



A View of Sustainability in Polyester Films

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New Product Development

DuPont Teijin Films

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DuPont Teijin Films™

6 manufacturing locations

Sites in Europe, the USA and China

All the major regions of the world

2375 employees

Global turnover
\$ 600 million

Europe contributes over one third of global business

Global volume - almost
150,000 tonnes



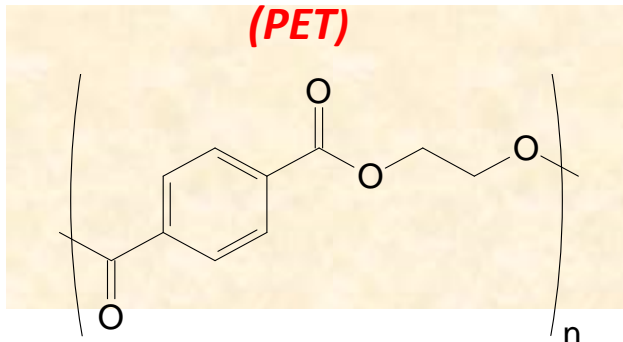
Semi-Crystalline, Biaxially Oriented PET (BOPET)

PET Polyester Film

- High stiffness
- Dimensional stability
- Optical transparency
- Solvent & moisture resistance
- Thickness = 0.6-500 μm

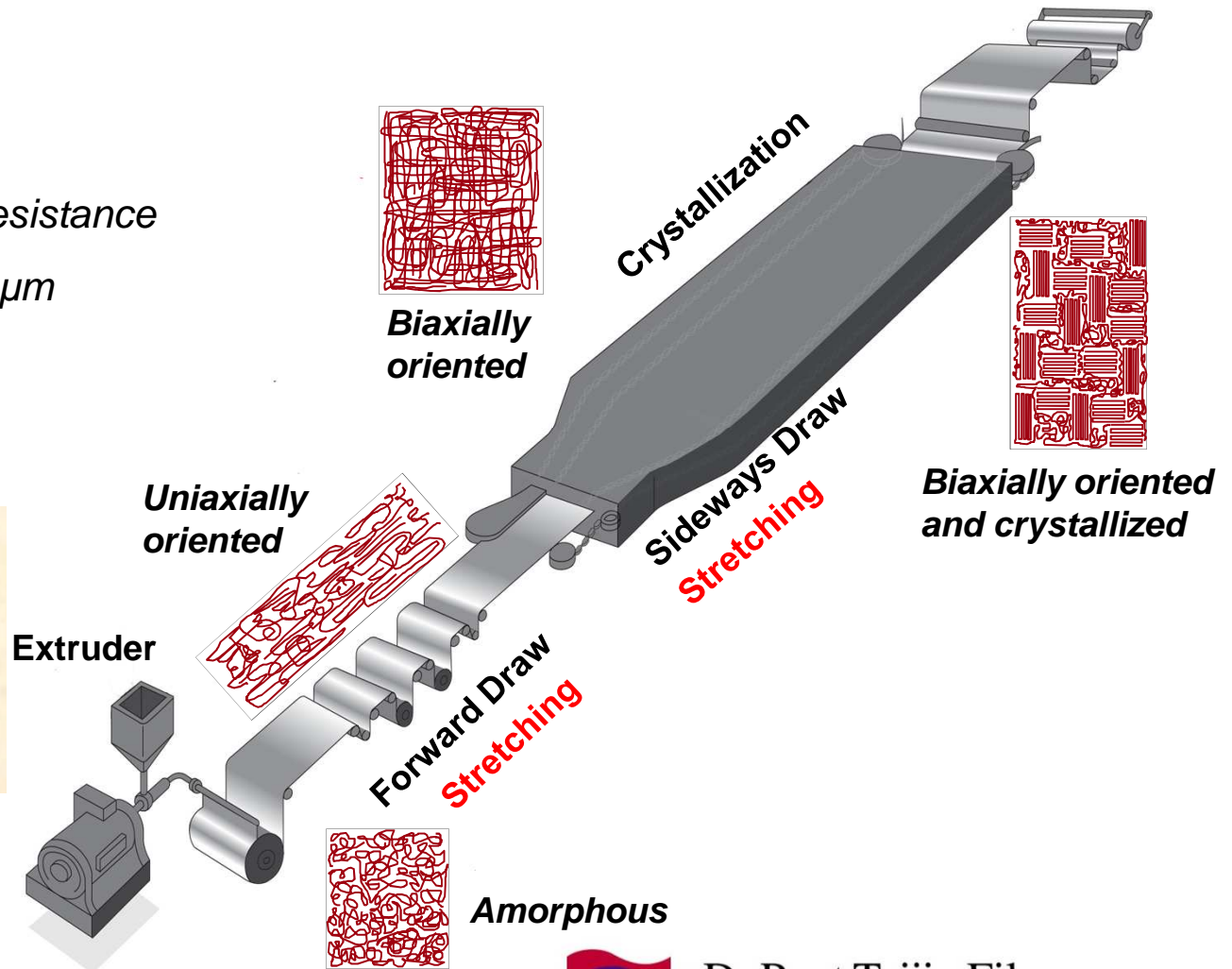
Melinex® & Mylar®

**Polyethylene terephthalate
(PET)**



$T_m = 255\text{oC}$

$T_g = 78\text{oC}$



Public pressure and 'the war on plastics'

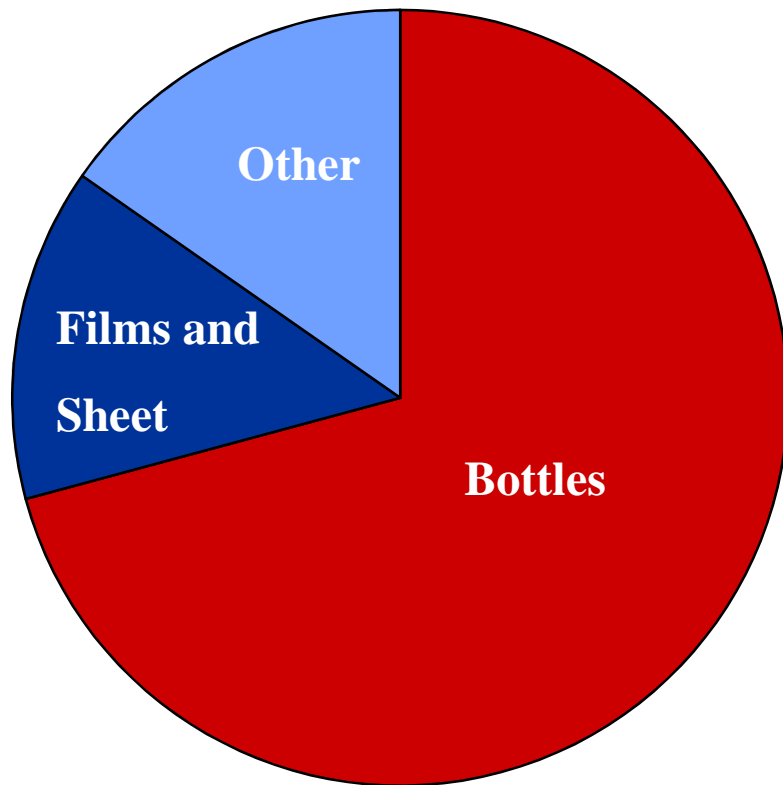
- **Significant public pressure on the responsible use and end of life of plastics.**
- **This is felt strongest in the packaging and food market (single use plastics)**
- **Pressure is becoming action:**
 - Major brands are pledging to move to 'sustainable' packaging
 - Global legislation is targeting the reduction in the use of single use plastics.
 - Targeting a circular economy becoming accepted industry wide and is supported by a number of organisations.

Ellen Macarthur Foundation , European commission, British plastics Federation

Overview of PET Usage

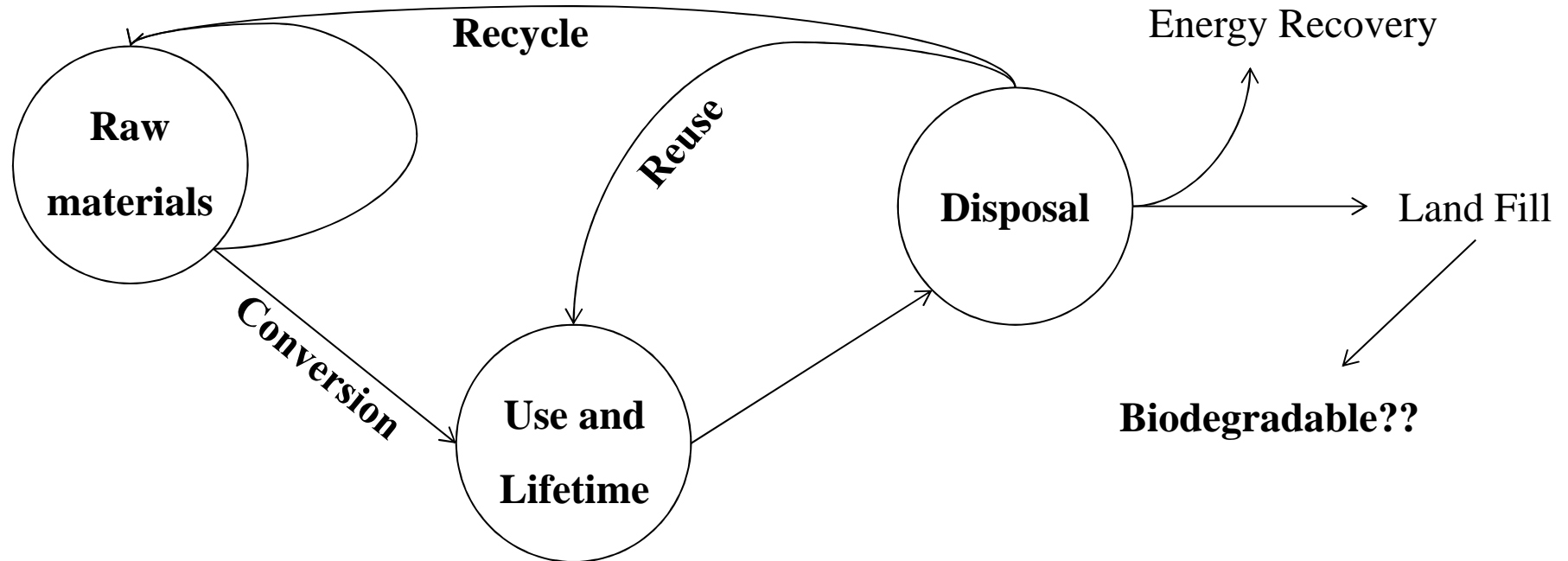
- The majority of PET polymer goes in to fibres (more than 60%).
- The rest goes in to PET resin and of this approx. 70% goes in to bottles.

Global Use of PET Resin



- Films makes up a smaller yet significant portion of this.
- New developments in sustainable PET resin and recycling is driven by the major drinks brands.

Life Cycle of PET Products



Considerations:

Source of Raw Materials

Water use and CO₂ Emission

Use of Hazardous chemicals

Recycled material

New Sustainable Materials

- **Widely accepted that new sustainable routes to plastics and polymers are required.**
- **But..... 'Green' in itself is not always enough.**
- **Barriers to Establishing New materials are often linked to Scale.**
 - Suitability with existing Infrastructure.
 - Availability of Raw Materials and reagents
 - Cost
- **Over coming barriers to new materials**
 - Value added (such as a property benefit).
 - Cost effectiveness (multiple properties in a single material)
 - Legislation
- **Important to consider the end of life (design for recycle or biodegradability)**

Recycling of Polyester Films

- PET Film alone is typically recyclable.
- Conversion typically includes coatings, other polymers and inks (multi-layer).
- Each layer serves a purpose, however this makes recycling more difficult:
 - How do you separate layers?
 - How can the structures be simplified or be designed for recycling?
 - If Separated, What purity of materials can you get out of this feed stock?

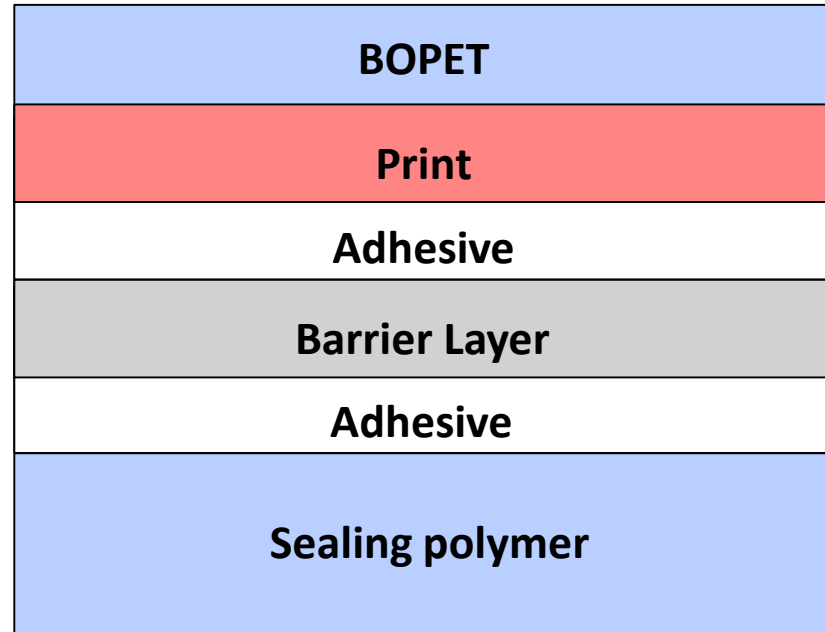


Diagram of a multilayer film structure

- Chemical and/or biological recycling methods such a depolymerisation or pyrolysis could play a part in this.
- Biodegradability could also have a place. (Especially where recycling is not possible)
- Change will require industry wide collaboration

Summary

- **The plastics industry is under significant pressure to become more sustainable.**
- **In polyester films the start and end of life are important considerations in the sustainability challenge.**
- **Future materials should be sustainably sourced but also designed to be reused or recycled.**
- **New materials will ideally offer additional value/ property benefits.**
- **Recycling of flexible packaging is challenging due to the multilayer nature of many of the products.**
- **A linked up approach to overcoming recycling challenges is essential.**

Questions ?

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