



lc packaging®

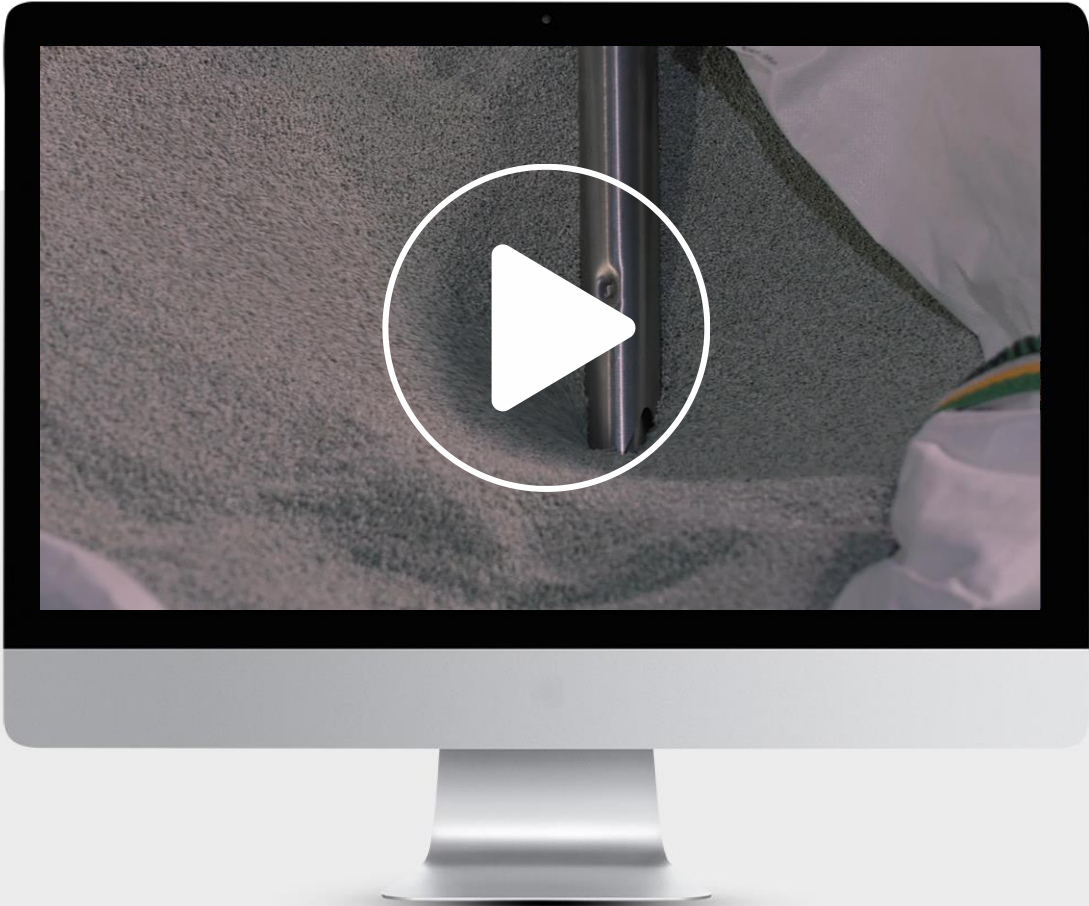
Sustainable FIBC Virtual Conference

Closing the loop together • 19 May 2022

Session 4



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On the agenda



The path to a sustainable, circular future

What does this mean for FIBCs?

09:00 – 09:45 hrs CET



A transforming financial landscape

EPR, taxes and incentives

09:45 – 10:30 hrs CET



The road to implementing circularity

An example from the IBC Industry

10:45 – 11:15 hrs CET



Circular FIBC solutions

Design for recycling, reuse and recycled content

11:15 h – 12:15 hrs CET



Circular **FIBC** solutions

Design for recycling,
reuse and recycled
content

Session 4 – Speakers



Tom Harrison-Prentice

Circular Economy Lead at
LC Packaging International



Sebastiaan Dalmeijer

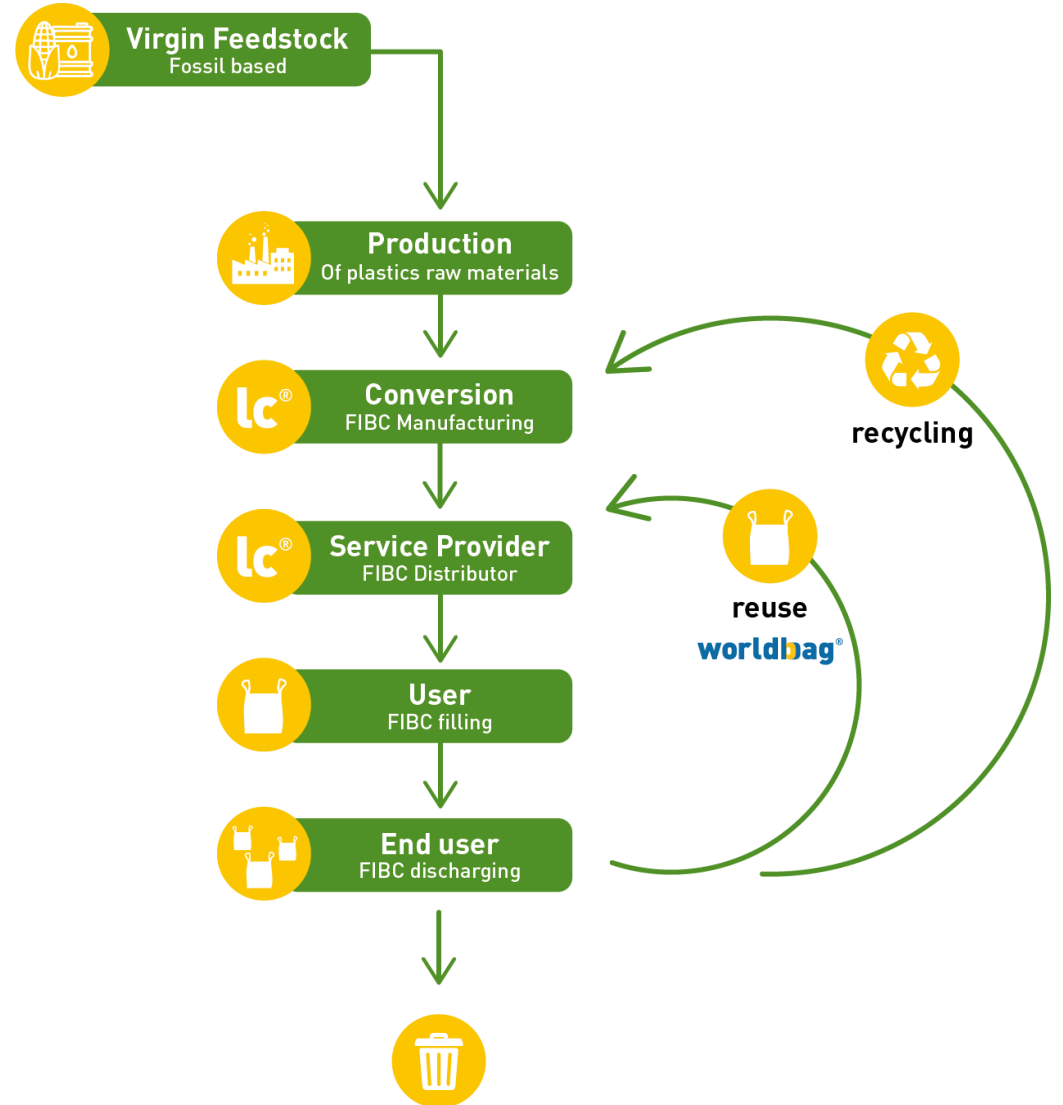
Commercial Lead at
WorldBag



Thorsten Classen

Managing Director at
LC Packaging GmbH

Circular FIBC Solutions





What is needed to reach our ambitions?

50%

Emission
reduction in
production &
Transportation

80%

Designed for
recycling (DfR)

70%

Actually recycled
after use

50%

Use of recycled
materials (rPP)
on average

25%

Of all bags
produced is
reused

About WorldBag

- Specialist in the reconditioning of FIBCs
- Founded in 1995; member of LC Packaging since 2009
- Located in Nieuwerkerk aan den IJssel, the Netherlands
- 2,500 m² reconditioning facility incl. warehousing



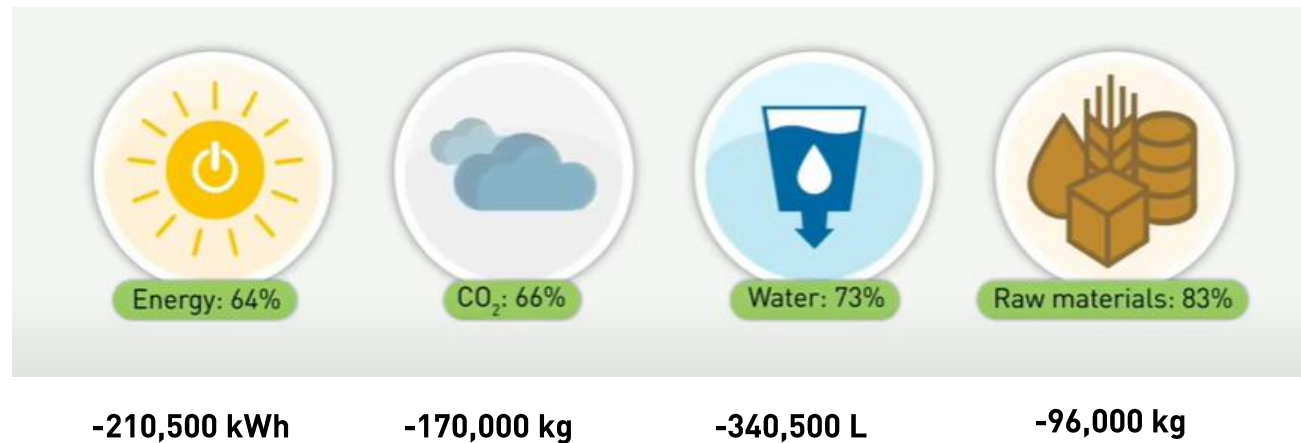
About WorldBag



save the planet: refurbish & recycle

Environmental impact

When reusing 10,000 big bags, 5 times, you save:



Source: external research based on GHG protocol

save the planet: refurbish & recycle

FIBC reuse models

1. Intercompany use



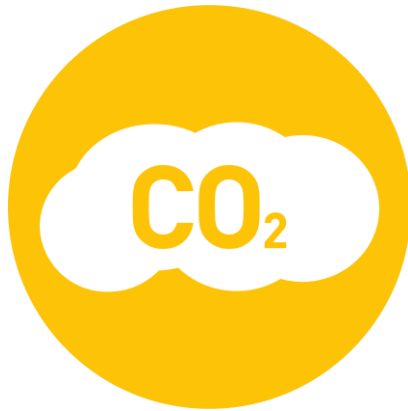
2. From company A to end user(s)



3. Exchange between industries



Benefits of FIBC reconditioning



Minimising environmental footprint



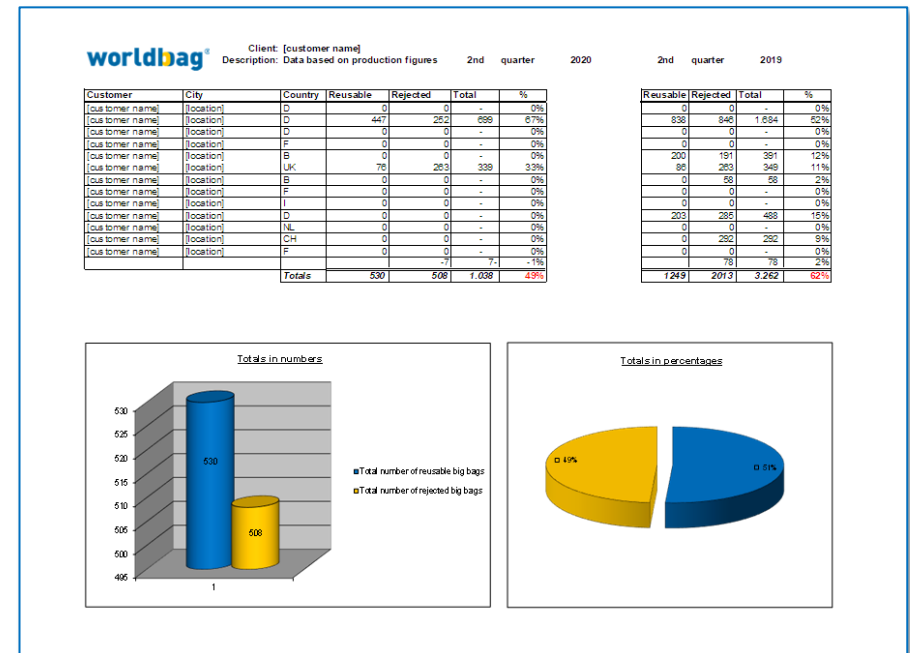
Cost savings



Customer loyalty

Cleaning Process

- Two cleaning lines
- Dry cleaning by filtered air – no chemicals
- FIBCs are checked on pre-agreed control points
- Traceability through signing off
- Quarterly report: FIBCs cleaned / rejected



Potential challenges

Potential challenge



Solution



No support/ low interest from organisation	→	Internal pilot case / customer examples
Possible contamination	→	Re-develop bag design
Small quantities at end users	→	Minimum volume 150 pieces
Commercial doubts	→	WorldBag business case calculation

WorldBag Dry Cleaning Best Practices – Examples



Chemicals - Silica Powder

Internal Reuse



Polymers for Hotmelt Adhesives

End User Pull



Recycled Plastic Granulate (rPET)

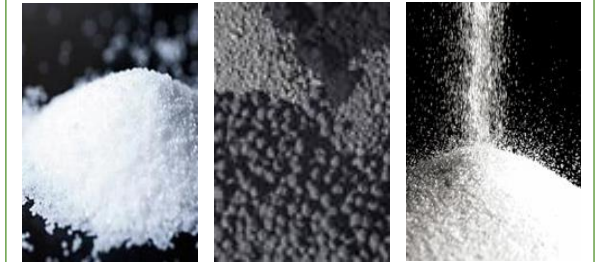
Combined Internal + External



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orion ENGINEERED CARBONS

VENATOR



Pigments

Product Challenges



Internal Reuse: Chemicals / Silica Powders



> Key challenge

- > Collecting of FIBC's (stacking)
- > High rejection (50%): poor condition of FIBCs



> Solution

- > Successful trial run
- > Bag rack system
- > Increase internal awareness: training and communication



> Status Quo



- > Design For Reuse: already implemented
- > Rejection rate decreased to appr. 10 % (after 3.5 y)
- > Advanced Big Bag (high value Q bags)
- > Significant cost savings through reuse



End User Pull – Hotmelt Adhesives Industry



- End user: Hotmelt Adhesives producer with strong focus on sustainability and ambition to significantly reduce their plastic „waste“
- Main lever: emptied FIBCs from raw material supplies such as resins, polymers
- WorldBag project presented incl. potential impact on waste + cost reduction
- Identification of most relevant raw material suppliers + bag types
- Engagement with + onboarding of key supplier as part of the project + Kick – Off

Next Challenge

- Collection

Opportunity

- After cycles of use bags are ready for incorporation into recycling project

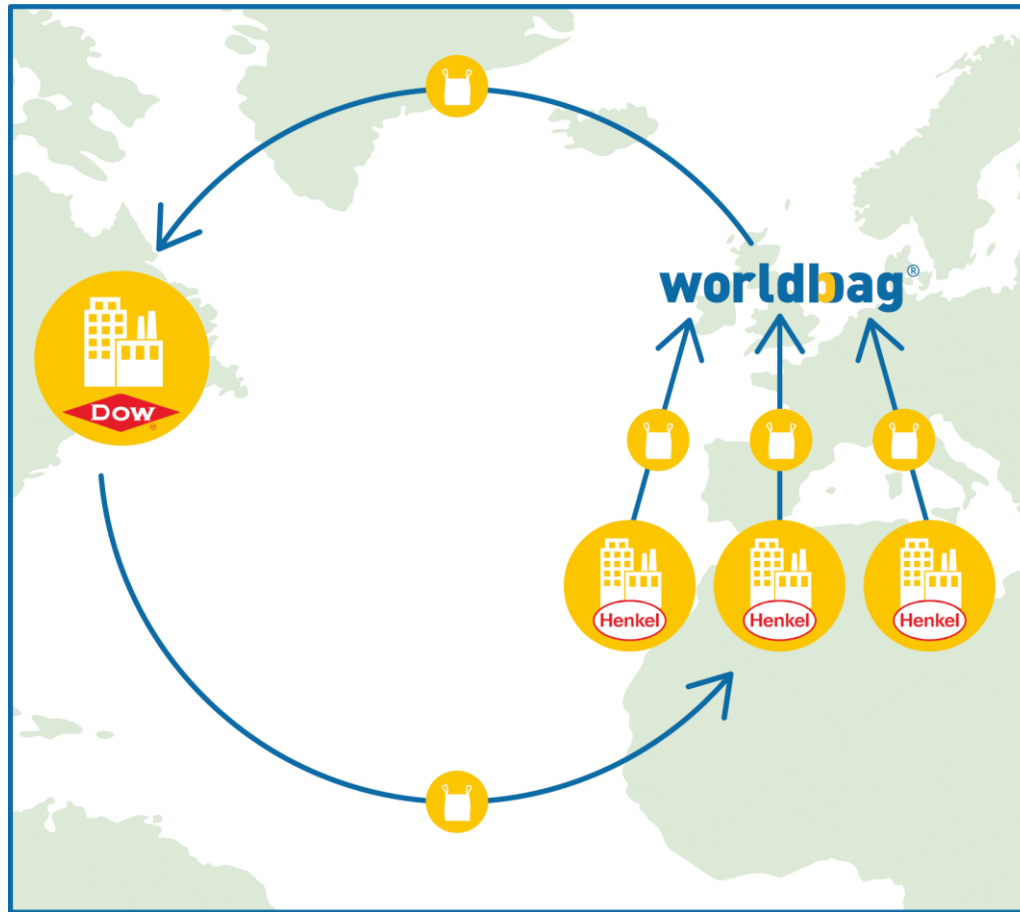
-57%

Reduction of kg CO₂ used

End User Pull – Adhesives Industry



> Business Model



Combined Internal - & External Use: PET Bottle Recycling

With the comprehensive international plastic strategy REset Plastic, the *Schwarz Group* is setting yet another milestone. As the highest-grossing retail group in Europe, it leverages its size and expertise to **develop solutions for sustainable plastic management and to set global standards for resource conservation.** One of the most important aspects of this is that the **responsibility for reusable materials** is never relinquished.

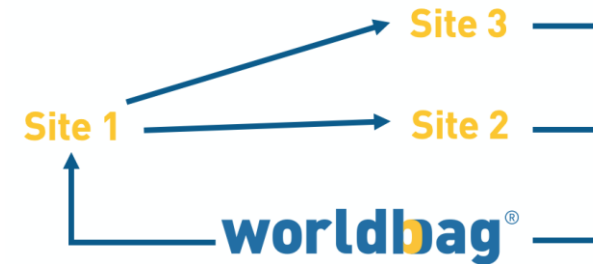
OUR GOAL IS TO MAKE 100% OF OUR PRIVATE LABEL PACKAGING MAXIMUM RECYCLABLE BY 2025.

OUR GOAL IS TO USE UP TO 20% LESS PLASTIC BY 2025.



Combined Internal - & External Use: PET Bottle Recycling

- **Market:** Bottle-to-bottle recycling
- **Products:** PET Flakes + PET Granulates



Business Case(s)

- FIBCs as intermediate stock used internally or flake shipment other processing plants
- As **packaging for PET granulate for bottle preform maker**



Savings potential: appr. 12 % of total spent vs. single use (after y1 full cycle)



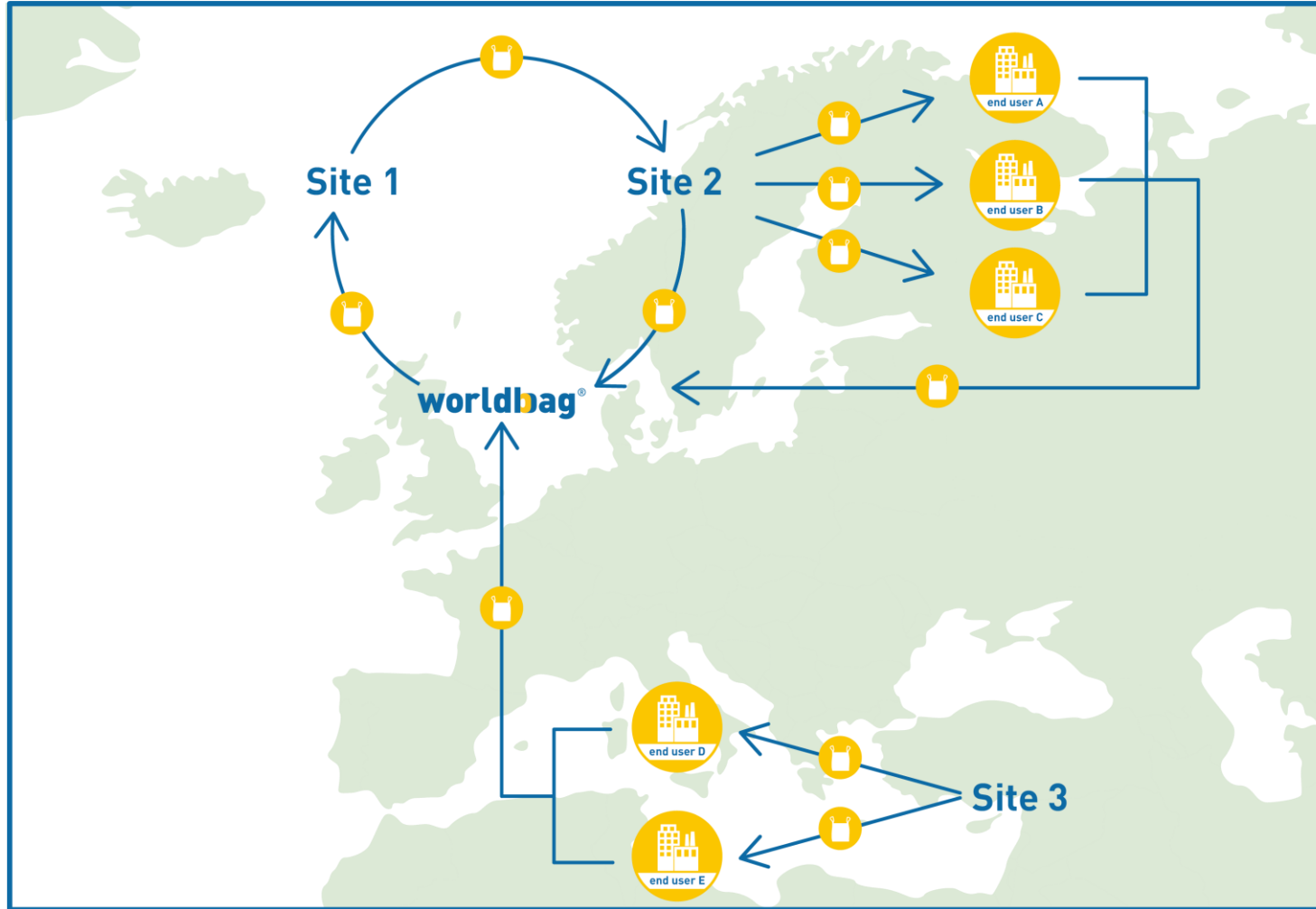
Pigment Industry



- **Market:** pigment industry, e.g. Carbon Black, TiO₂
- **Business Models**
 - Internal Use
 - External End User, even cross continent shipments



Pigment Industry – Business Models



Pigment Industry – Success Factors



- Early involvement of Marketing
- Portfolio alignment – complexity out
- Basic technical feasibility study as kick off
- Clear and joint definition of milestones + Joint Business Case preparation



Pigment Industry – Challenges



- Logistics Pick Up / Collection

- Powder Characteristics
 - Fine particles
 - Sticky
 - Dusty
 - Electrostatic characteristics
 - Heavy dust accumulation during cleaning process

- Optical Appearance / Aesthetics



Upgrade Cleaning Technology

Prototype 1

- Closed in- and outlet air system
- High air pressure rotating nozzle
- High pressure blowing and suction in same step
- Closed cell for dust control



Prototype 2

- Closed outlet air system
- Control inside dust accumulation
- Simultaneous air blowing and suction
- Mobile device



Design for Reuse – ERL project

- ERL: Easy Release Liner
- Reuse of liner bags – chemical & food industry

Benefits:

- Environmental impact by reusing outer bag
- No contamination risk initial filling product
- Mono material for recycling



FIBC Washing



FIBC Washing - Process Steps

- Preparation & Sorting
- Washing
- Drying
- Final Quality Inspection
- Optional Liner Exchange



FIBC Washing - Quality Inspection



➤ **Example:** FIBC for Tea

FIBC Washing - Packing Finished Bags



FIBC Washing - Potential Defects

➤ Loose fibre



➤ Coating



➤ Printing (label)



FIBC Washing - LC Packaging “Design for Washing”

FIBC Wet Washing Project

Background

LC Packaging offers a closed-loop reuse system for used FIBCs through its subsidiary WorldBag (<https://www.worldbag.com/closed-loop/>). FIBCs are collected from customers and their customers, reconditioned, inspected, and returned for reuse. Damaged bags are recycled and replaced by new bags. This way World Bag facilitates the sustainable use of FIBCs.

WorldBag reconditions FIBCs by dry-cleaning, using both blowing and suction of dry air to clean the inside of FIBCs. This can be used in a wide variety of sectors, including chemicals, materials, aggregates and plastics. However, this is not suitable for food or animal feed. Reuse is therefore not suitable for these sectors. To address this, LC Packaging is working together with a partner to introduce wet washing of FIBCs.

Why is LC pursuing this?

LC Packaging has made a commitment to sustainability. LC Packaging is the only FIBC producer with SA8000 and EcoVadis Platinum certification, and has recently announced a 2030 Ambition, including an SBTi-approved emission reduction pledge throughout our value chain, and a commitment to reach 80% of revenue coming from the Circular Economy.

Independent Life Cycle Analysis of reuse at WorldBag shows that reusing a bag 5x delivers a CO2 footprint reduction of 66%, significantly more than recycling. It also reduces the plastic material use. For this reason LC Packaging is investing in expanding WorldBag and developing new approaches to cleaning FIBCs to offer reuse to more sectors in the future.

How does wet-cleaning work?

- FIBCs are collected after use at defined pickup locations. The used FIBCs must be collected and stored properly. FIBCs must be
- FIBC Washing Process:
 - o FIBCs are washed inside a large washing machine. The washing programme and the correct combination of washing products has to be adjusted for each product – this is a technically challenging part, but has been successfully achieved with a sample of FIBCs from Alltech. In general, FIBCs are washed at around 50C for between 30-45 minutes depending on the programme. Depending on the dimensions of the FIBC between 15-40 FIBCs can be washed per load. 3 washing machines are installed for this.
 - o Drying: after washing, the FIBCs must be dried. This is done in a large tumble-drying machine which take between 30-40 minutes. Once dry, the bags are emptied onto a conveyor belt. 5 drying machines are installed.
 - o Inspection and folding: Once dry, the FIBCs are inspected, the moisture is checked, and then closed and refolded for redelivery.



certified for the process of cleaning of FIBCs for food contact, and certified by HYBETA by way of microbiological tests for meeting the requirements of the Robert Koch Institute and Association of Applied Hygiene. The process has been ISO9001 certified.

LC Packaging conducted inhouse microbiological tests. Sensory analysis by the German Packaging Institute (BVI) has also shown there is no transfer of substances. Tests shown there is no presence of harmful substances.

FIBCs have not been designed to be washed. In order to address this, LC Packaging has developed a 'Design for Washing' standard, detailed in the document.

LC Packaging is a family-owned company and international manufacturer and producer of FIBCs with a headquarters based in the Netherlands. LC Packaging has been in the FIBC industry since 1923 and has its own production facilities for FIBCs in Europe, Africa and Asia. With a turnover of 204 million euros in 2021, LC Packaging has offices, warehouses and production facilities in 16 countries, it contributes to a world without waste. LC Packaging specialises in FIBC production and packaging from stock to 29,000 customers in the industrial sector worldwide. In 2021, LC Packaging was awarded an EcoVadis Gold award for the second consecutive year, belonging to the top 1% of all 75,000 companies. LC Packaging also has a high CSR score. The company is particularly recognized for its commitment to safety, quality, and human rights, and sustainable procurement practices.

Design for Washing standard

The standard is for FIBCs that are to be wet-washed. The maximum washing temperature is 50°C, so it does depend on the product filled with the FIBC. Based on the long-term experience of our customers, washing should be possible, keeping the bag shape and strength.

The standard specifies their main dimensional parameters after washing:

The standard specifies a lower shrinkage tendency; however, all FIBCs should be both coated and uncoated. Washing does not require that it has been done with proper adhesive (glues) during the original production.

The standard specifies to avoid seams to end to become curly and fluffy; hence PP

The standard specifies design for washing. Seams with dustproof stitching. The ends of yarns need to be burned well on

The standard specifies that the inner liner must always be separated from the outer

The standard specifies that the printing inks are primarily water-based and should be removed from the bag surface after the first cycle.

The standard specifies that the edges in case of uncoated bags. In contrast, for coated bags, as the proper heat or ultrasonic cutting methods for cuts or skirts on the bag should be hemmed

FIBC Washing



- Suitable for food products
- Dustfree process
- Disinfection
- 100% sterile
- Food compliant process
- Reproducible process



- Water consumption
- High investment in equipments



Future Opportunities

- Multi-Level water reclamation
- Recovery of waste heat

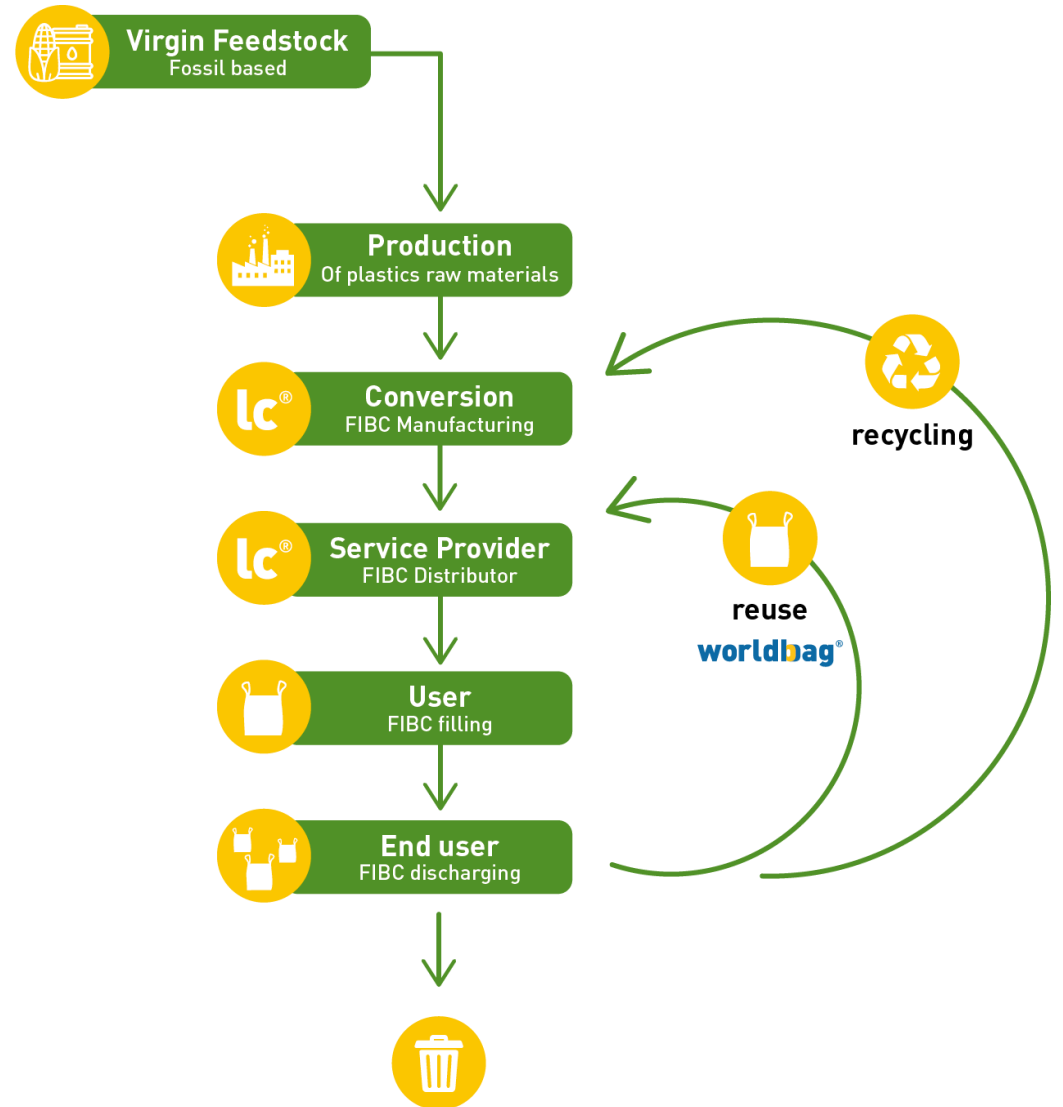


- Dangerous goods
- Inorganic chemicals
- Specific FIBC-models with complex constructions

FIBC Washing - Thanks



Circular FIBC Solutions





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Of all bags
produced is
reused

Designed for Recycling standard



FIBC Design for Recycling standard

Closed Loop

Project MONO



FIBCs made with recycled content



Questions?



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Today's sessions



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