Challenge: Sustainable collation shrink film solution containing up to 30% recycled polyethylene.

As consumers become increasingly concerned about the environmental impact of packaging, the value chain is looking at using recycled content as part of the solution.

As part of its commitment to helping customers create sustainable solutions, ExxonMobil wanted to develop a thinner-tougher collation shrink solution that would include recycled PE, while maintaining packaging quality and integrity.

Solution: Extrusion technology with performance PE polymers allow the use of different recycle PE streams.

A collaboration between ExxonMobil, Windmöller & Hölscher, and Grupo Armando Alvarez has created a 40-micron, 5-layer POD collation shrink film, which includes up to 30% recycled polyethylene (PE). The solution is designed to wrap 6 x 1.5L bottles.

The collation shrink film, which includes up to 30% recycled PE, was processed on a VAREX II blown film line and maintains performance due to the inclusion of Exceed™ XP and Enable™ performance PE polymers in the formulation.
The combination of VAREX II technology and ExxonMobil performance PE polymers, allows different recycled polyethylene streams to be used. The processing challenge presented by recycled materials with a broad melt index and density range is solved by using Exceed™XP and Enable™ performance polyethylene polymers.

**Result:**

Thinner film with excellent package integrity, optical properties and processability while adding recycled PE.

eXtreme toughness and excellent optics with Exceed XP

Exceed XP performance polymers boost the mechanical properties of the film, so that recycled PE can be added without having to increase film thickness. Exceed XP maintains the toughness, optical properties and improves processability. The extreme performance properties provided by Exceed XP allow more recycled materials to be included in film formulations. Converters can optimize film formulations and increase output, helping them to produce extremely tough 5-layer polyolefin-dedicated (POD) collation shrink packaging solutions.

Package integrity and process consistency, even with recycled PE

Medium density Enable performance PE polymers deliver collation shrink packaging films with balanced properties including shrinkability, holding force and toughness-stiffness. The shrink speed of the film can be adjusted for different shrink process conditions using ExxonMobil™ LDPE.

**Comparable performance with up to 30% recycled content**

The new collation shrink packaging with Exceed XP delivers eXtreme Performance properties, which allows up to 30% recycled PE to be included and delivers:

- **Toughness** - puncture and dart impact
- **Stiffness** - MD tensile strength, excellent holding force
- **Optics** - Shelf appeal, brand visibility with up to 30% recycled PE
- **Shrink performance** - comparable shrink performance with up to 30% recycled PE

<table>
<thead>
<tr>
<th>Layer configuration</th>
<th>40 μm 100% performance PE with Exceed™XP</th>
<th>40 μm 100% virgin performance PE with Exceed XP™</th>
<th>40 μm 70% virgin performance PE with Exceed XP™ + 30% recycled PE™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin layer</td>
<td>Exceed + ExxonMobil LDPE</td>
<td>Exceed XP + ExxonMobil LDPE</td>
<td>Exceed XP + ExxonMobil LDPE</td>
</tr>
<tr>
<td>Sub-skin</td>
<td>Enable</td>
<td>Enable</td>
<td>Enable + ExxonMobil LDPE</td>
</tr>
<tr>
<td>Core</td>
<td>Exceed + Enable + ExxonMobil LDPE</td>
<td>Exceed + Enable + ExxonMobil LDPE</td>
<td>Recycled PE + ExxonMobil LDPE/HDPE</td>
</tr>
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1. presented in K2016
2. presented in K2019

All data from tests performed by or on behalf of ExxonMobil.