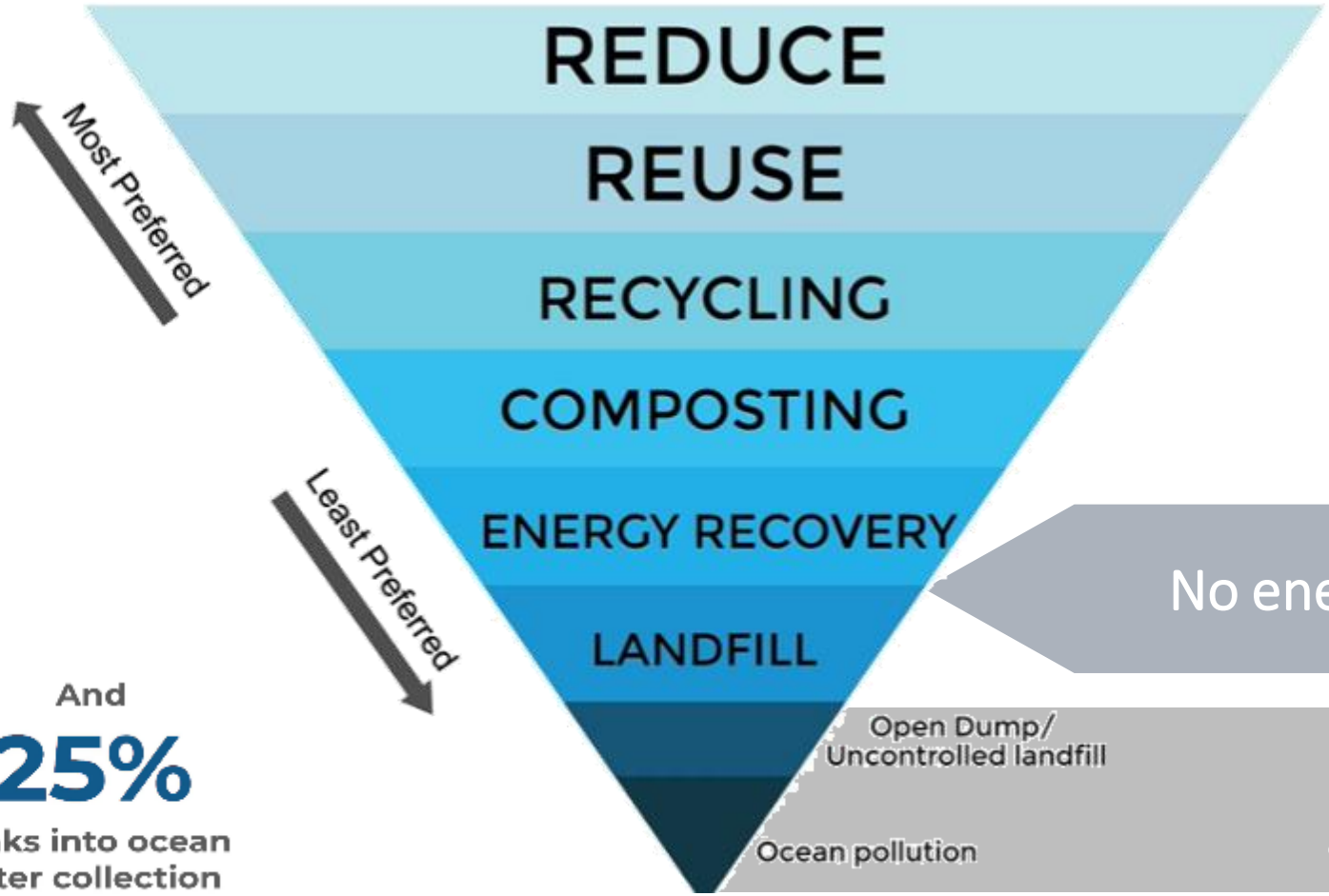
Step 5:
Right-sizing

Work with your customers to explore opportunities for right-sizing the packaging in your shared value chain. This optimization will lead to cost saving opportunities.

Sustainable Packaging Basics

- Easy wins first (ex. non-regulated, previous supplier experience, scalable)
- Reduce packaging size (versus dosage) / eliminate layer or coating?
- Use recycled materials
- Reusable
- Recyclable / ease of recycling
- Environmental certified materials
- Manufacturing process simplification

Packaging Disposal Hierarchy



*Adapted from Zero Waste Europe

Over **80%** of ocean plastic comes from land

And of that, **75%** comes from uncollected waste

And **25%** leaks into ocean after collection

Sustainable Packaging Initiatives – Packaging must still perform!

Recycled Material

- Post-Consumer recycled content (PCR):
  - Designed for Recycled Content Guide

Recyclable

- Mono-materials
- Easy separation
- Larger size
- Recycling claim on package / instructions
- URL to site with recycling directions
- Avoid colorants
- Consider closures, glue, inks, etc.

Reusable and Refillable

- Pallet re-use
- Closed-loop
- Pouches

Alternative / Certified Materials

- Sustainable Aluminum
- Sustainable forest management - FSC, PEFC, etc.
- Bio-based versus petroleum-based
- Avoid unsubstantiated claims of biodegradability
- Eliminate toxic materials / heavy metals

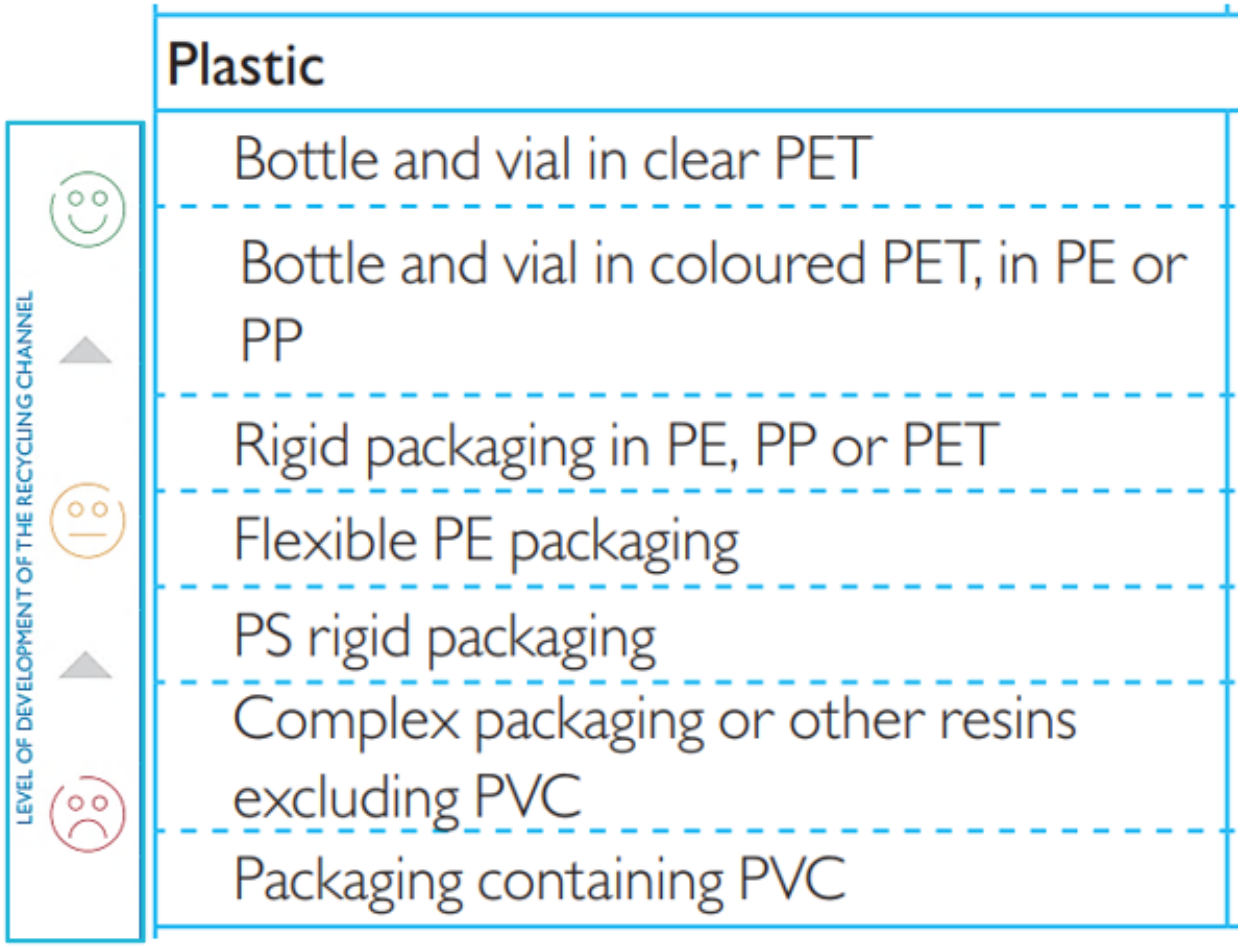
Process Simplification / Material Reduction

- Standardize packaging
- Remove layers
- Avoid inserts
- Reduce unnecessary process steps
- Resource usage reduction – water, energy, etc.
- Source materials locally
- Increase mass / volume per dose
- LCA

Improve recyclability by removing disruptors

- To ensure the recyclability of your packaging, consider moving away from:
  - Black plastic
  - Aluminum on PET blisters
  - Glass bottle with non-metallic cap
  - HDPE with large amounts of EVOH
  - Aluminum can with steel nozzle

Understand the recyclability of different materials



Source: CITEO 2020 rates for recycling household packaging

Tools and platforms

Design	COMPASS® COMPARATIVE PACKAGING ASSESSMENT
Sourcing	RMS; USDA CERTIFIED BIOBASED PRODUCT PRODUCT 95%; FSC MIX From responsible sources FSC® C000000
Material Health	chemsec MARKETPLACE; GREENSCREEN® FOR SAFER CHEMICALS
End-of-life/ Recovery	BPI COMPOSTABLE IN INDUSTRIAL FACILITIES Not suitable for backyard composting. CERT # SAMPLE; Empty & Replace Cap PLASTIC BOTTLE how2recycle.info

Using recycled content improves GHG profile

- Redipoint® GHG Coefficients for using Recycled Content
  kg CO_2 eq per kg of material

Redipoint Coefficients	10% recycled content	50% recycled content	100% recyced content
Glass	**1.051**	0.855	0.660
Metal - Aluminum	**18.178**	10.209	2.240
Paper - Bleached Corrugated	**0.788**	0.666	0.544
Paper - Unbleached Corrugated	**0.749**	0.683	0.617
Paper - Bleached Paperboard, coated	**1.366**	1.155	0.943
Paper - Unbleached Paperboard, coated	**1.284**	1.085	0.886
Paper - Incada	**0.366**	0.329	0.293
Paper - Invercote	**0.220**	0.206	0.192
Paper - Stora Enso	**0.324**	0.302	0.280
Plastic - PE	**2.094**	1.947	1.800
Plastic - PET	**3.186**	2.708	2.230
Plastic - Bioresin HDPE	**0.195**	0.172	0.149
Plastic - SAN*	**3.460**	3.460*	3.460*
Plastic - ABS*	**3.600**	3.600*	3.600*
Plastic - High Impact PS*	**3.240**	3.240*	3.240*

Greenhouse gas (GHG) outputs are becoming increasingly important.

A higher use of recycled materials leads to a reduction in GHGs.

Opportunity to lower carbon footprint based on paper material choices

*No recycled content deductions due to a lack of availability

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Case studies

Merck KGaA

- Developed a four-year approach to drive improvement within a complex system.

- Targets set for each goal with the vision to continue to new goals & targets beyond 2024

SHRINK – Reduce amount of packaging

- Mergk KGaA collaborates with packaging, distribution and procurement teams to minimize the amount of packaging that we use to pack and ship our products to our customers.

Redesign of cut disc membranes packaging system

The redesign of the packaging led to a **22%** reduction of plastic consumption. It represents **6,7 tons of plastic saved annually**.

It also improved ease of use for customers.

SHRINK – Reduce amount of packaging

Redesign of Lynx S2S packaging

The redesign of the packaging led to a **57%** reduction of the total packaging weight.

For a customer in Belgium, this reduction in packaging weight reduces annual life cycle greenhouse gas emissions by **79,000 kg CO_2e**, which is equivalent to the CO_2 emissions from combustion of **33,500 liters** of gasoline.

SHRINK – Reduce amount of packaging

Bulk Packaging solution for Millistak PODs

This bulk packaging solution was developed in collaboration with a biotech customer.
It allows to reduce the amount of corrugated packaging **by 24%** and the operator time at reception **by 80%** compared to standard individual packaging.

SHRINK – Reduce amount of packaging

Lower distribution packaging-to-product volume ratio

The redefinition of the range of distribution boxes used at the Strasbourg Distribution Center has led to a reduction of **17%** of the air in the boxes during shipment, resulting notably in reduction of consumption of packaging materials and packaging waste at customer sites.

Ship less air!

Similar initiatives are currently underway at other distributions centers, and we're also investigating other technologies, such as "box-on-demand."

SECURE – Achieve zero deforestation

- We focus on demonstrating responsible sourcing and increasing certified and recycled content of our wood and fiber-based packaging materials.

2019 Deforestation Survey Results

To move toward our zero deforestation target, we conducted our first deforestation survey in 2019.
The results show that **66% by mass** of our wood and fiber-based packaging materials used in our manufacturing plants are aligned with our zero deforestation.

SWITCH – Improve plastic sustainability

- We collaborate with packaging, distribution and procurement teams to select materials and packaging techniques that are more sustainable.

Tackling Polystyrene Usage

We previously used Expanded Polystyrene (EPS) for packing glass reagent bottles for shipment.

We have replaced EPS by molded pulp packaging material for some of our packaging configurations. Today this represents **3,000,000** inserts annually. This leads to a reduction of CO_2 emissions and customers' packaging waste.

SAVE – Maximize recycling

- We focus on developing packaging solutions that can be easily recycled or even reused through specific programs.

Returnable Containers

Our solvents can be delivered to our customers in special **reusable** steel containers.

Our customers can return empty stainless-steel containers to us for refilling, enabling us to significantly reduce the consumption of primary packaging materials.

More than 50,000 containers are in circulation in Europe and in the U.S.

Case Studies: Right-sizing

- FSC Certified
- ½ Box size
- Waste reduced by 90%
- NeO is an innovative technology which replaces traditional freeze-dried vaccine pellets in glass vials with innovative effervescent tablets of vaccine in blister packs.
- Each tablet contains a freeze-dried vaccine virus, packaged in a light-weight aluminum blister. Active vaccine ingredients are the same as the ones used for viral vaccines in glass vials.

Case Studies: Eliminate Layer / Films

Simplifying to a one-piece design (Abilify)

- Annual **cost savings** of more than $2 million
- 70 tons **less paper** per year
- 30% more product per pallet, leading to 30% **less containers shipped** (finished product) and less energy required for shipping

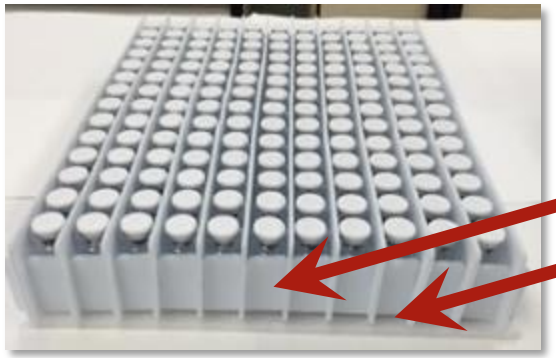
Greener Packaging Materials

Drug Product Bulk Nesting Unit Package (BNU)

Blue Polyurethane Foam

Made With Ozone Depleting Chemicals

Difficult to Recycle & Dispose



NEW Drug Product Bulk Nesting Unit Package

Recyclable Polypropylene Partition

Recyclable Polyethylene Foam Pad

Case Studies: Reduced Environmental Footprint

- **Flame Treatment Elimination**: Pressure sensitive and shrink labels do not require the use of flaming to adhere to HDPE and PP bottles. This makes the flaming process unnecessary. For every 5 million bottles not flamed approximately 3 metric tons of CO2 is eliminated. Flaming calculation tool available upon request to determine reduction in carbon footprint. Opt out and conserve natural gas. Easy way to reduce the carbon footprint since most labels do not require this process.
- **100% PCR**: Resin derived from 100% recyclable post-consumer material
- HDPE Bioresin: Plastic bottles made from ethanol derived from renewable resources (e.g. sugarcane)
  - *In general, for every 1 ton of bioresin used, approximately 3.1 tons of carbon dioxide are captured from the atmosphere on a cradle-to-gate basis.*

Replacing plastic kits by solid board packaging

- The task
  - Replace plastics
  - Postal delivery
  - Continuous use
- Solution
  - Easy to use solid board case with inserts: The lid can be closed on the front side thanks to two flaps which enter the box on the inside.
- Results
  - Eco-friendly solution
  - Easy to use for operator and patient
  - Holds content in place and tidy
  - Folded or mounted

New packaging

Solid board packaging for sensors

- The task
  - Replace existing styrofoam/plastic packaging with a single material
- Solution
  - Single-material easy-to-set up solution without additional inlays
- Results
  - Monomaterialsolution -easyto recycle
  - Easy to set up -higher efficiency
  - Lower cost and lower complexity
  - Winner -World Star and Swiss Star Packaging Awards 2016

Corrugated packaging for eco-friendly cleaning capsules

- The task
  - Replace existing blister packaging to fit product philosophy
  - Child safe
- Solution
  - Corrugated single retail pack for transport and shelf-ready packaging
- Results
  - Child-proof with two-stage opening mechanism
  - Tamper evident but non-destructive seal
  - Avoids unnecessary waste
  - Reduced carbon footprint

Corrugated single retail pack for transport and shelf-ready packaging

- corrugated pack including inserts to secure the product in place

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About the Secretariat
Carnstone Partners Ltd is an independent management consultancy, specialising in corporate responsibility and sustainability, with a long track record in running industry groups.

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