



Progress beyond

Enhancing Safety and Sustainability for the Pharma Packaging Industry with Diofan® PVDC





Federico Baruffi

Global Marketing Manager Packaging & Healthcare
Solvay Specialty Polymers

Federico is Global Marketing Manager for the Packaging market at Solvay Specialty Polymers. He is based in Bollate, Italy. Federico holds a Masters degree in Mechanical Engineering from Politecnico di Milano, Italy. He was then awarded a PhD in Manufacturing Engineering by the Technical University of Denmark, where he specialised in micro injection molding for medical devices. He joined Solvay in 2019 and, since then, worked in different technical and marketing positions with the objective of growing different markets, such as the Healthcare and Packaging ones.



Antonio Puppo

Technical Development Engineer Packaging
Solvay Specialty Polymers

Antonio has worked as a Customer Technical Development Engineer since his early days at Solvay Specialty Polymers, in 2012. Before joining Solvay Antonio worked for a printing ink manufacturing corporation covering different positions from R&D to Production. Within Solvay he sustains the development and the technical support of many Solvay's customers dealing with the coating applications of the extensive Specialty Polymers product portfolio, with particular focus on pharmaceutical and food packaging. He holds a masters degree in Industrial Chemistry from University of Pisa

The needs of Pharmaceutical Packaging



SAFETY

- Protect
- Preserve over time
- Ensure efficacy



SUSTAINABILITY

- Low Carbon Footprint
- Lower waste
- Recyclability

Agenda

Our commitment to Sustainable Progress

Diofan® PVDC portfolio for Pharma Blister Packaging

New Diofan® Ultra736 - "Do More with Less"



Conclusion and Q&A





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Our commitment to Sustainable Progress

2030 Solvay One Planet goals

10 ambitious objectives to reduce our global impact

● 2030 Target
● 2022 Progress vs 2018

Climate

Fight against climate crisis



Align Greenhouse Gas Emissions with Paris Agreement & SBTi^{*}
Reach Carbon Neutrality / Scope 1 & Scope 2 by 2040 excl. soda ash, by 2050 incl. soda ash



Reduce by 31%**
10.3 Mt CO₂ 1eq. / Reduced-15% structural

Phase out coal



Exit 5 coal plants
28 PJ/Reduce -15% / 4 plants

Phase out coal



Reduce by 30%
-5%/Reduced / -28% since 2018

Resources

Embed circular business



Increase sustainable Solutions % of Group sales



Achieve 65%
55% / ↑ +5%

Increase circular economy % of Group sales



More than double / 10%
9% since 2018

Reduce Non-Recoverable Industrial waste



Reduce by 30%
56 Kt / Reduce -36% since 2018

Reduce Intake of Freshwater



Reduce by 25%
330 Mm³

Better Life

Improve quality of life



Safety RIIR KPI Reportable Injury and Illness rate



Aim for zero
0.34

Inclusion & Diversity % of women in middle/senior management



Achieve 50% by 2030
26.5% Diversity / ↑ 2.8 pp Inclusion / high participation
Global Employee Share Program

Equity



Publication of gender pay gap in April 2022 and corrective measures in place for 951 people



* SBTi: Science Based Targets initiative
** scope 1&2
1) Biodiversity - year on year

Specialty Polymers Sustainability Roadmap builds on 2 key levers Renewable Energy and Circular Solutions



CLIMATE

We actively drive transition to renewable energy

→ We aim to be carbon neutral Scope 1, 2 by 2040



RESOURCES

We increase circularity with renewable and circular solutions

- Launch Kalix[®] in 2013, Amodel[®] Bios in 2021 and Omnix[®] ReCycle in 2022
- Launch Mass Balance product portfolio from 2023 (Udel[®], Radel[®], Ryton[®], Amodel[®])
- Reach at least 6% of total revenues with circular economy solutions by 2026

We target Carbon Neutrality by 2040

CO₂ Scope 3 upstream initiatives

CO₂ Scope 1, 2 carbon neutral by 2040

- Process energy efficiency
- Solar and wind electricity
- Biogas
- Electric boilers

By 2024, all our compounding facilities will be carbon neutral thanks to transition to renewable electricity.



Wind and
biomass
India



Solvay Solar
Facilities
United States



Solvay Solar Facilities
France

Solvay Specialty Polymers Ambition

- Mass balance bio/circular attributed content
- Bio/recycled based materials
- Engage our suppliers
 - Sustainable procurement & sourcing initiatives launched to collect primary data and open the discussion



CLIMATE



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Diofan® PVDC portfolio for Pharma Blister Packaging

Diofan® PVDC portfolio for Pharma Blister Packaging

Product Portfolio

Broadest portfolio for pharmaceutical blisters:

- Diofan® A736
- Diofan® Super B
- Diofan® Ultra736 
- Diofan® PVDC aqueous dispersions

Technical Properties

- Applied via coating process
- Superior water vapor & oxygen barrier
- Excellent transparency
- Scratch and abrasion resistance
- Excellent thermo-formability
- Good seal integrity
- Regulatory compliance for pharma and food contact

Diofan® PVDC portfolio for Pharma Blister Packaging

Sustainability Benefits

1. Sustainability at material level

Diofan® PVDC features one of the lowest GWP level among barrier materials

2. Sustainability at plant level

Production plant targets to be carbon neutral (Scope 1 + 2) in 2040



2022 results compared to 2018 baseline

3. End-of-life valorization

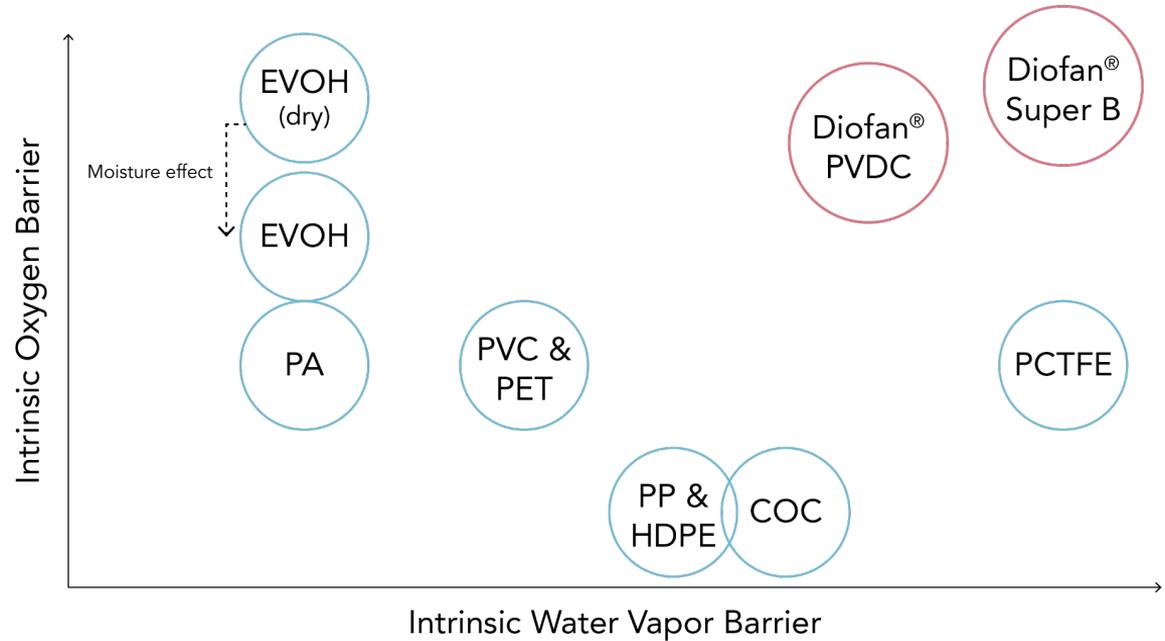
Demonstrated PVDC PIR waste closed loop via solvent-based recycling

Proven repulpability of PVDC coated on carton board

Demonstrated compatibility of PVDC with Carbios PET recycling

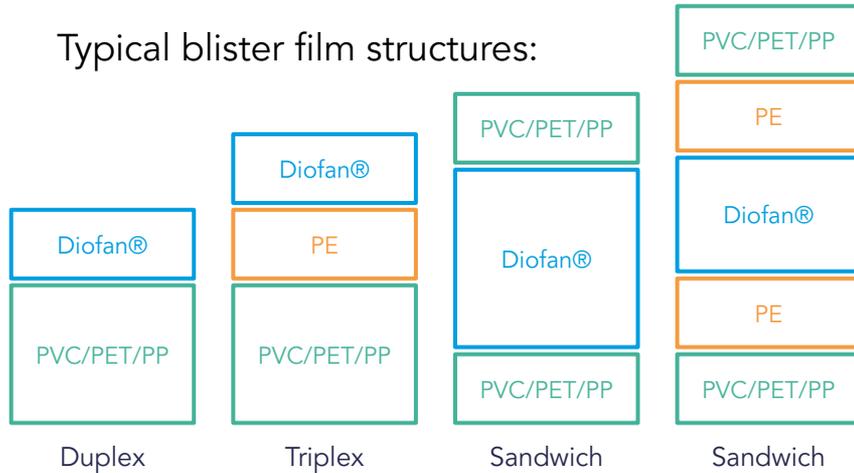
Diofan® barrier performance

Diofan® coatings provide best-in-class barrier to both oxygen and water vapor



Transparent blister films structures with Diofan®

Typical blister film structures:



| | Type of structure | Typical coating weight | Barrier level WVTr (g/m ² .day) |
|-----------------|----------------------|------------------------|--|
| Diofan® A736 | Duplex/ Triplex | 40-90 gsm | 0.7 - 0.3 * |
| Diofan® Super B | Triplex/ Sandwich | >120 gsm | <0.11 * |

* ASTM F-1249 - 38°C / 90&RH

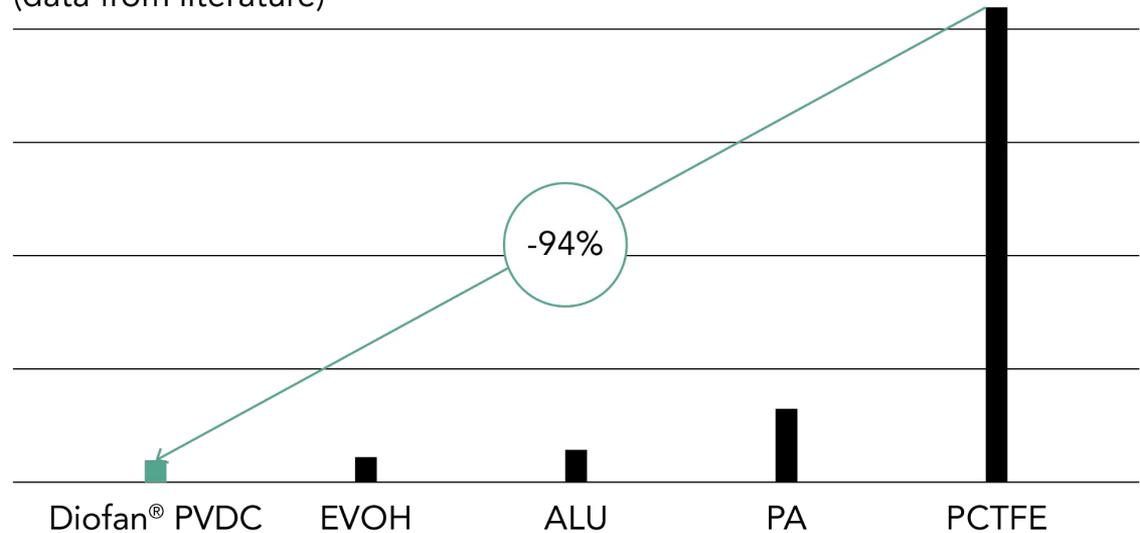
Diofan® GWP performance

Diofan® PVDC features one of the lowest carbon footprint for barrier materials



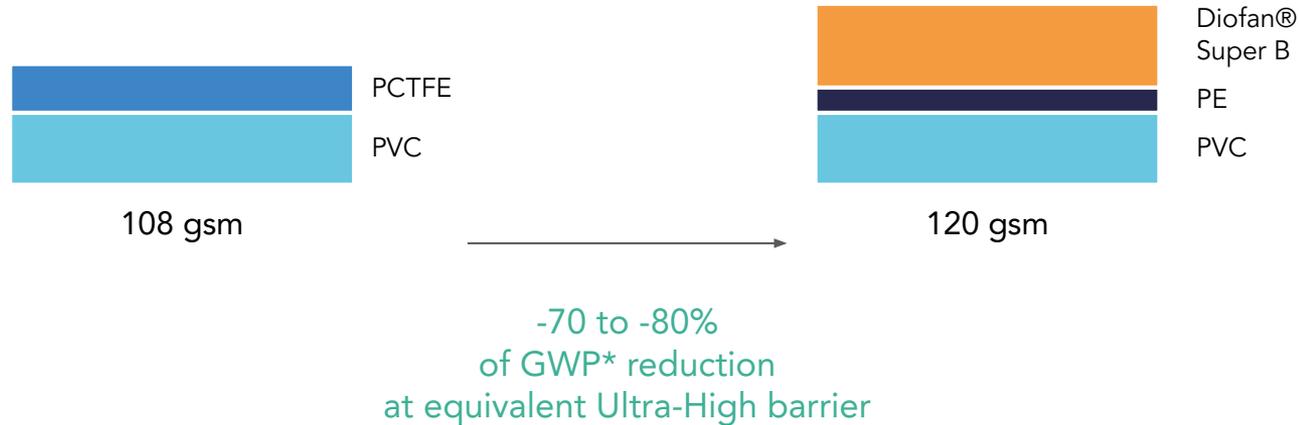
*GWP: Global Warming Potential

GWP* estimates in kgCO2 equivalent/kg of material
(data from literature)



The benefits of Diofan® Super B (1)

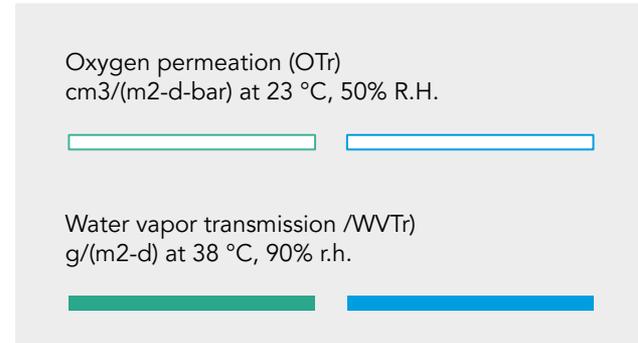
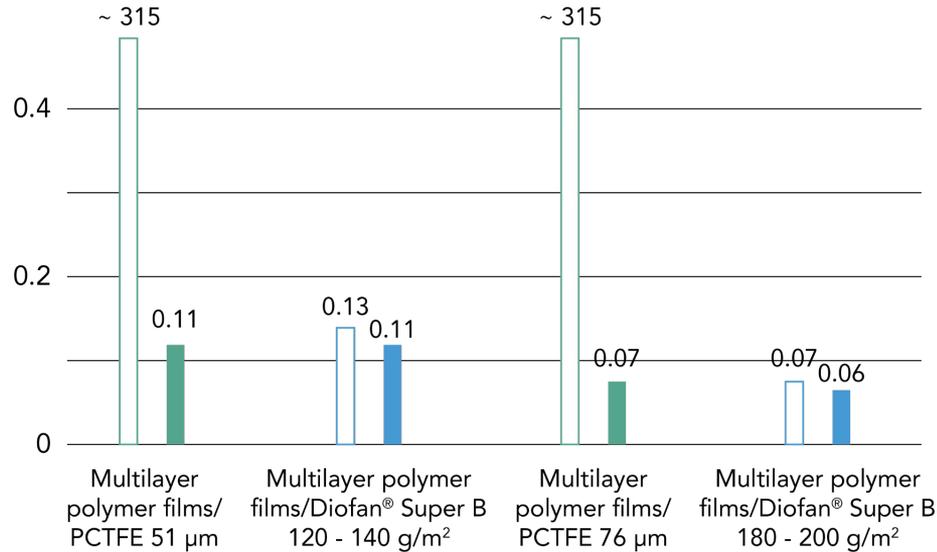
The most sustainable solution for Ultra-High Barrier Blister Packaging



*GWP: Global Warming Potential

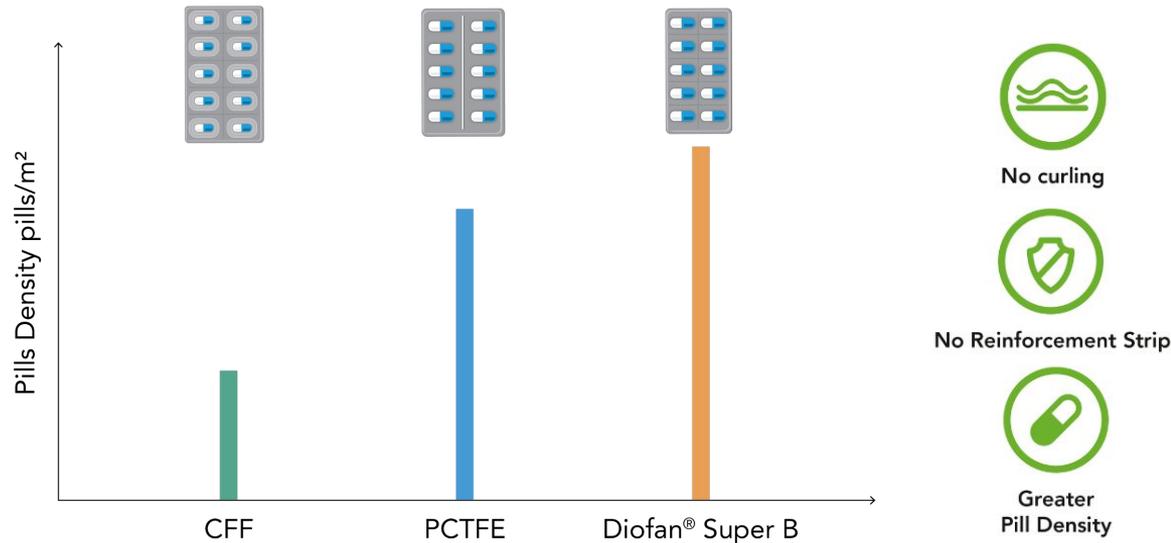
The benefits of Diofan® Super B (1)

The **most sustainable** solution for **Ultra-High Barrier** Blister Packaging



The benefits of Diofan® Super B (2)

Enabling the **highest pill density and smallest pack size** vs alternative Ultra-High barrier solutions





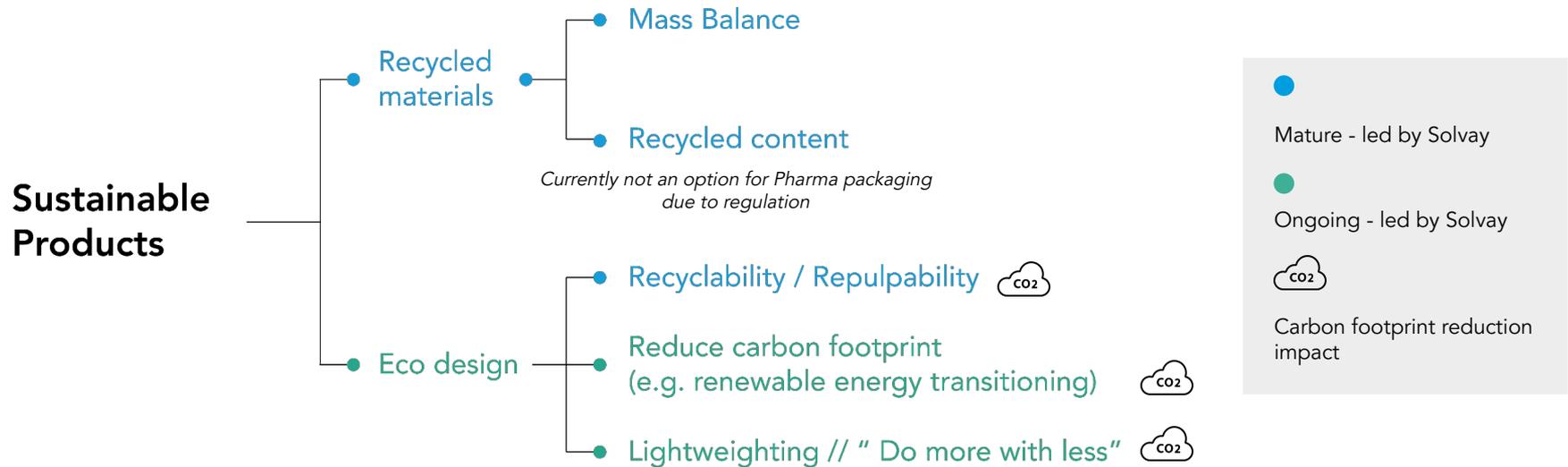
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New Diofan® Ultra736

“Do More with Less”

What are the key levers to enhance sustainability in Pharma Blister Packaging ?

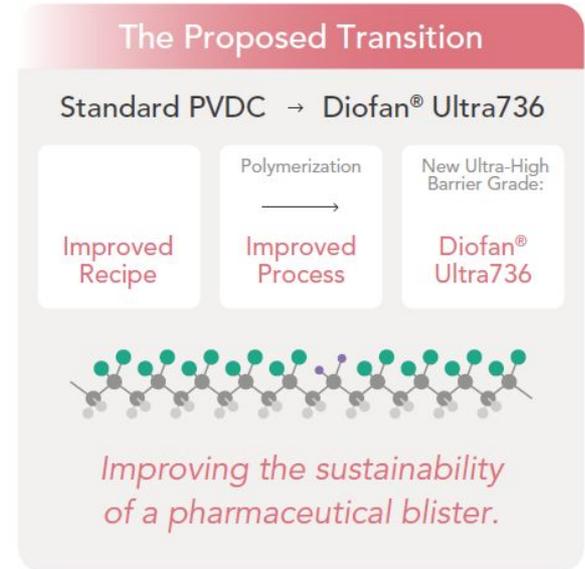


Introducing Diofan® Ultra736

A new material to **tackle sustainability** in the Pharma Packaging Industry

Key properties and target applications:

- Specifically designed for Mid-to-high barriers (equivalent to 40-90 gsm)
- Excellent water vapor barrier performance
- Good oxygen barrier performance
- Excellent thermo-formability
- Transparency
- Regulatory compliance for direct food and pharmaceutical contact



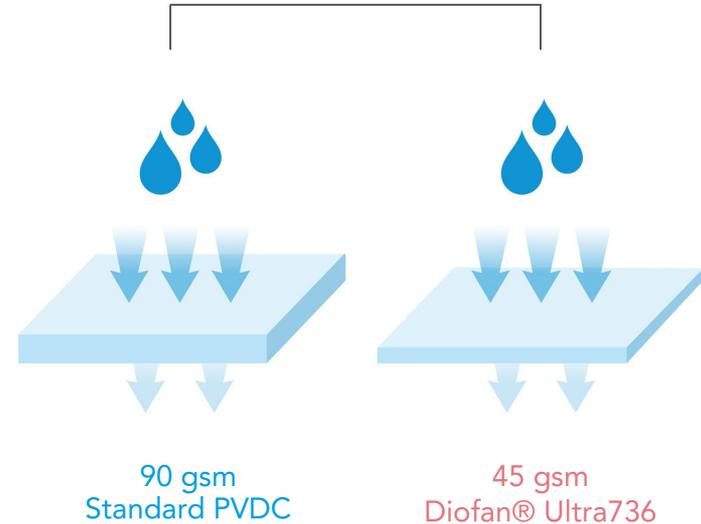
Diofan® Ultra736 technical profile

| | Standard PVDC | Diodan® Ultra 736 |
|--|---------------|-------------------|
| Intrinsic moisture barrier , (Flat films, 38 °C, 90% RH) referred to "package" value and Basecoat thickness only | Reference | +110% |
| Intrinsic oxygen barrier , (Flat films, 23 °C, 0% RH) referred to "package" value and Basecoat thickness only | Reference | +70% |
| Time to barrier (Thermoformed) | 60 hr | 40 hr |
| Yellowing @ equivalent Barrier (Duplex - after 180 days @ 40 °C, 75% RH) | Reference | Equivalent |
| Thermoforming | Reference | Equivalent |

-50% coating weight
-13% on GWP of the blister film
at barrier equivalent ($WTr = 0.3$)

“Do more with less”

Ultra736: An innovative solution
enabling low carbon footprint for
barrier films equivalent to std
40-90 gsm





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Conclusion and Q&A

To Summarize

How our Diofan® can support the value chain carbon footprint reduction



Diofan® portfolio

Diofan® A736 - For Mid-to-high barriers



Standard 40-90 gsm PVDC barrier films

Diofan® Super B - For Ultra-high barriers



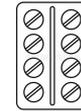
>120 gsm PVDC barrier films



Diofan® Ultra736 - For Mid-to-high barriers



New 20-45 gsm PVDC barrier films



Benefits of Diofan®

- High to ultra high barrier
- Future Carbon neutrality at production plant
- Renewable energy
- Advantages of integrated production
- More sustainable resources
 - less dependant on fossil based resources
 - lowest GWP among barriers

- High to ultra high barrier films
- Low carbon footprint films
- Made from more sustainable resources
- "Do more with less" Maximize barrier while minimizing weight and GWP

- High to ultra high barrier blisters
- Optimized blister size and weight
- Low carbon footprint blisters
⇒ support "Net Zero"
- Made from more sustainable resources



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Questions?



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