SUITABILITY

of the Packaging /

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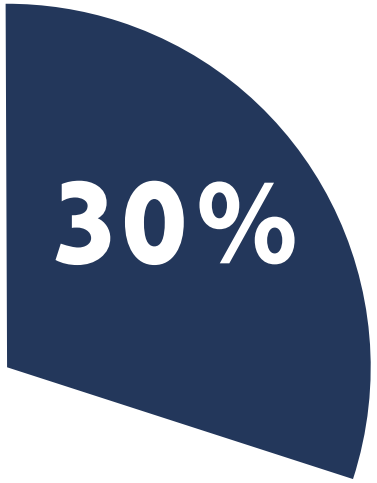
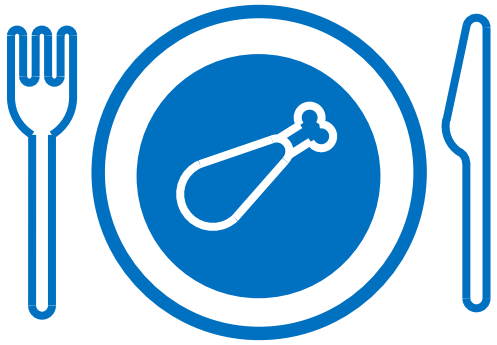
FOOD WASTE





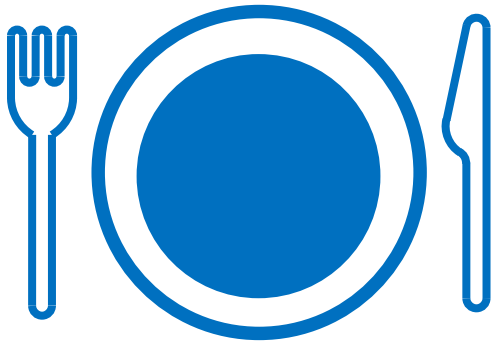
1,3

Billion tons

($1 Trillion equiv.)

Food waste every year

FOOD WASTE

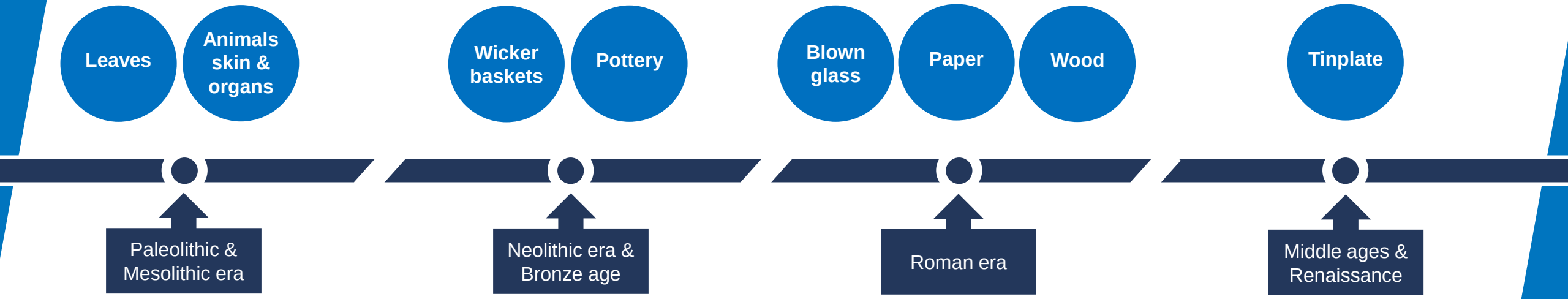


Saving only 25%

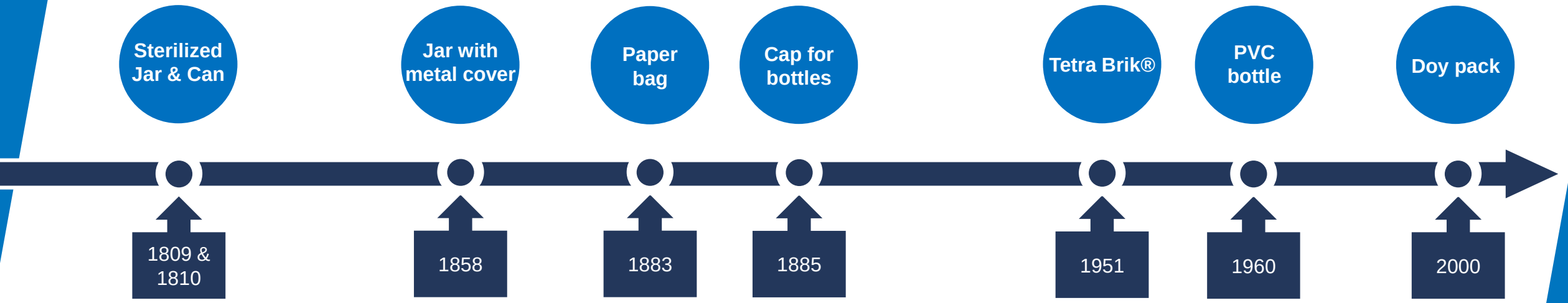
of these food wastes would cover the nutritional needs

Performance packaging is part of the solutions

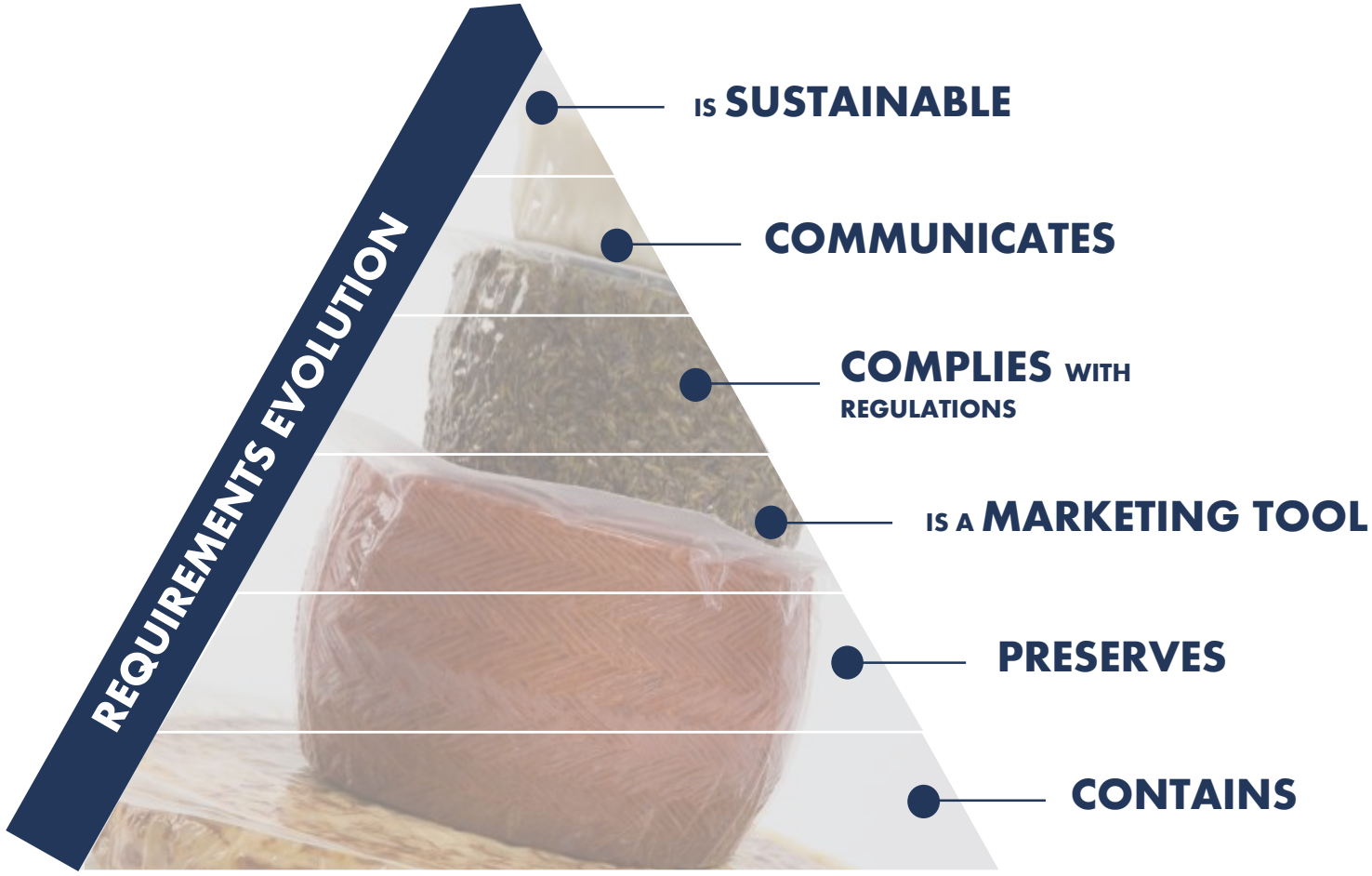
PACKAGING HISTORY



PACKAGING HISTORY

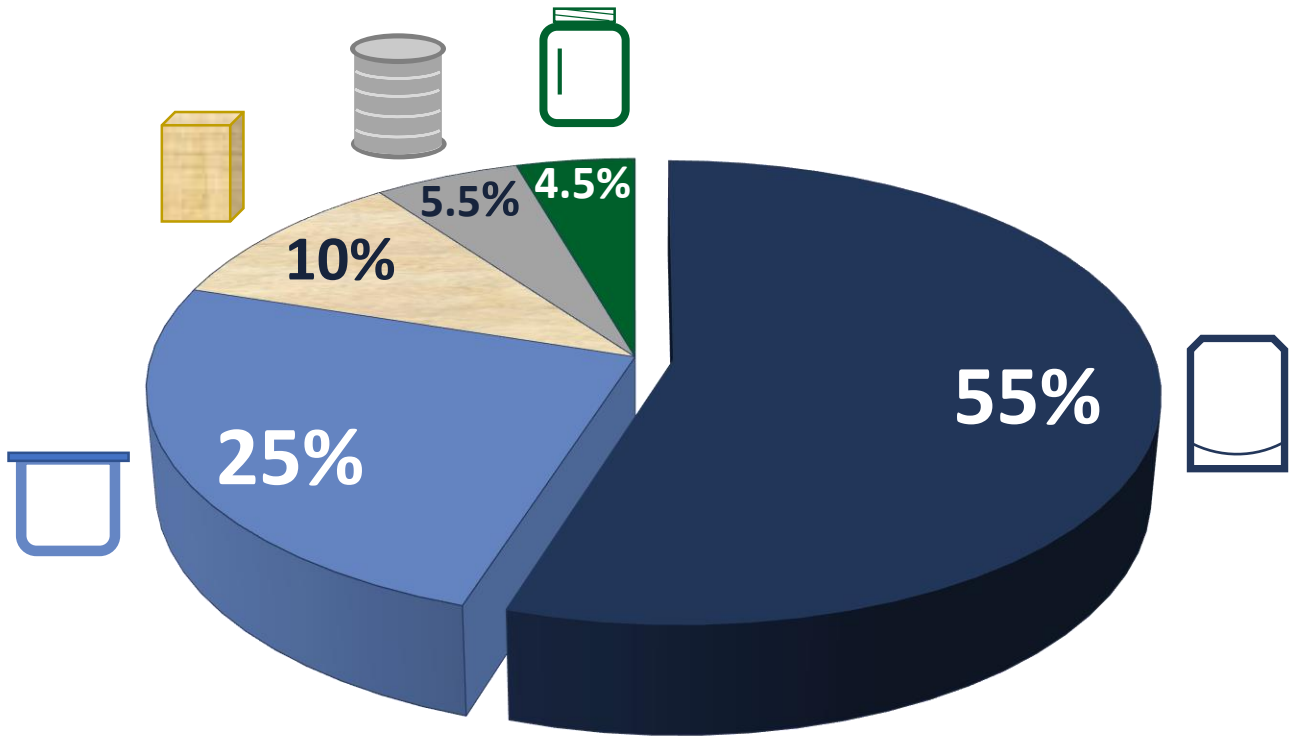


TODAY'S PACKAGING



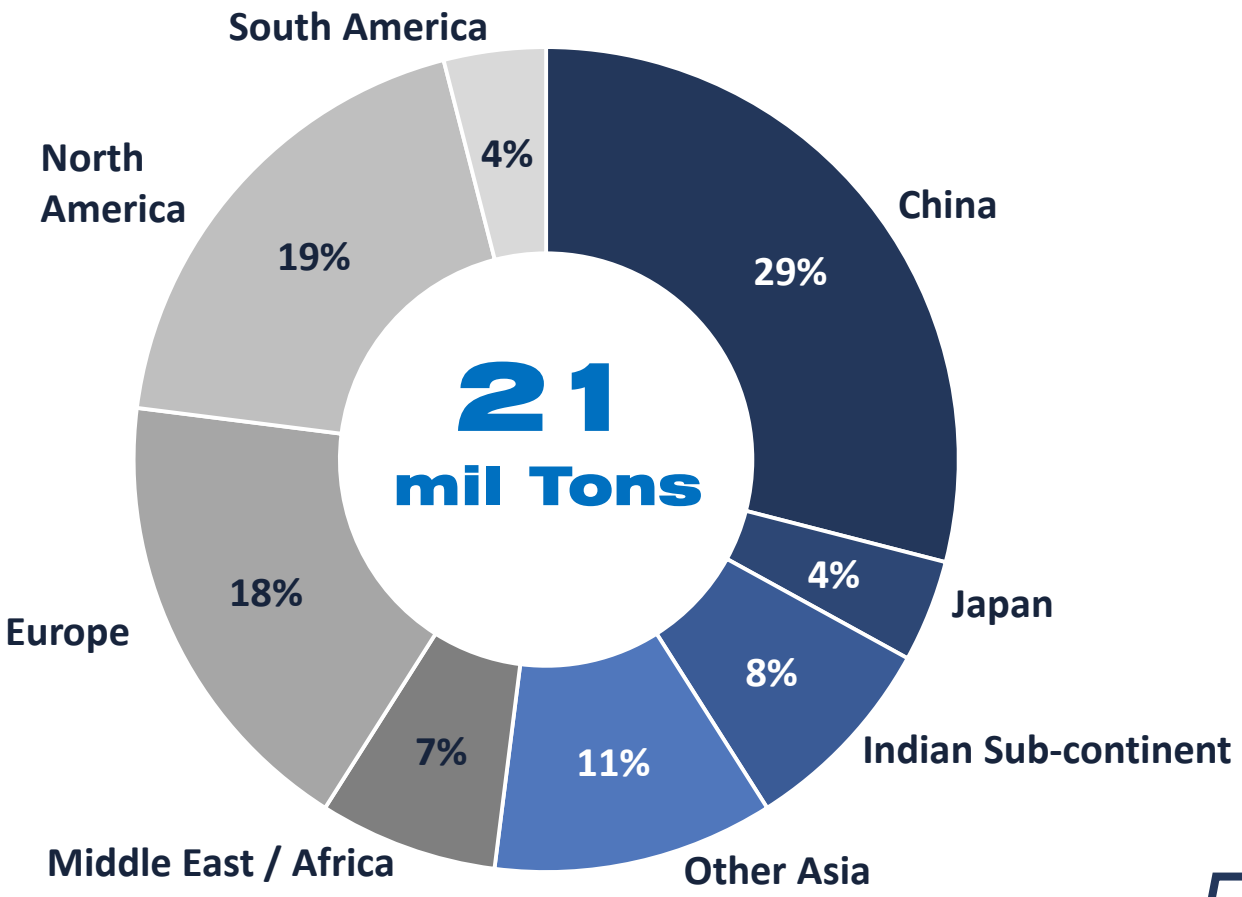
TODAY'S PACKAGING

% of Food packed in



- Flexible packaging
- Rigid plastic
- Paper & Cardboard
- Metal
- Glass

GLOBAL POLYMER DEMAND / FLEXIBLE PACKAGING



Asia :

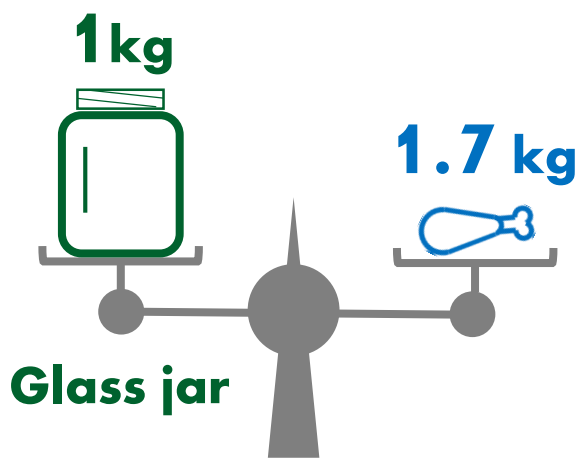
>50% market demand

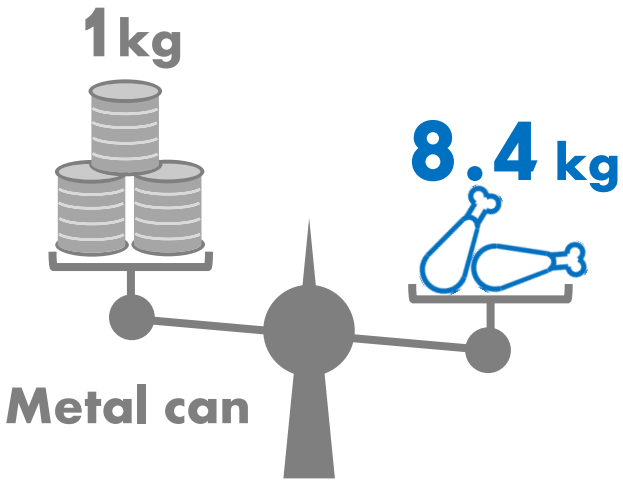
Source : Applied Market Information Ltd

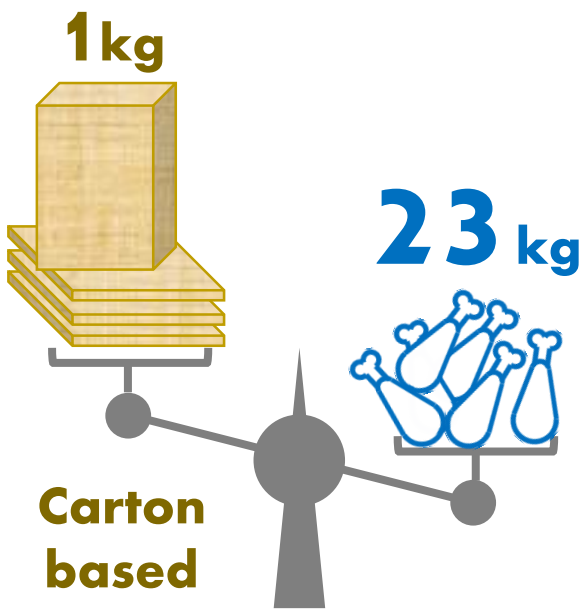
FLEXIBLE PACKAGING IS

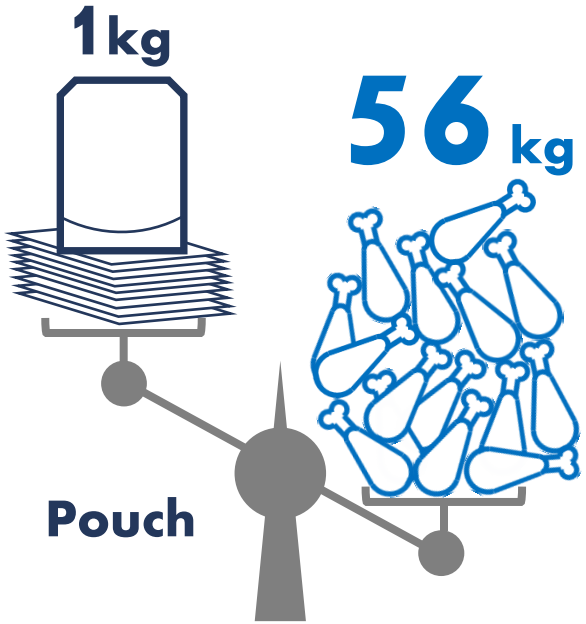
Packing efficient !

Highest Product to package ratio!





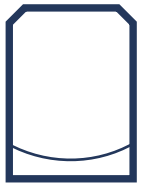
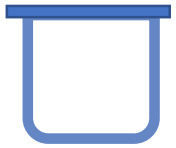




FLEXIBLE PACKAGING IS

Resources efficient !

Less Energy
Less Water
Less Emissions

	Energy MJ equiv.	Water L	Emissions kg CO_2 equiv.
 Pouch	Reference	Reference	Reference
 Thermoformed Tub	+ 6.6 %	- 37.6%	+ 6.7 %
 Glass jar	+ 98.8 %	+ 1294 %	+ 302 %

Source : Flexible Packaging Association
(Baby food package comparison)

FLEXIBLE PACKAGING FORMATS

Pouches & Vacuum bags

Thermoforming

Sausage casings

Shrinkbags

BARRIER FLEXIBLE PACKAGING

Shelflife extension

x 7.5

4 days to 30 days [1]
with barrier flexible vacuum bag

Integrity

Less packaging failure

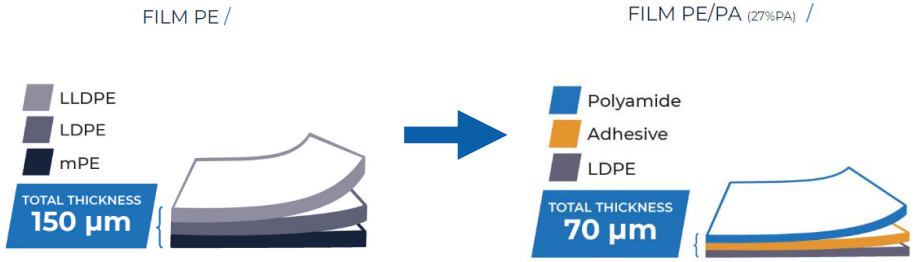
- During production
- During transportation
- At the retailer
- At the consumer

Appeal

Attractive packaging for the consumer :

- Format
- Transparency
- Gloss

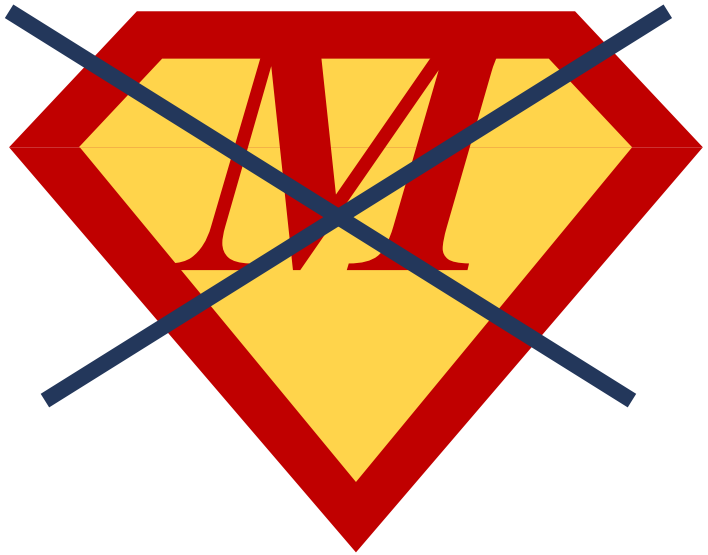
Downgauging



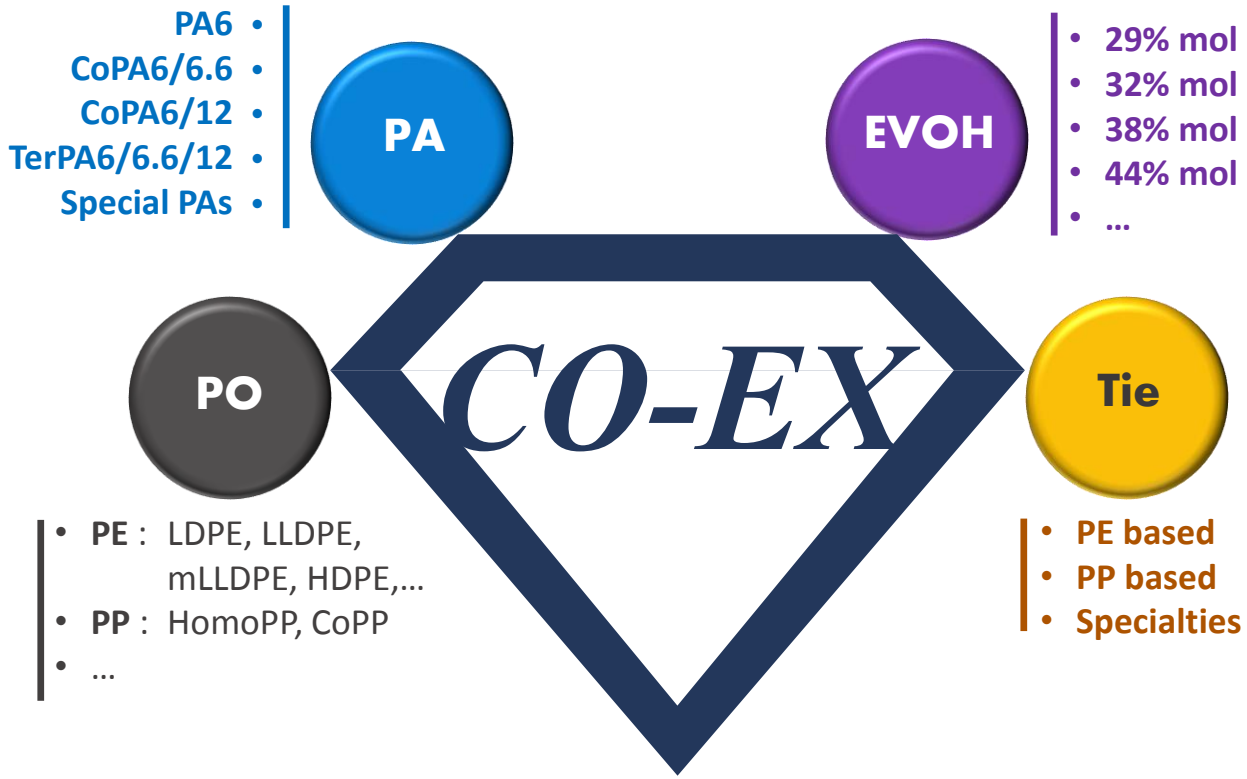
> 50% **less Plastic** & 50% **less failure** rate (after transportation simulation)

[1] Source : Flexible Packaging Association

MATERIALS IN CO-EXTRUSION BARRIER FILMS



No SUPER HERO's material available



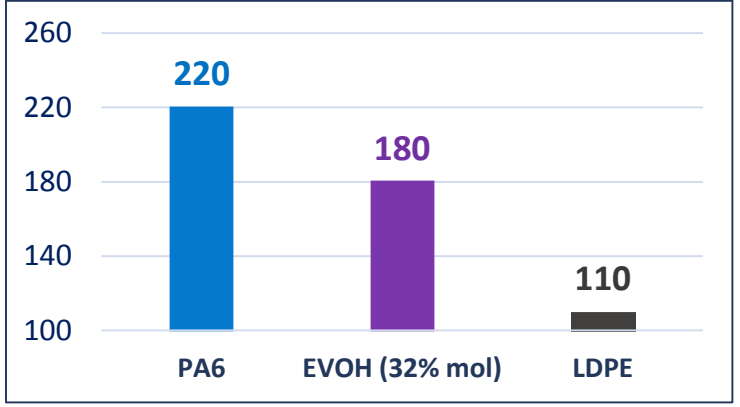
Combination of individual strengths

MATERIALS IN CO-EX BARRIER FILMS

50µm monolayer Airblown films

UBE

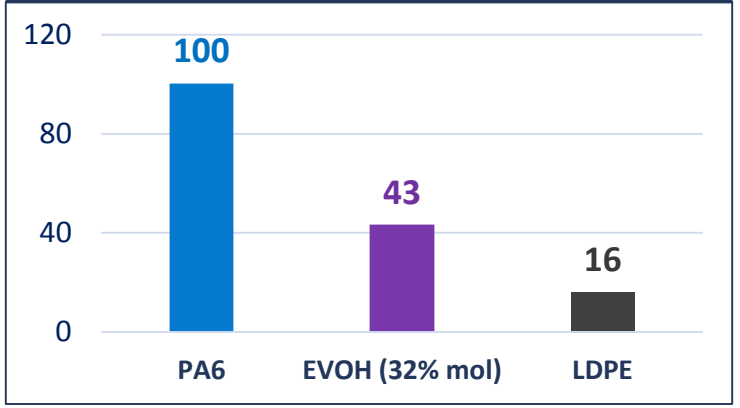
Melting point (ºC)



Heat resistance

Sealability

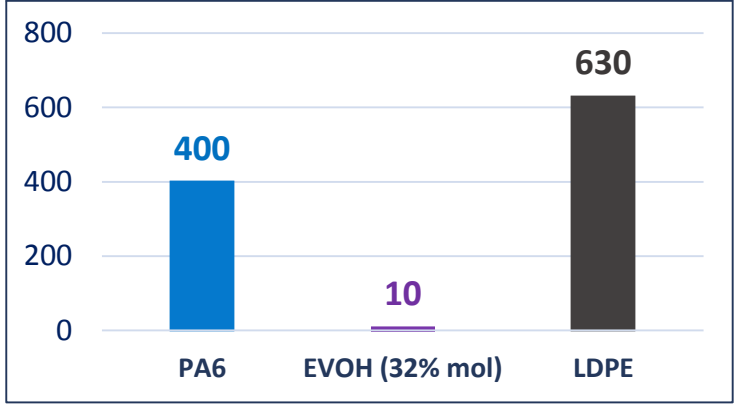
Tensile strength at break (MPa)



High strength

Low strength

Tensile elongation at break (%)

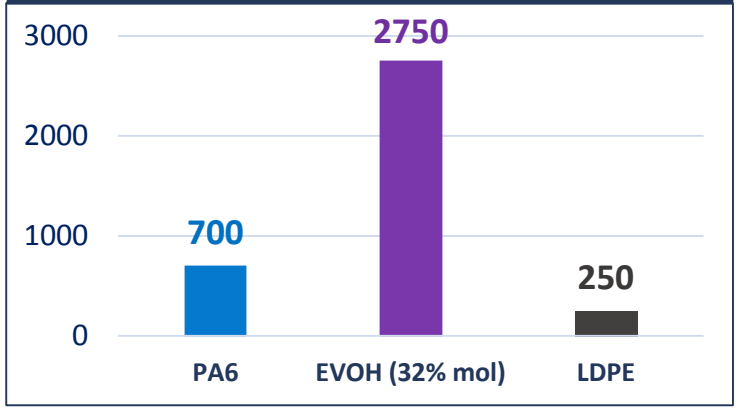


Medium to High elongation

Brittle

High elongation

Modulus (MPa)

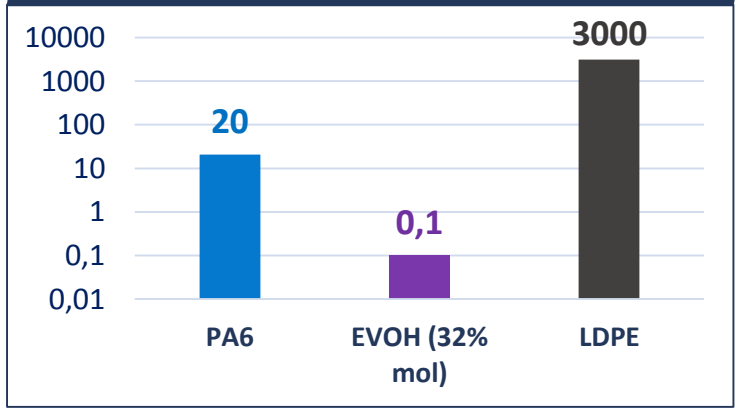


Medium to flexible

Stiff

High flexibility

OTR (ml/m².day)

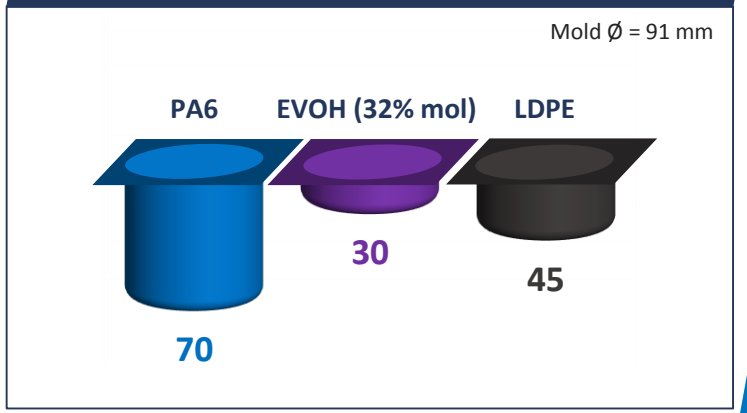


Medium O_2 barrier

High O_2 barrier

Low O_2 barrier

Max. Thermoforming depth (mm)



Deep thermoforming

Low

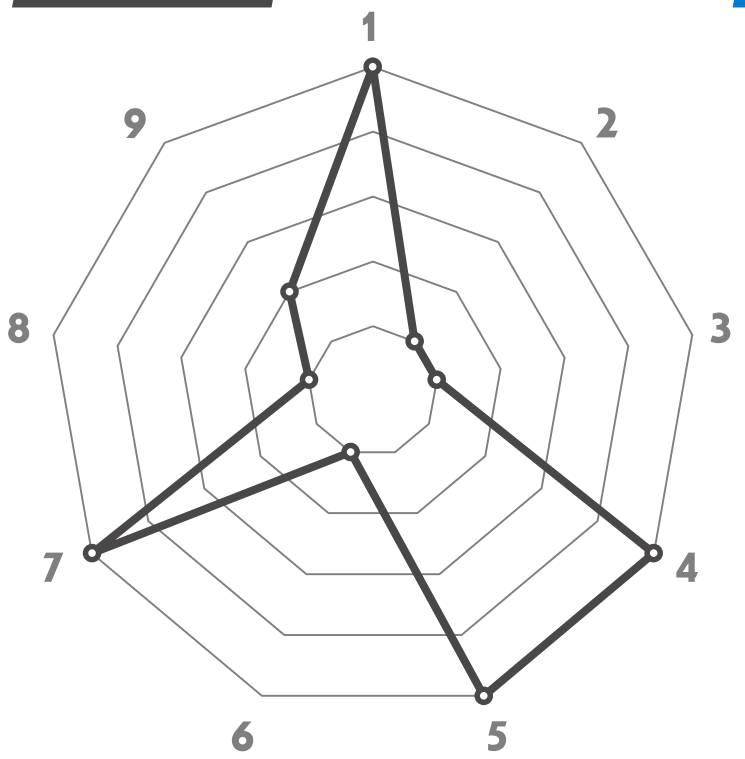
Low to medium thermoforming

MATERIALS IN CO-EXTRUSION BARRIER FILMS

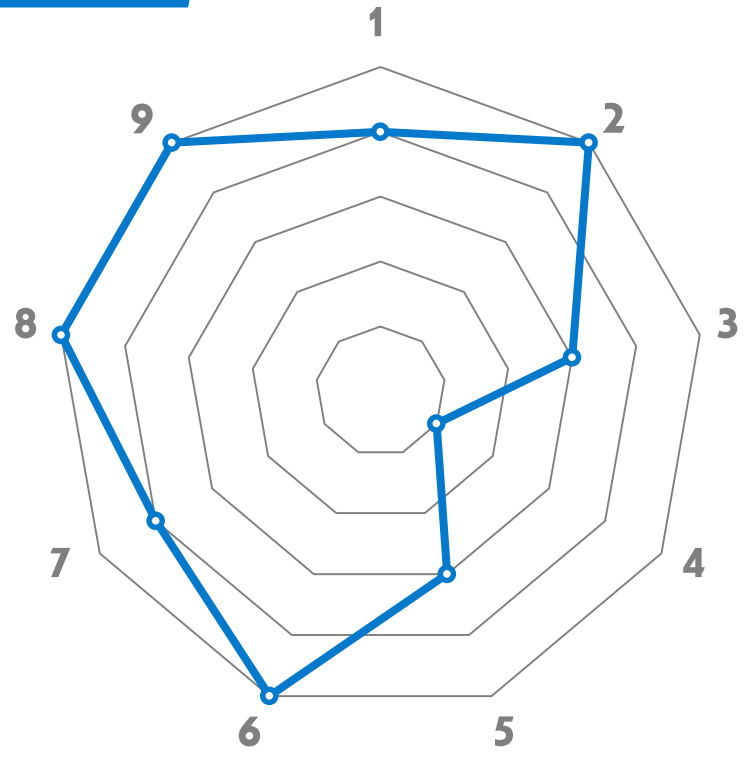
50µm monolayer Airblown films

UBE

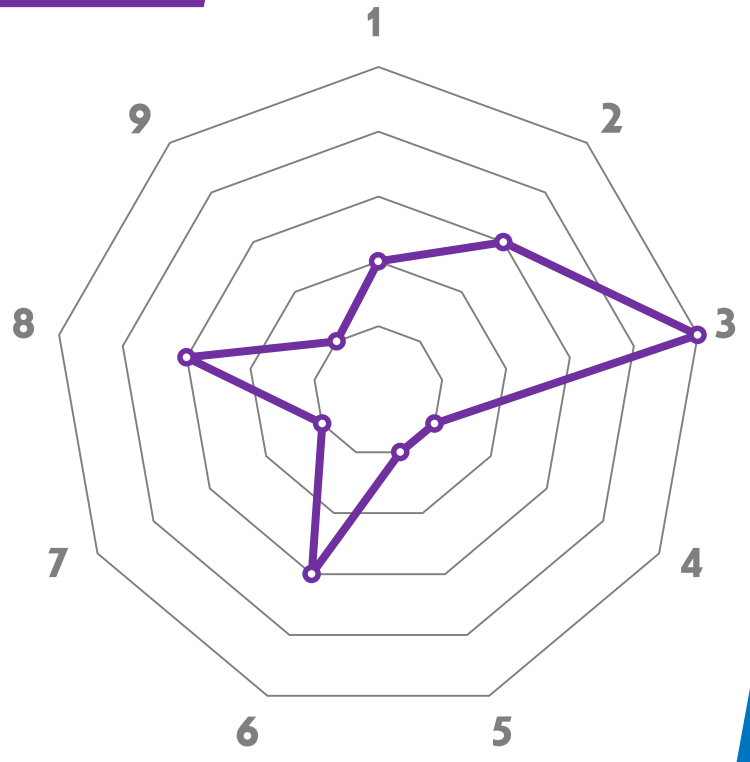
PE



PA



EVOH



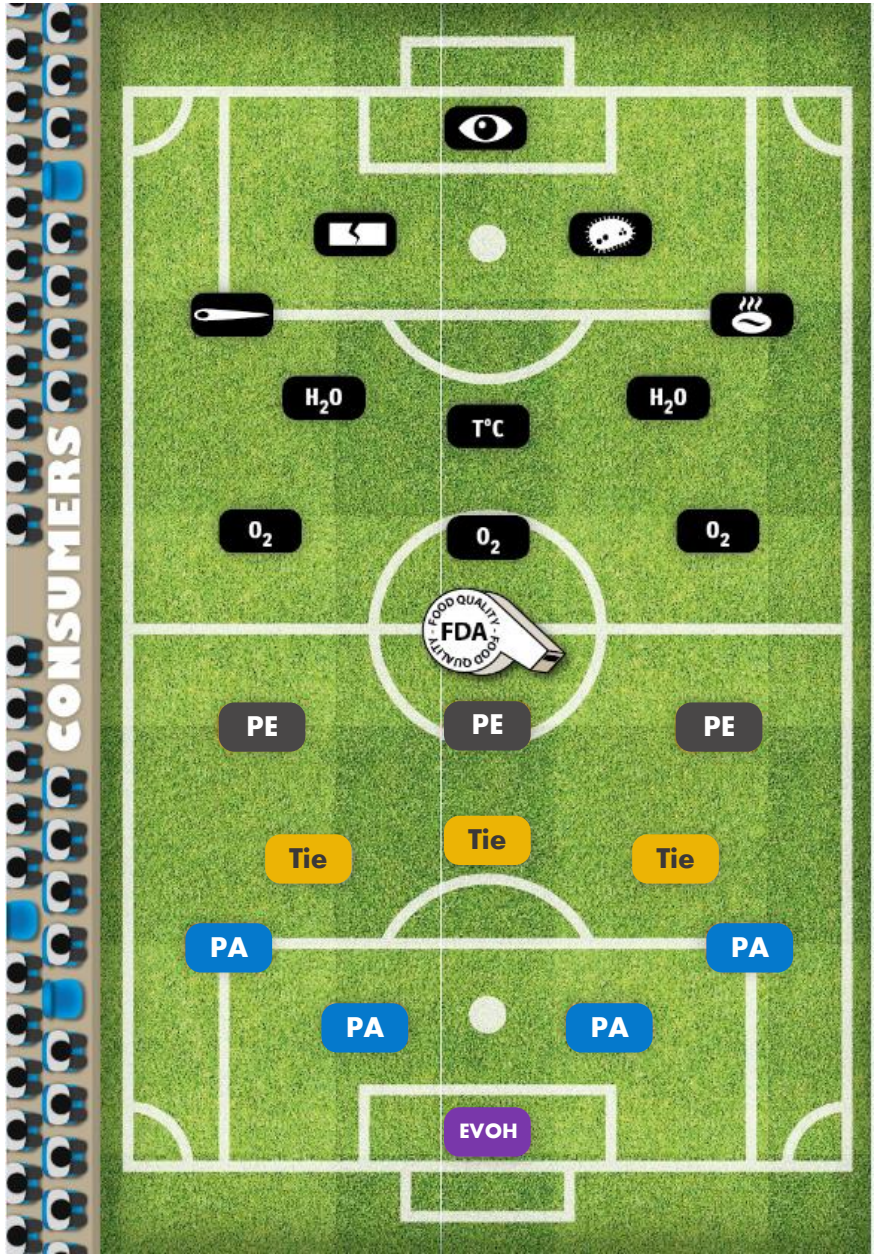
1 Processability
2 Melting point
3 Oxygen barrier
4 Water vapor barrier
5 Softness
6 Tensile strength
7 Tensile elongation
8 Puncture resistance
9 Thermoformability

MATERIALS IN CO-EXTRUSION BARRIER FILMS

UBE

Good packaging = Team work !

		PE	PA	EVOH	Tie	Team Co-EX
Heat	Heat sealing	●				●
	Heat resistance		●			●
Barrier	Oxygen		●	●		●
	Water vapor	●				●
	Aroma		●	●		●
Mechanical	Tensile Strength		●			●
	Tensile Elongation	●				●
	Puncture resistance		●			●
Cohesion	Bonding			●	●	●
Packaging	Thermoformability		●			●



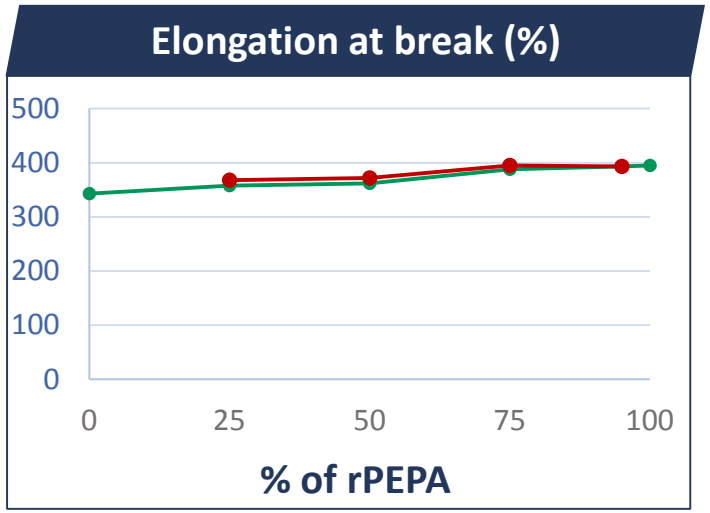
ARE BARRIER FILMS RECYCLABLE ?

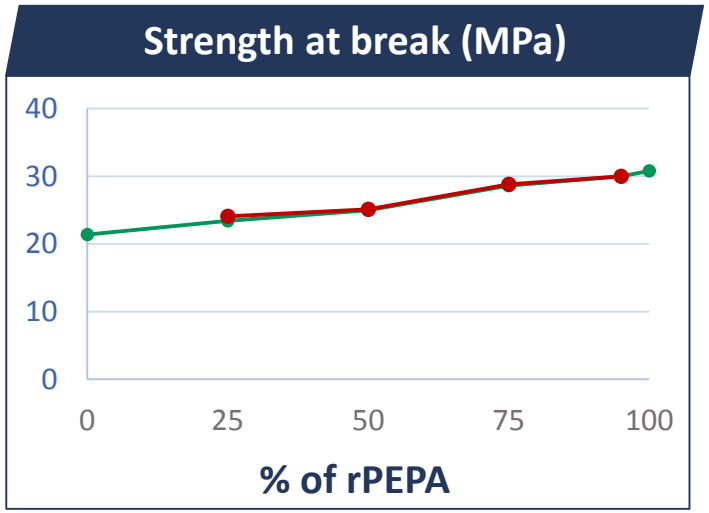
- **rPEPA resin**
  obtained from a post industrial multi-layer film : PA6 (24%) / Tie / PE (mechanical recycling)

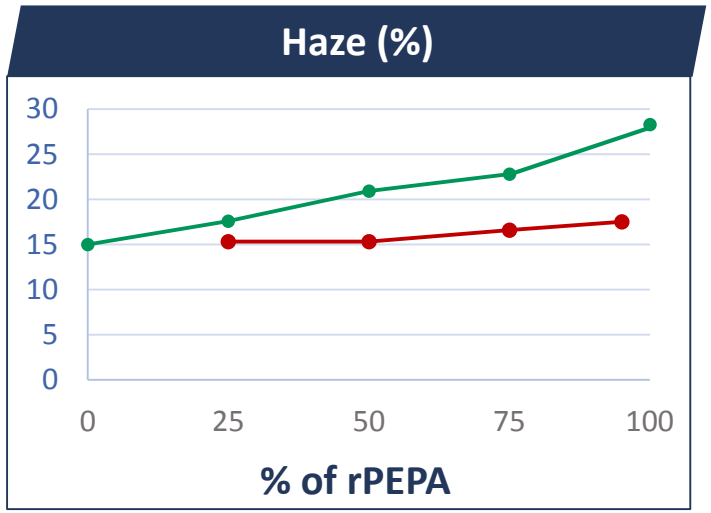
- **New film barrier film co-extrusion, including rPEPA**

20 µm	PA6
8 µm	Tie
16 µm	LDPE
60 µm	% PE + **% rPEPA** + % Compatibilizer
16 µm	LDPE

ARE BARRIER FILMS RECYCLABLE ?







- No compatibilizer used
- Incl. 5% compatibilizer

Mechanical properties even improved

Haze balanced with compatibilizer

CONCLUSIONS

1

Performance packaging is part of the **solution** to the massive **food waste** problem (including it's social and environmental consequences)

2

Flexible packaging is the most **efficient** option

3

Materials strengths **combination** guarantees the **best performance** and consequently offers the opportunity of downgauging (**better packaging with less plastic**)

4

PA/PE barrier films are **sustainable** & **recyclable**

WHO ARE WE ?

UBE INDUSTRIES LTD

Founded: June 1st, **1897**
(Consolidated in 1942)

Employees:
11,010

Group Companies:
140

UBE NYLON

Nylon:
>200,000 mT/y

Knowhow:
50 years

Location in Thailand:
Rayong

Founder:
Sukesaku Watanabe

THANKS

for your attention /