Sustainable Healthcare Solutions through eco-efficient design

Emmanuel Boxus & Martin Fraissler
Borealis



With the support of:

· Sensitivity: External

Introducing Borealis

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Application Development Engineer Healthcare

Martin Fraissler
Senior Application Marketing Manager Healthcare

Borealis GmbH



Key facts and figures

120
Countries. Head Office in Vienna, Austria

6,200
employees worldwide

Production and distribution of advanced and circular polyolefins solutions and base chemicals

Ownership structure:

75%
OMV, Austria

25%
ADNOC, United Arab Emirates

Our JV's: Bayport Polymers (Baystar™) – brings Borstar® technology to American polyethylene markets

Our JV's: Borouge – one of the world's largest integrated polyolefin complexes (Ruwais, UAE)

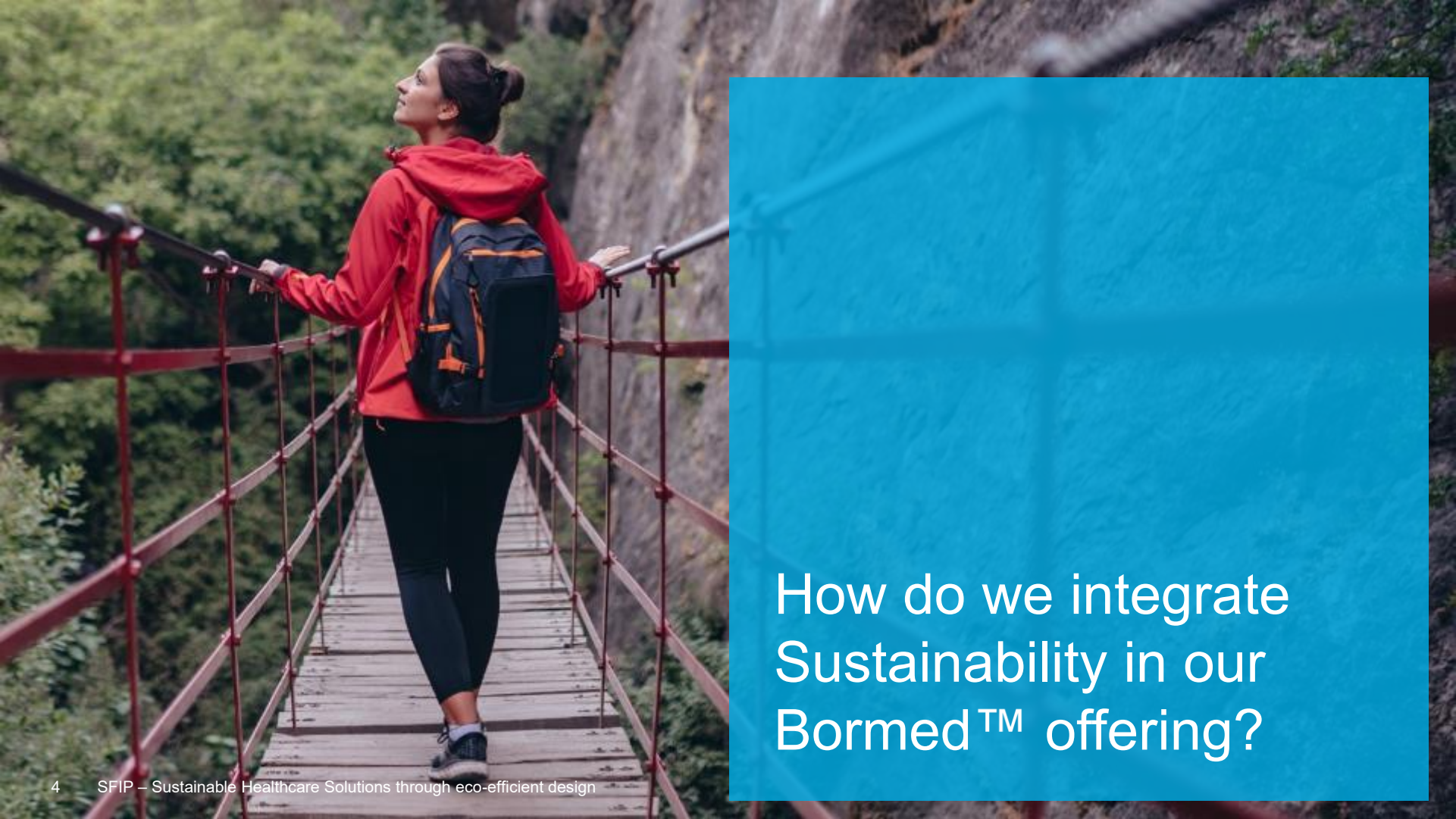
#2
Among polyolefin producers in Europe

EUR 566 million
net profit

121
Priority patents filed in 2024

5
Polyolefin recycling operations in Europe

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How do we integrate Sustainability in our Bormed™ offering?

Bormed™: Borealis portfolio of medical grade PE and PP

Commitment

– Consistency of product recipe

– Continuity of supply

– Bormed Directive (PO-4047)

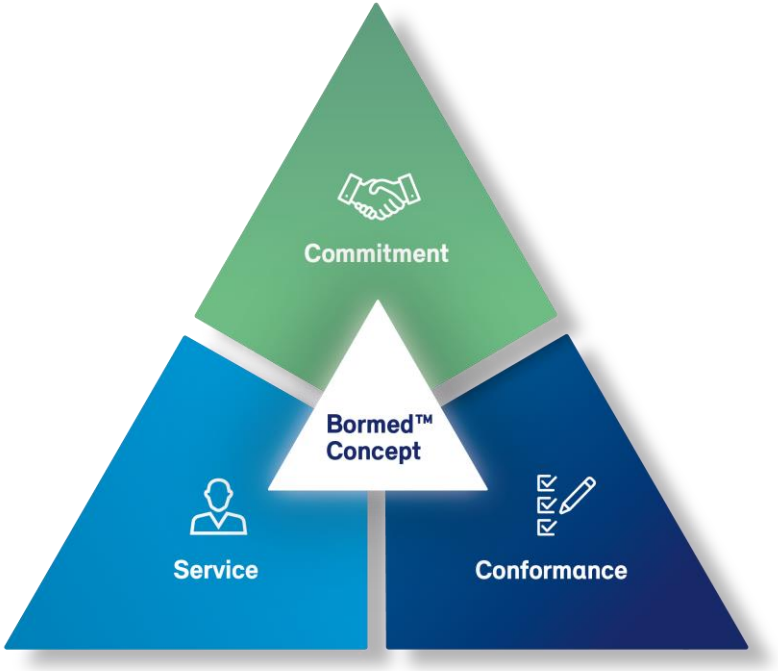
Conformance

– Pharmacopeia compliance

Service

– Extractable profiles / recipe disclosure

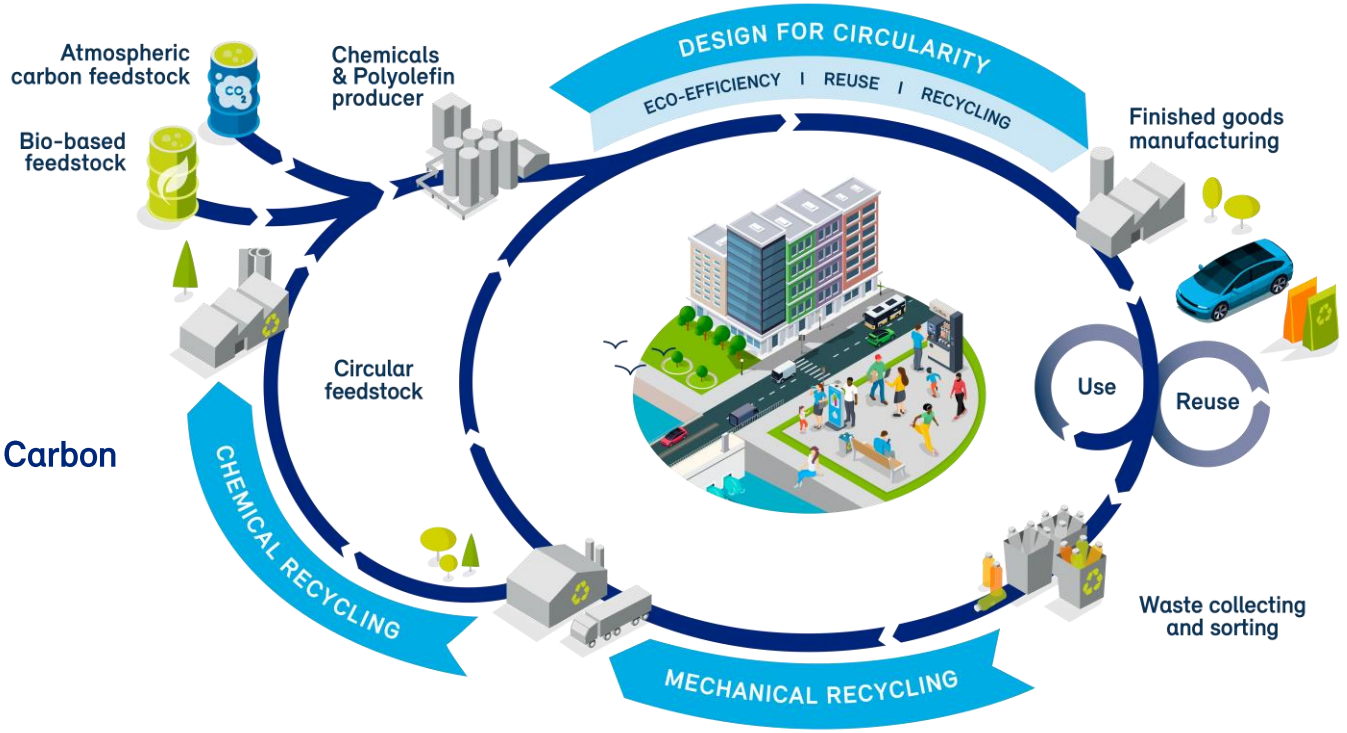
– Global team of technical and regulatory experts



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Borealis is dedicated to enabling customers transition to circular solutions

Our Circular Economy model



A Atmospheric Carbon

B Bio-based

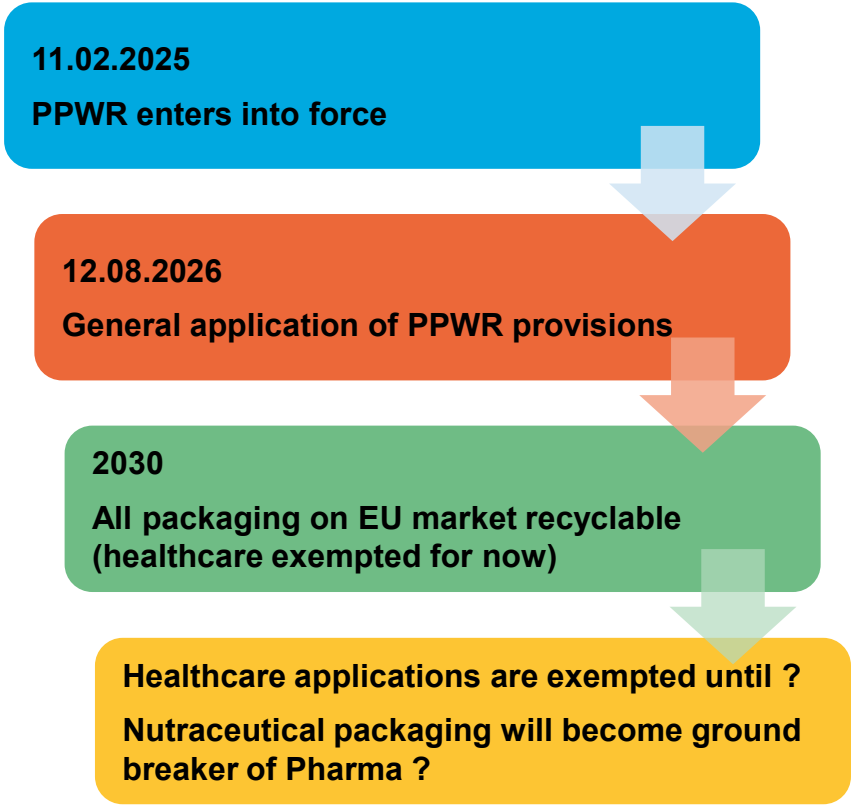
C Circular

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Legislative Context and Changes

Packaging & Packaging Waste Regulation (*PPWR*)

- Replaces corresponding directive from 1994
- Target: Packaging & packaging waste reduction
- Key principle: ***Design for Recycling*** (*DfR*)
- *Post Consumer Recycled* (*PCR*) content becomes mandatory.
- Registered healthcare applications exempted, but:
  - Food contact applications will be within scope
  - Healthcare applications likely to follow



Sensitivity: External



Eco-efficient design guidelines applying to Pharmaceutical blister packaging

PP blister pack, a >30 year reliable and proven solution

Award winning in the past, ready to address present challenges

What are today's renewed challenges?

- Increase package performance, e.g. shelf life
- Environmental sustainability meeting pharma company pledges
- Increased regulatory compliance needs
- Match packaging performance of existing blister forming lines

Bisherige Prämierungen / Awards of the packaging-system

- Österreichischer Staatspreis 1993 für vorbildliche Verpackung
- Gewinner im 18. deutschen Verpackungswettbewerb
- Austrian state award 1993 for exemplary packaging
- Award of the 18th german packaging competition

BUNDESMINISTERIUM FÜR WIRTSCHAFTLICHE ANGELEGENHEITEN

STAATSPREIS
FÜR VORBILDLICHE VERPACKUNG



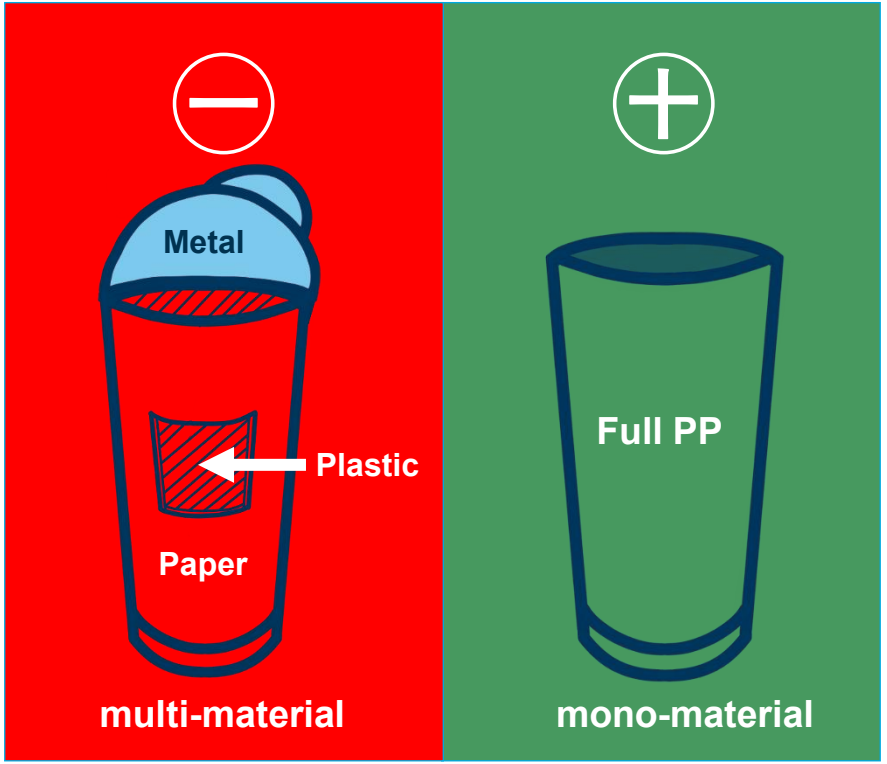
Source: Borealis (PCD) PP mono blister brochure, September 1995

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Use PE or PP whenever possible

For flexible or rigid packaging body

- Mono-material instead of multi-material
- PE, PP & PET: most efficient & widespread
  - Collection
  - Sorting
  - Recycling
- Other plastics: collection & sorting
  - Depending on area
  - Not yet on industrial scale



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Use compatible and separable combinations of polymer types, barrier layers, dyes and adhesives

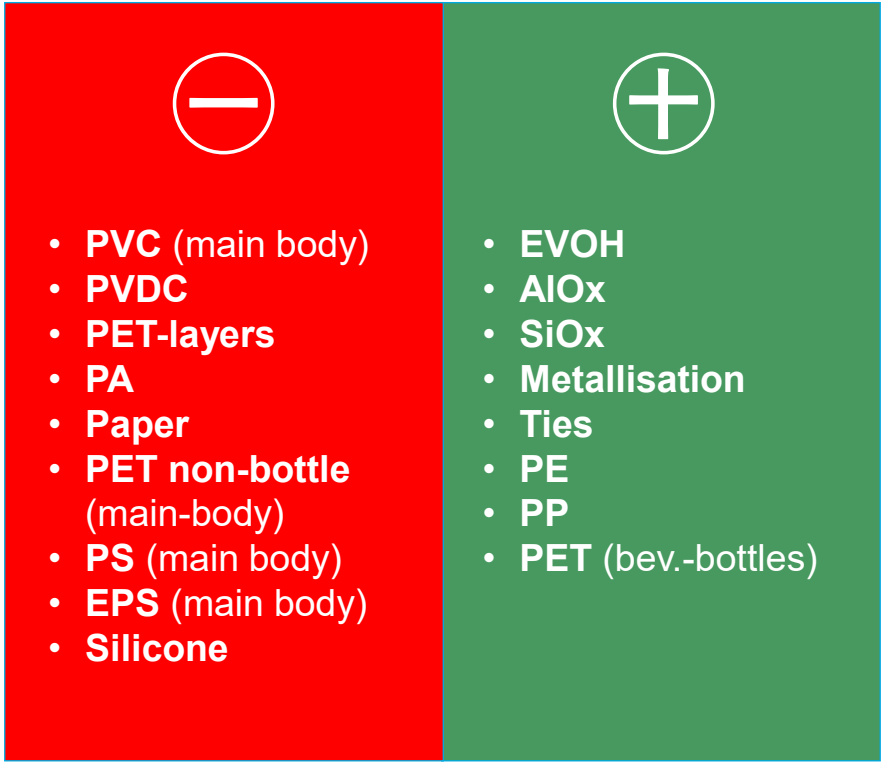
Minimising incompatibilities

- Recyclates with better properties

  => more suitable for second life in consumer goods packaging.

- Incompatible resins may be necessary for application's requirements.

  => design for easy separation from PE & PP recycling streams during the washing process (density differences).



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Aluminium foil as barrier only when easily separatable

Aluminum foil barrier layer

- only when easily separatable from pack to enable aluminium recycling
- Alu recycling: eddy-current separation
- Aluminium foil as inseparable barrier layer is problematic in recycling process.
  - ⇒ **Ensure aluminium foil to be separated from main pack body**
  - ⇒ Or, design for separation of fragments containing aluminium particles

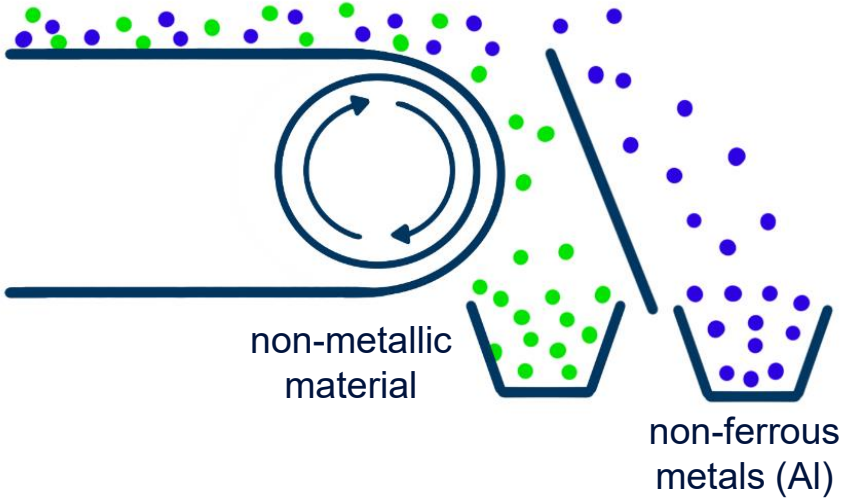


Illustration of an eddy-current separator

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Specific density guidelines for selection of pack components

Polyolefin sorting for recycling

- Water-based float sink: sorting by density

Density influencers

- Foaming agents
- Fillers
- Barrier layers
- metallisation
- Labels
  => design for separation
- Sleeves
  => design for separation

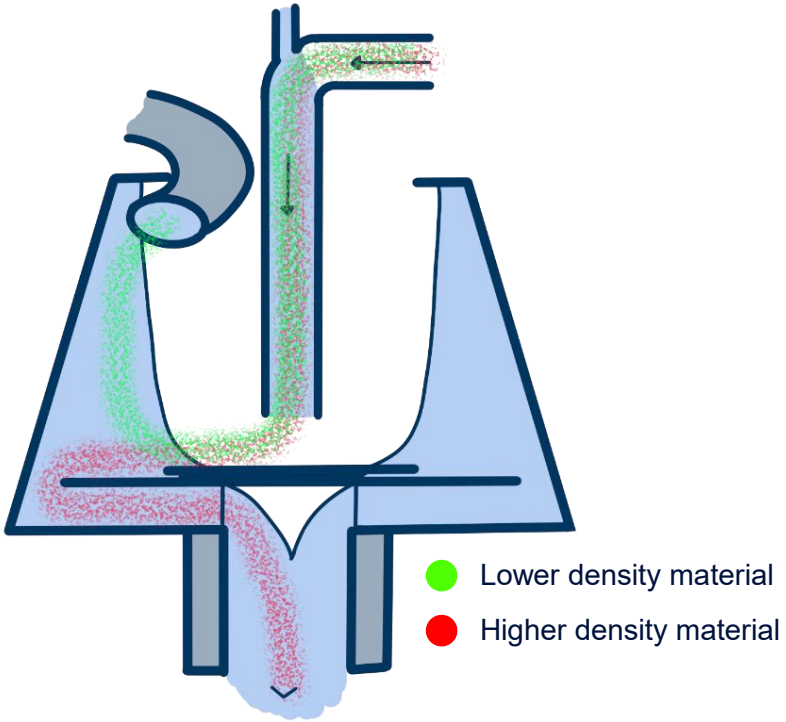


Illustration of water-based density separator

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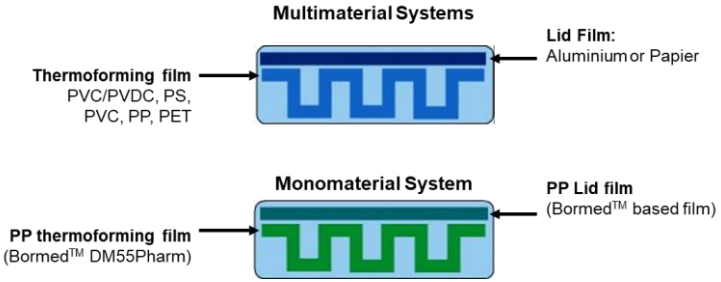
Mono-material polypropylene blister packs

Plastic packaging recycling begins with design

“Mono-material” from one polymer family can enable increase of future mechanical recycling rates

– Design for recycling (DfR) is becoming an aspect to consider for eco-efficient design of healthcare applications which – on the basis of a life cycle approach – needs to carefully and intelligently balance the production, usage, and after usage phases of a product

– DfR means designing a product so it can be collected, sorted, and recycled, by making appropriate material choices and intelligent design decisions



Example: Borealis “mono blister”



- Substitution of PVC/Al blister materials with 100% PP solution
- Key benefit: 70% improvement of carbon footprint vs currently used systems*

*Source LCA University Delft, The Netherlands


EverMinds™ Thinking Circular

BOREALIS Keep Discovering

Polyolefin Packaging Design

10 Codes of Conduct for Design for Recyclability

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Major Needs for Pharma Blister Packaging



NEEDS	PHARMA BLISTER PACKAGING
Physical	• Transparency • **Water-Vapour Transmission Rate** (WVTR) • **Thermoformability** • Push-through • Seal ability • Printability • *(Sterilisable)*

Regulatory Compliance	• Compliance to
	  • EP
	  • USP
	• DMF listing

Sterilization	• *(Steam 121 ℃)*

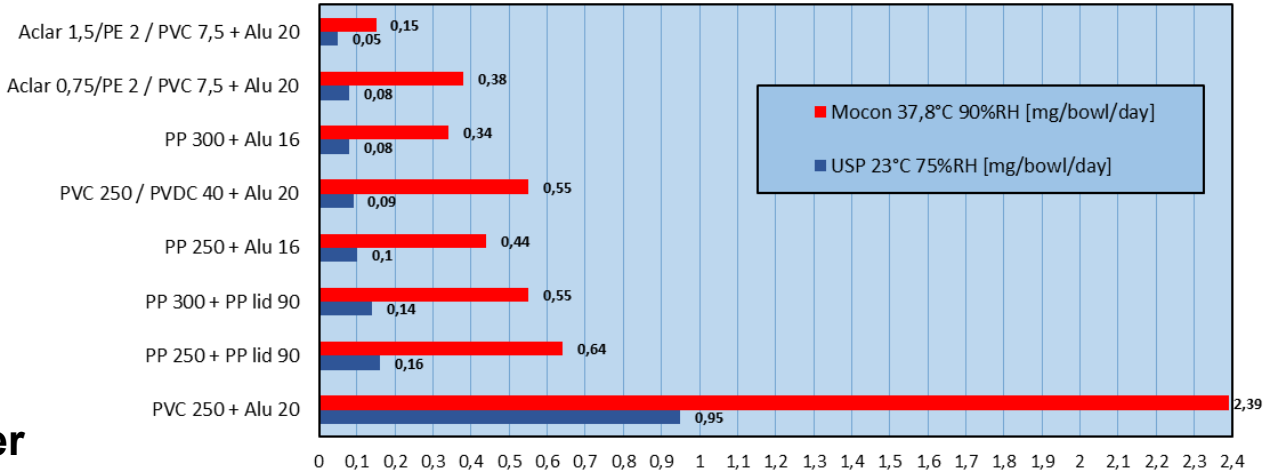
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PP is key choice for blister packs

PP meets the performance needs of blister packaging

- **Low density**
  Reduced
  plastic consumption
- **High rigidity**
  Optimum push through
  & blister integrity
- **High water vapour barrier**
  Optimised shelf life

Comparison of WVTR* of various blister material combinations



**WVTR = Water Vapour Transmission Rate*

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High Barrier PP for Pharmaceutical Blister Packaging

Prototype Testing
in close collaboration with NOVARTIS



BOREALIS

SML Cast Film Coextrusion Line – Innotech Lab – Linz

Exploring the limits for prototype film



Critical to Success

- Film production technology
- WVTR
- Thermoformability
- Optical quality
- Push-through performance
- Seal ability
- Printability
- (Sterilisable)

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Thank you!

Let’s re-invent!

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