



# MULTI2RECYCLE

## **CATALISTI MOONSHOT DAY**

Brecht Van Der Hoeven

27/11/2025, Vestar Antwerpen



# PACK4FOOD

## MISSION & VISION



# PACK4FOOD

## OUR NETWORK

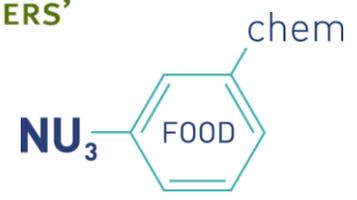




FLANDERS' FOOD



VLAAMS CENTRUM VOOR BEWARING VAN TUINBOUWPRODUCTEN

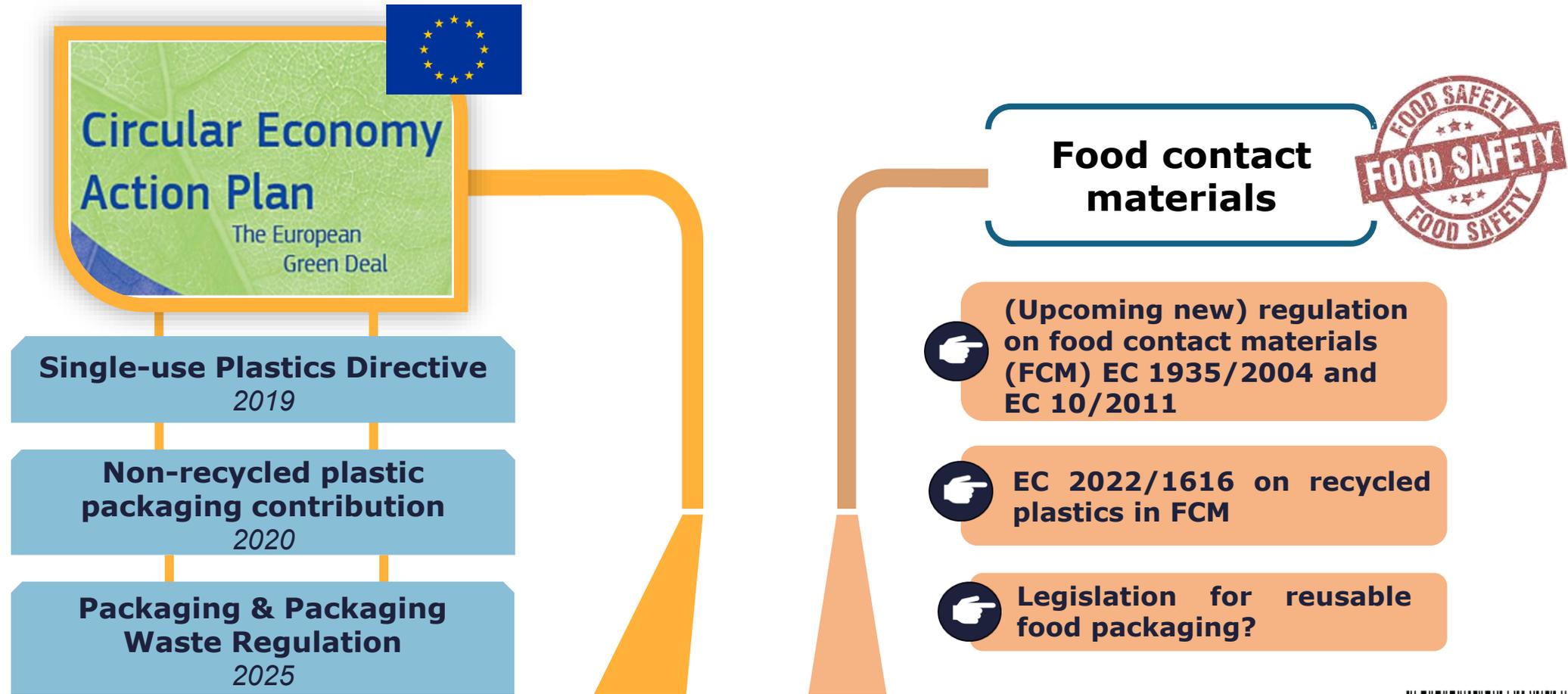


collaboration is key!



# MOTIVATION

## EU LEGISLATIVE LANDSCAPE



# FACTS & FIGURES

## MULTI2RECYCLE



START 2022 COOCK  
END 2025

### Multi2Recycle

'Design for recycling' guidelines for multilayer plastic food packaging



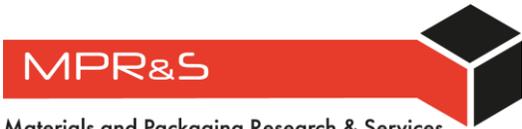
### Intercluster - COOCK



Coordinator 

  
**Pack4Food**

   
Materials and Packaging Research & Services

  **VLAIO** **FF** FLANDERS' FOOD  
samen voor #sterkgroeien

 **VLAIO** **CATALISTI**  
Clusters for Growth

With support of



# FACTS & FIGURES

## PARTICIPATING COMPANIES



essenscia



Fevia



STADLER

YPAREX



Euralpack  
FOODPACKAGING SOLUTIONS

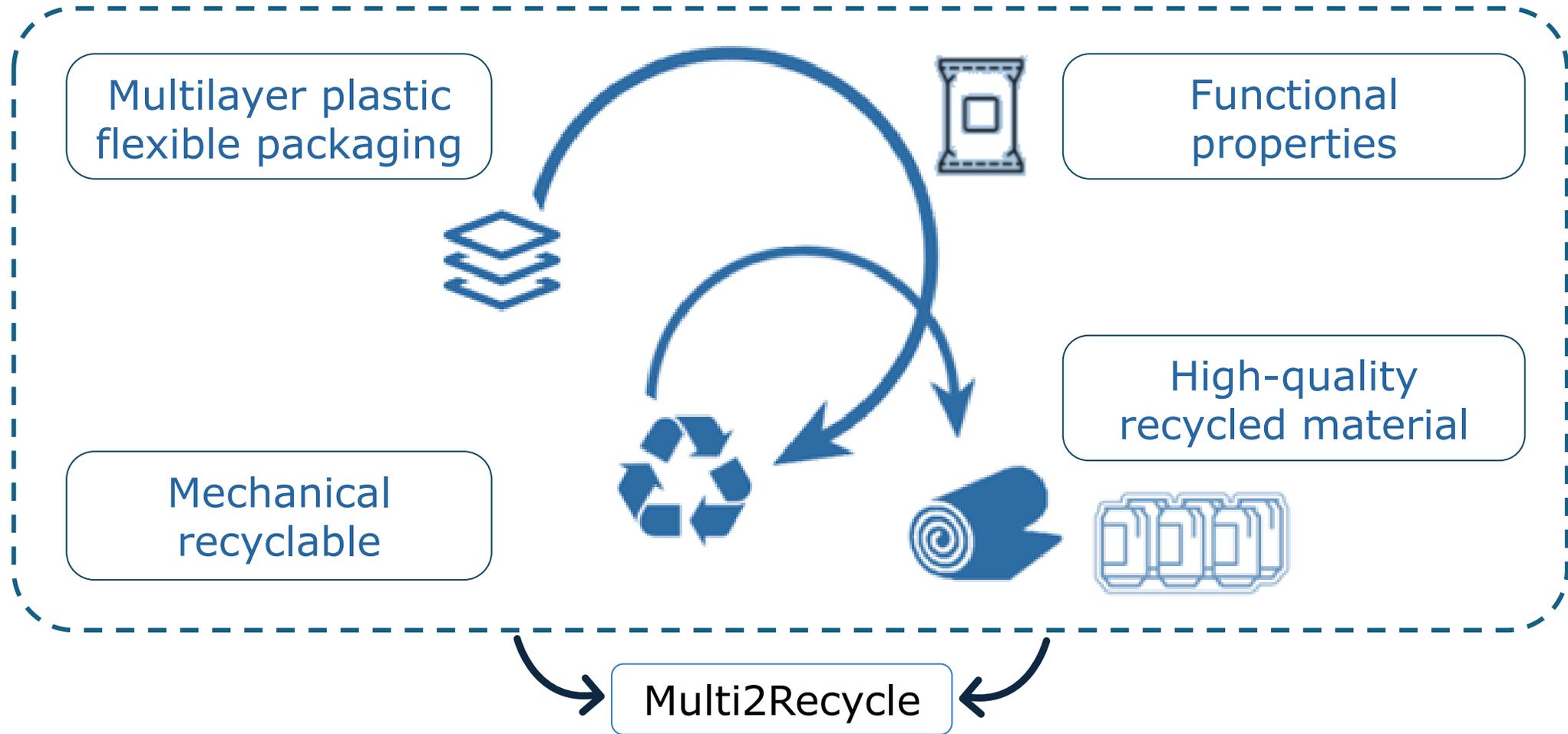


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# MULTI2RECYCLE

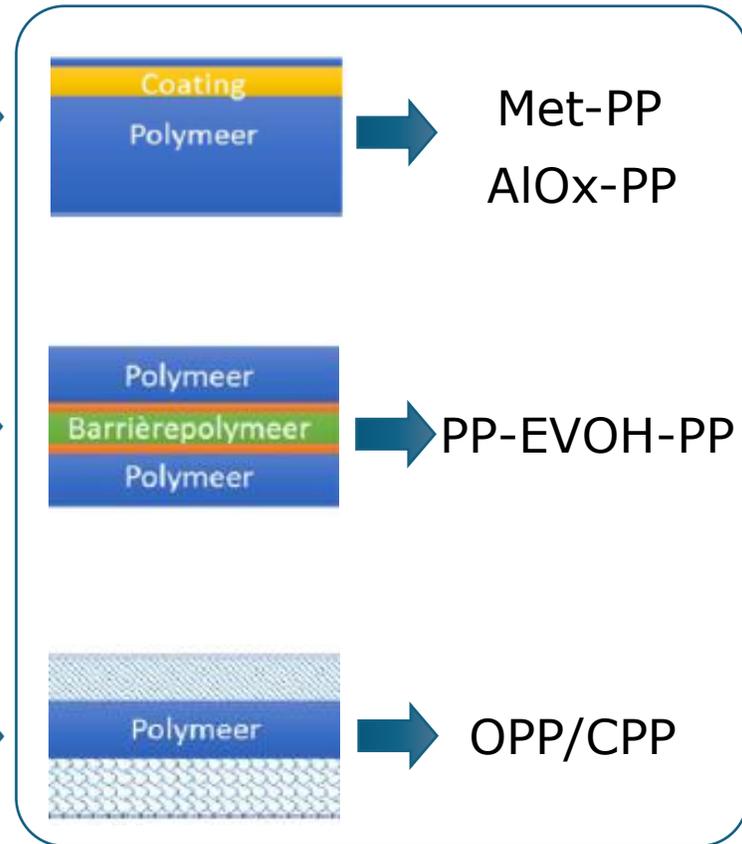
## KEY QUESTION



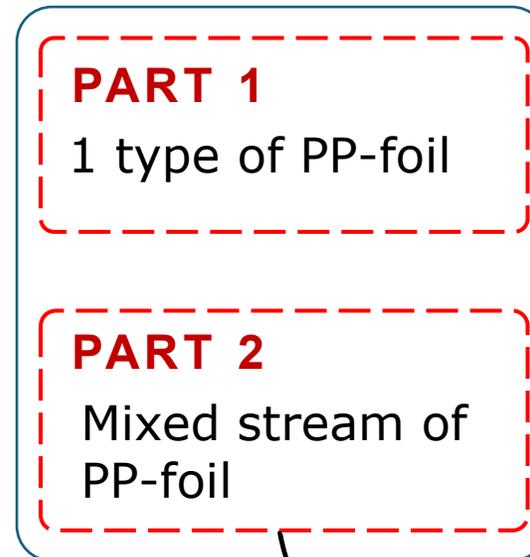
# RESEARCH PLAN

## WORKFLOW

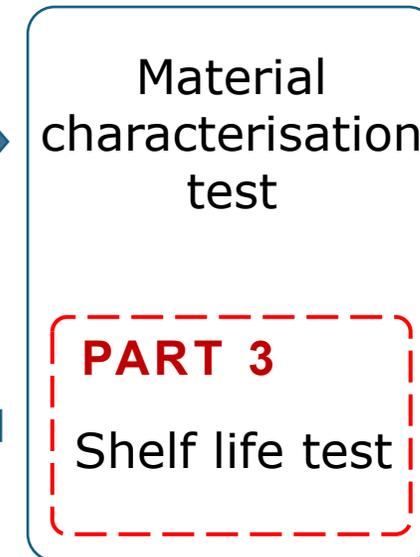
### Generic case studies



### Impact of packaging composition on mechanical recyclability



### Applicability of recycled alternative on food products

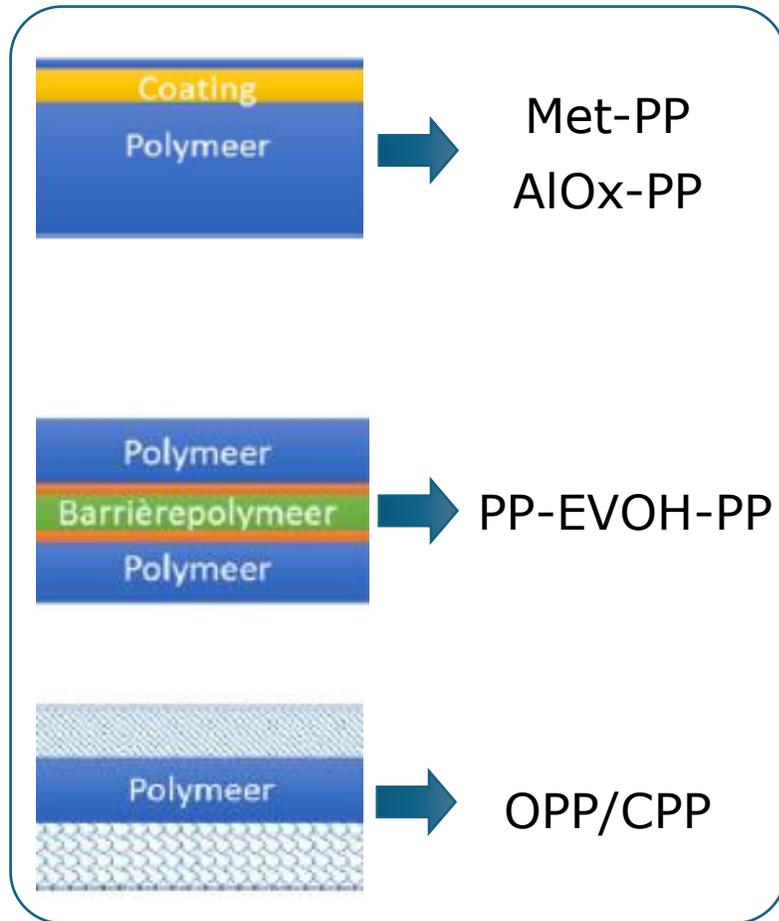


Main focus of today

Design  
Guidelines

# PART 1 – INDIVIDUAL PP FILMS

## FILM STRUCTURE CATEGORIES



Barrier & sealing properties

Mechanical properties

Cast film extrusion

How does **performance** of recycled material change after **multiple recycling cycles**?

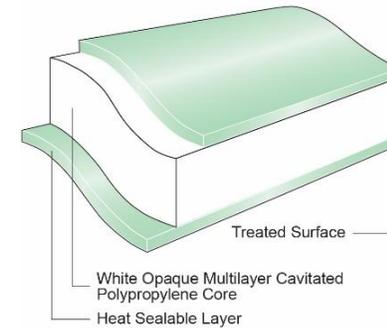
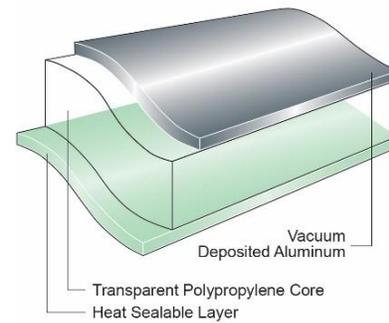
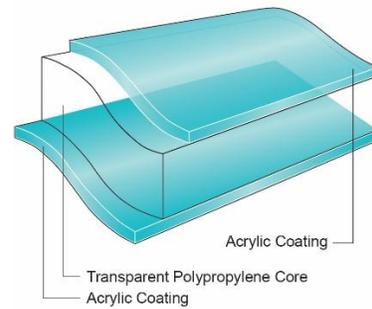
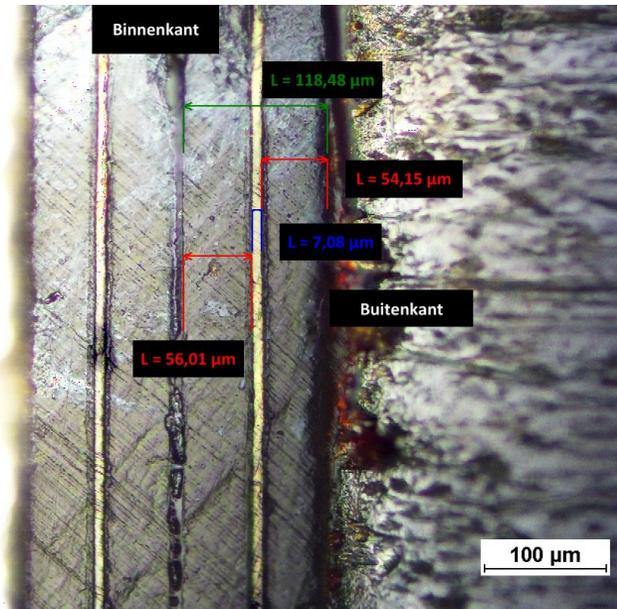
1 – 5 recycling cycles

Mechanical recycling

# PART 1 – INDIVIDUAL PP FILMS

## MECHANICAL PROPERTIES

Property	EVOH	Clear	Metalized	White	AlOx coated
Elastic Modulus	↑	↓	↓	↓	-
Tensile Strength	↑	↓	↓	↓	-
Strain at Break	↑	↓	↑	↑	↑
MFR	↑	↑	↑	↑	↑

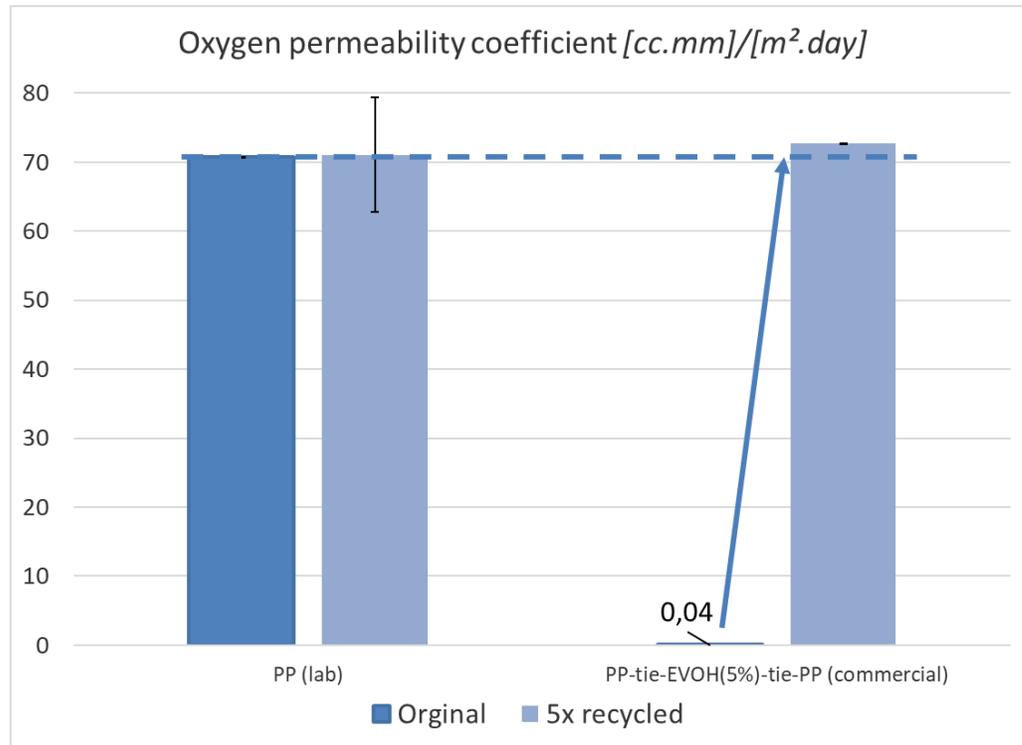


# PART 1 – INDIVIDUAL PP FILMS

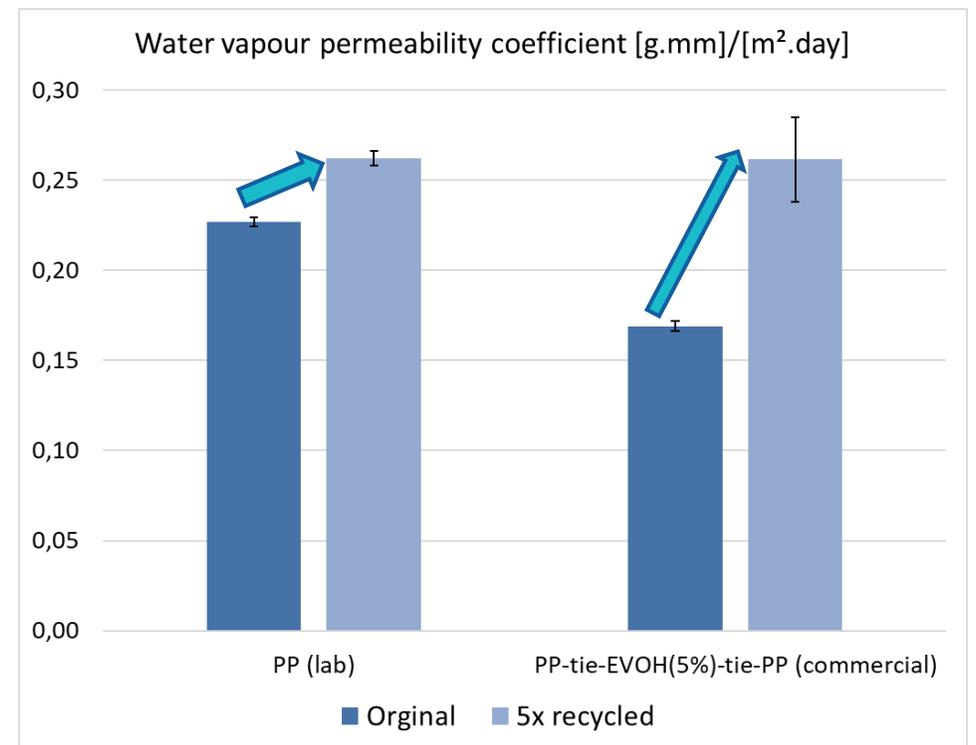
## BARRIER & SEALING PERFORMANCE

No sealing window after recycling

### > EVOH-layer



Oxygen permeability (ASTM F-1927)  
23°C, 50%RH, 100% O<sub>2</sub>, outside => inside



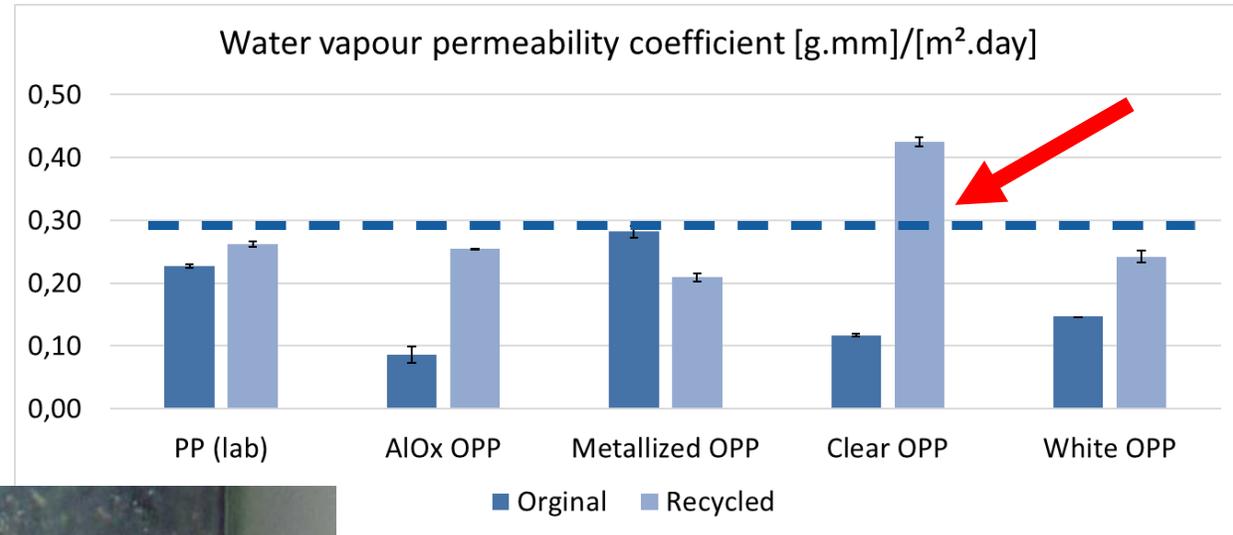
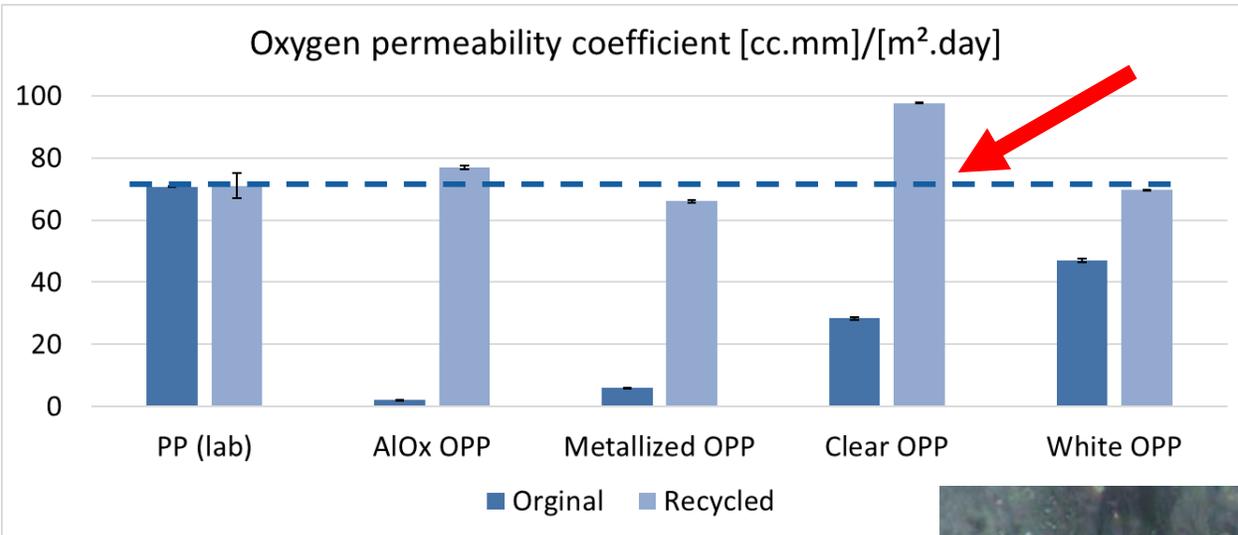
Water vapour permeability (ASTM F-1249)  
38°C, 90/0%RH, outside => inside

# PART 1 – INDIVIDUAL PP FILMS

## BARRIER & SEALING PERFORMANCE

No sealing window after recycling

> Coated & modified layer



Oxygen permeability (ASTM F-1927)  
23°C, 50%RH, 100% O<sub>2</sub>, outside => inside

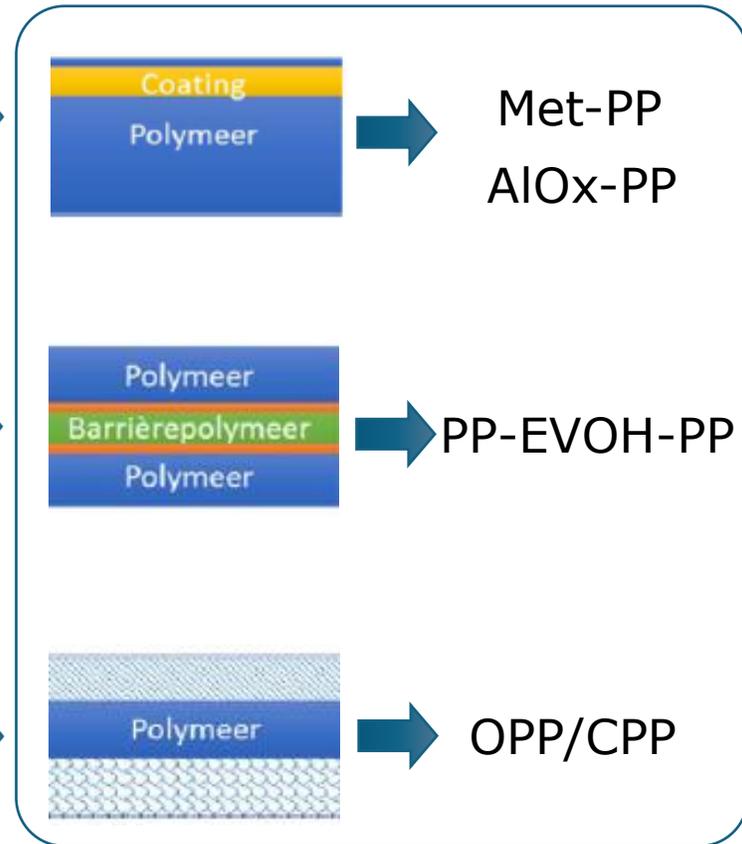
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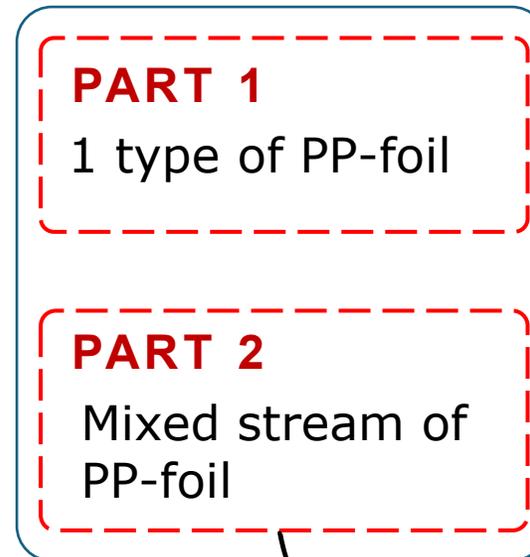
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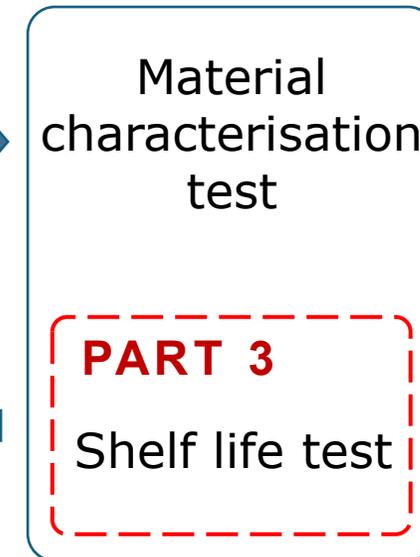
### Generic case studies



### Impact of packaging composition on mechanical recyclability



### Applicability of recycled alternative on food products

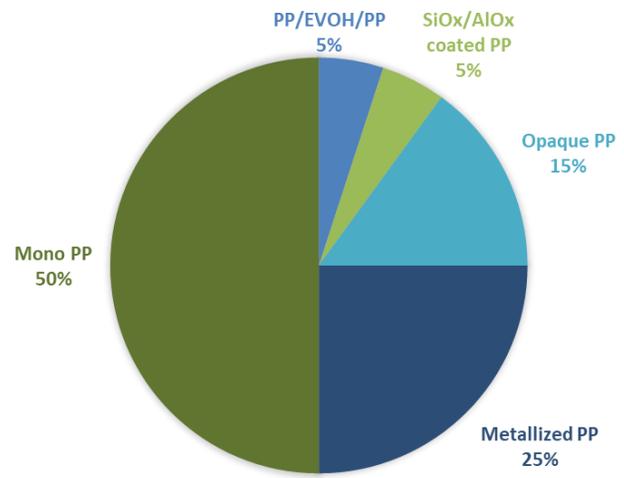
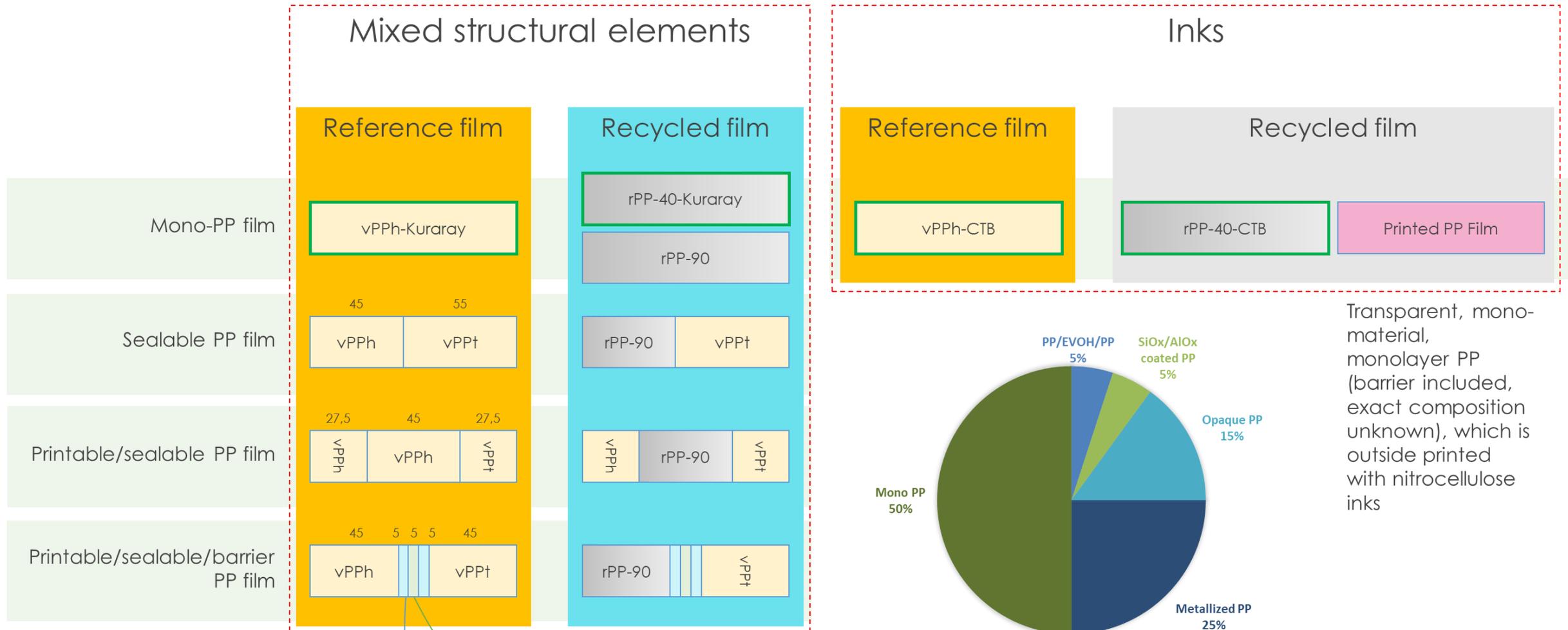


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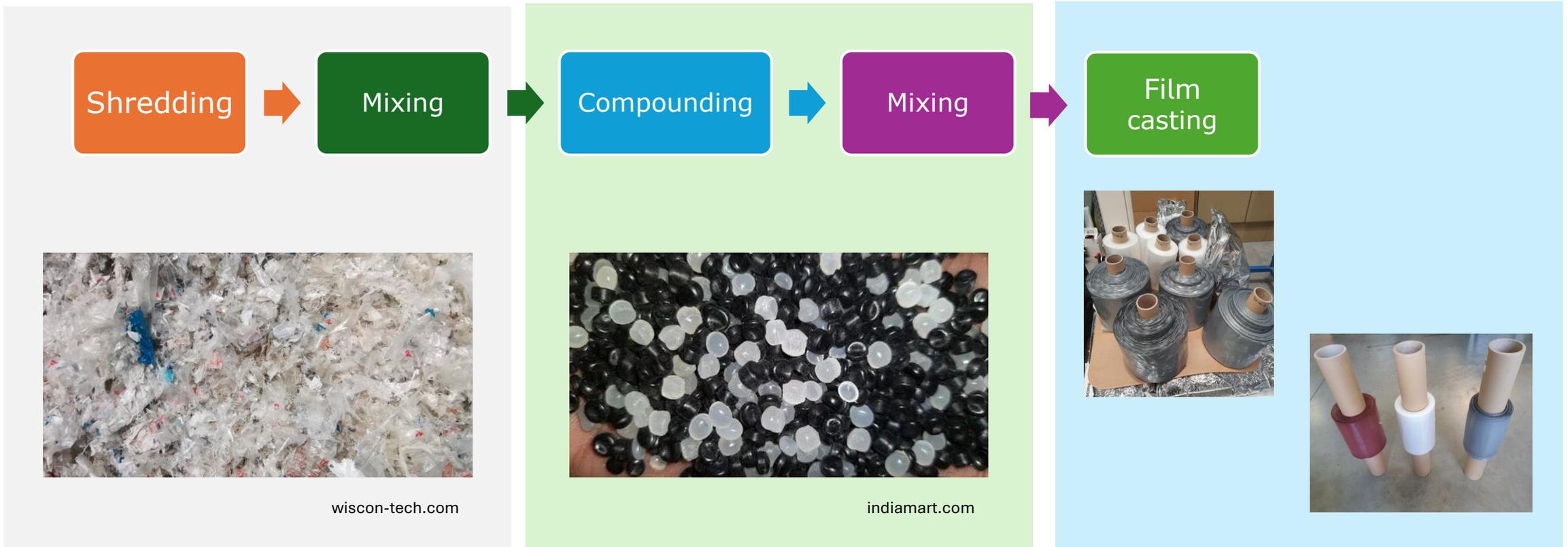
# PART 2 – MIXED STREAM

## APPLICATION SPECIFIC STRUCTURES WITH RECYCLED CONTENT



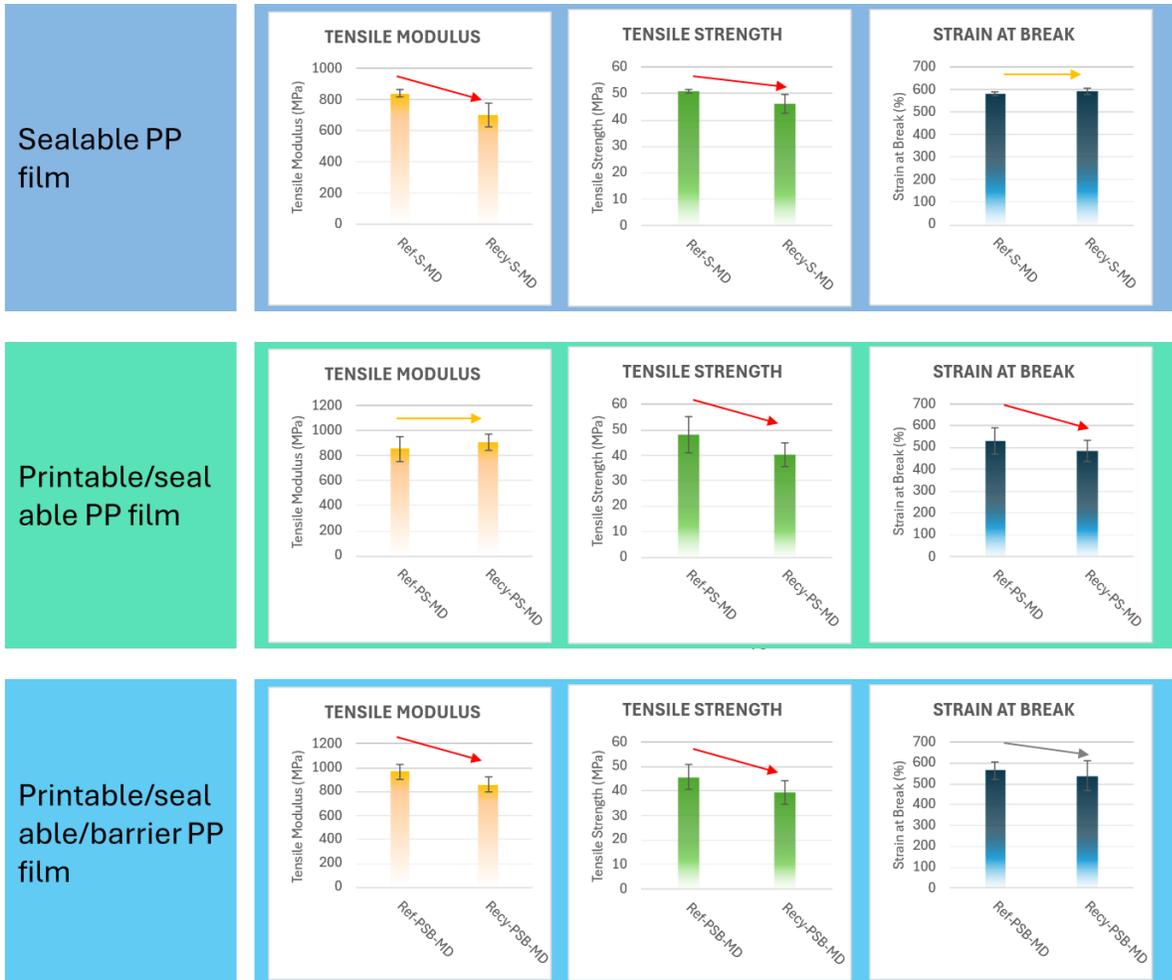
Transparent, mono-material, monolayer PP (barrier included, exact composition unknown), which is outside printed with nitrocellulose inks

# PART 2 – MIXED STREAM PRODUCTION OF FILMS

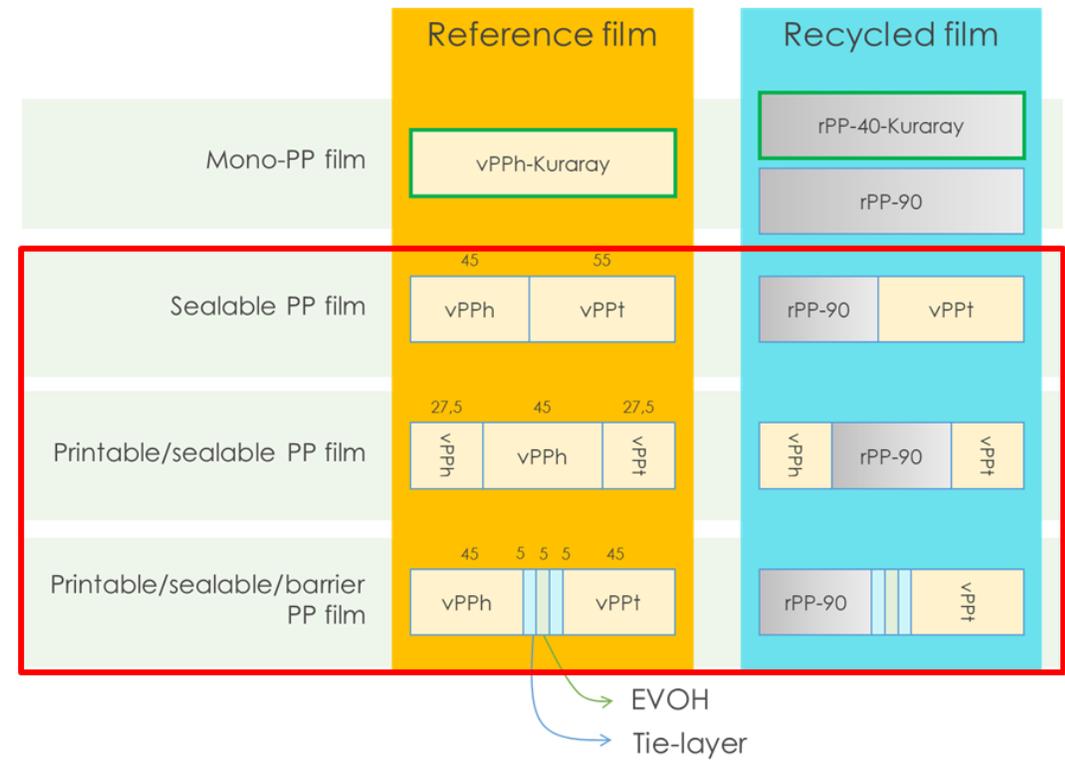


# PART 2 – MIXED STREAM

## INCORPORATION OF RECYCLED LAYER IN MULTI-LAYER STRUCTURES-MD



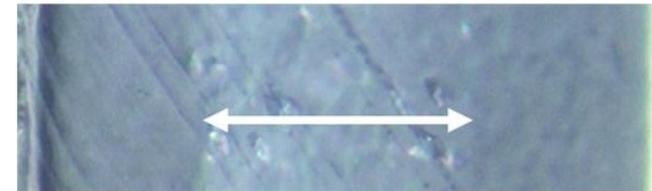
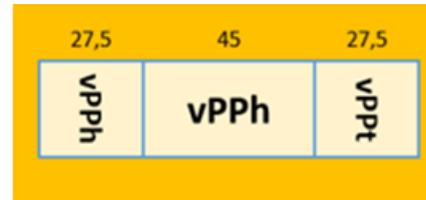
Mixed structural elements



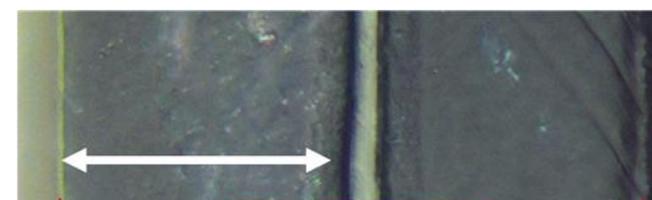
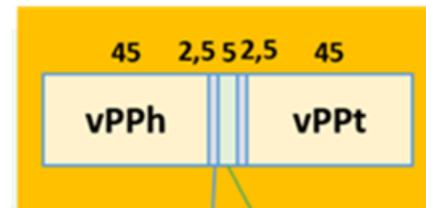
# PART 2 – MIXED STREAM

## BARRIER & SEALING PROPERTIES

Printable/sealable film



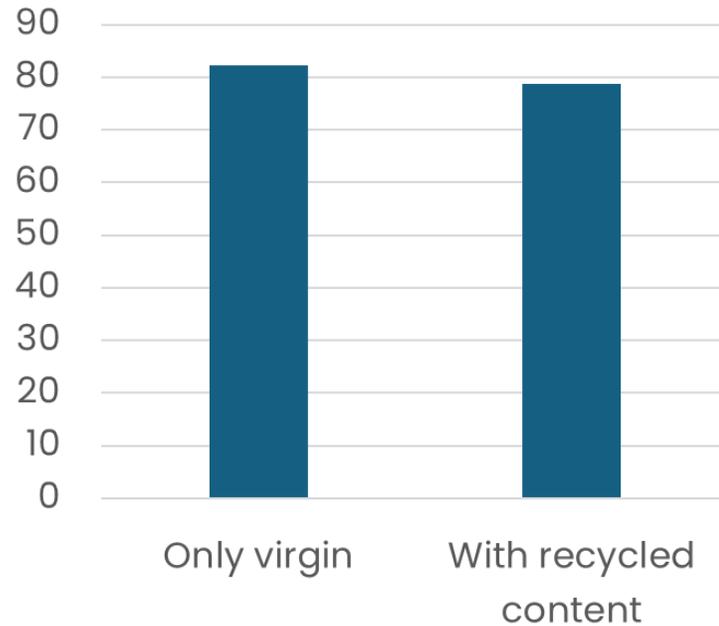
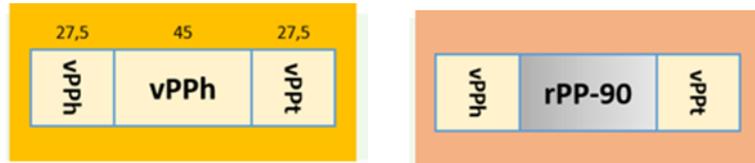
Sealable/barrier PP film



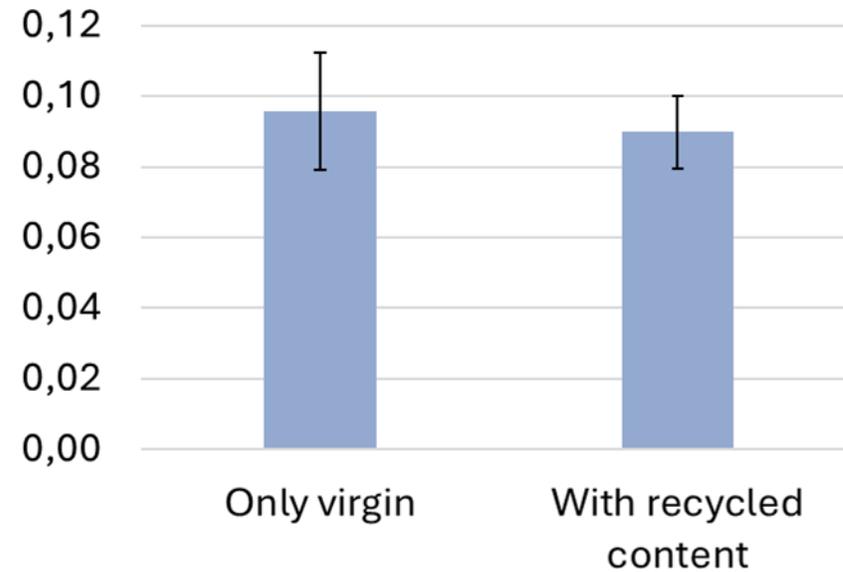
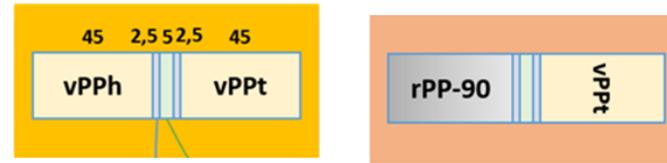
# PART 2 – MIXED STREAM

## OXYGEN PERMEABILITY COEFFICIENT [CC.MM]/[M<sup>2</sup>.DAY]

Printable/sealable film

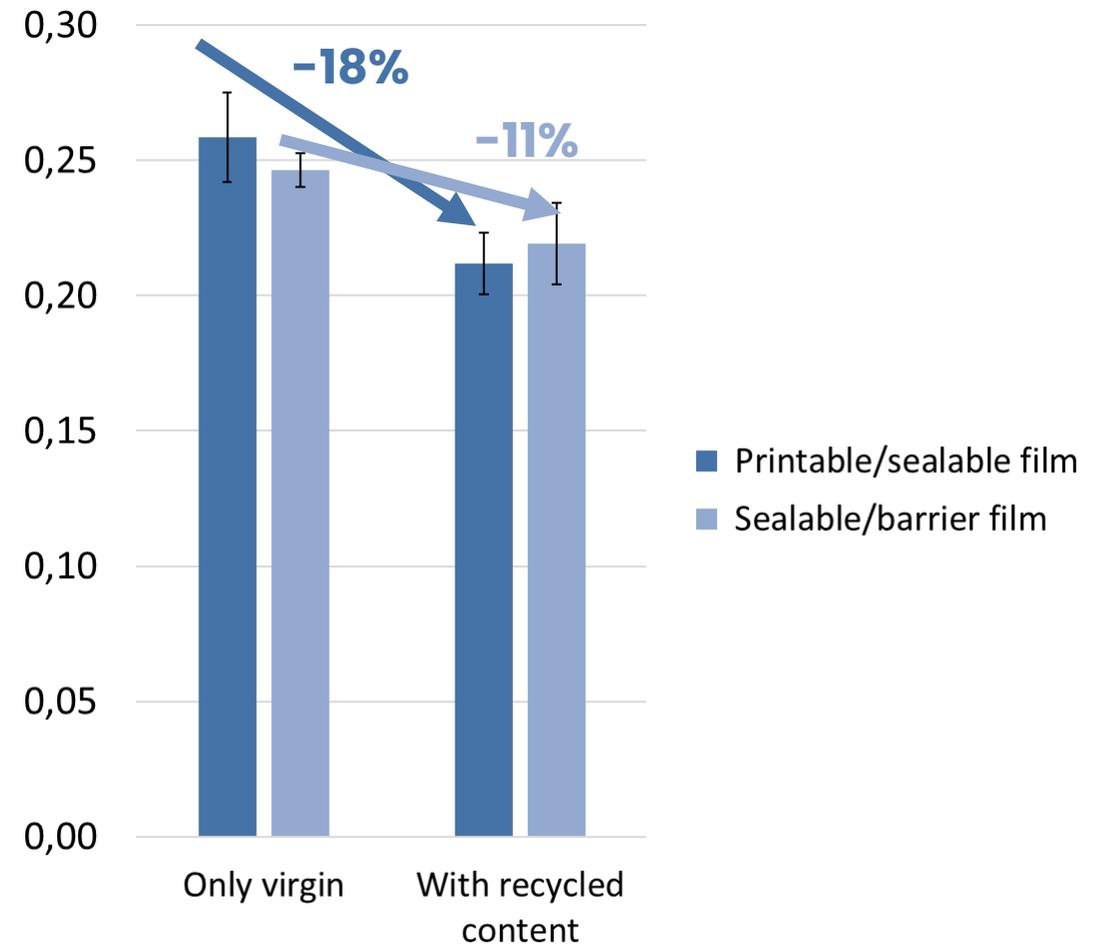
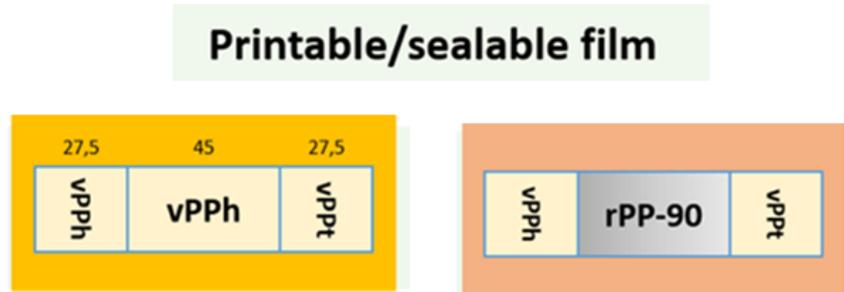


Sealable/barrier PP film



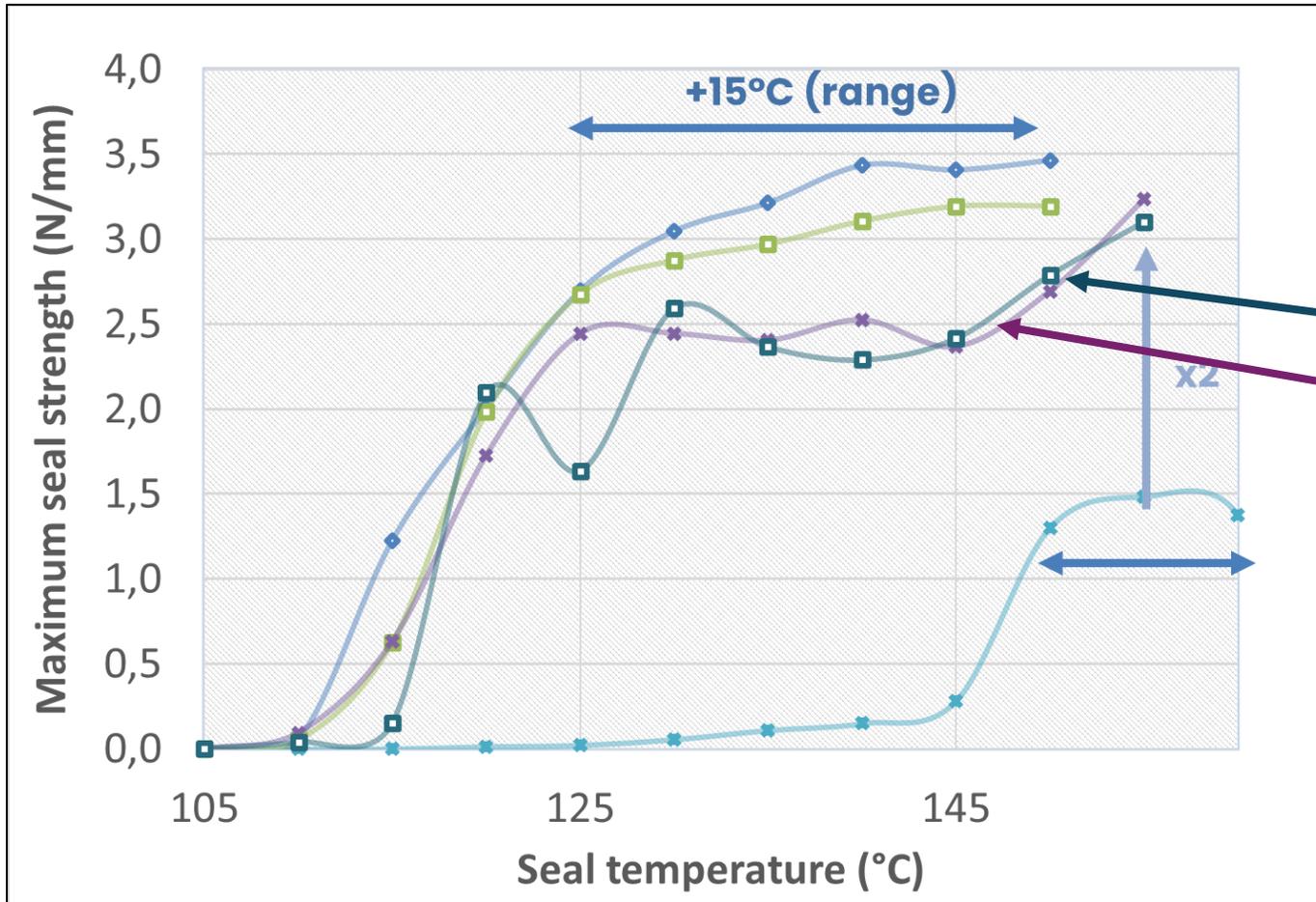
# PART 2 – MIXED STREAM

WATER VAPOUR PERMEABILITY COEFFICIENT [G.MM]/[M<sup>2</sup>.DAY]

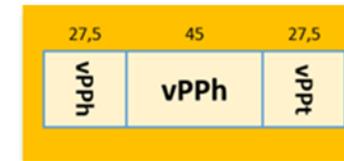


# PART 2 – MIXED STREAM

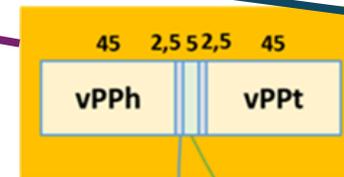
## SEAL PERFORMANCE



### Printable/sealable film



### Sealable/barrier PP film

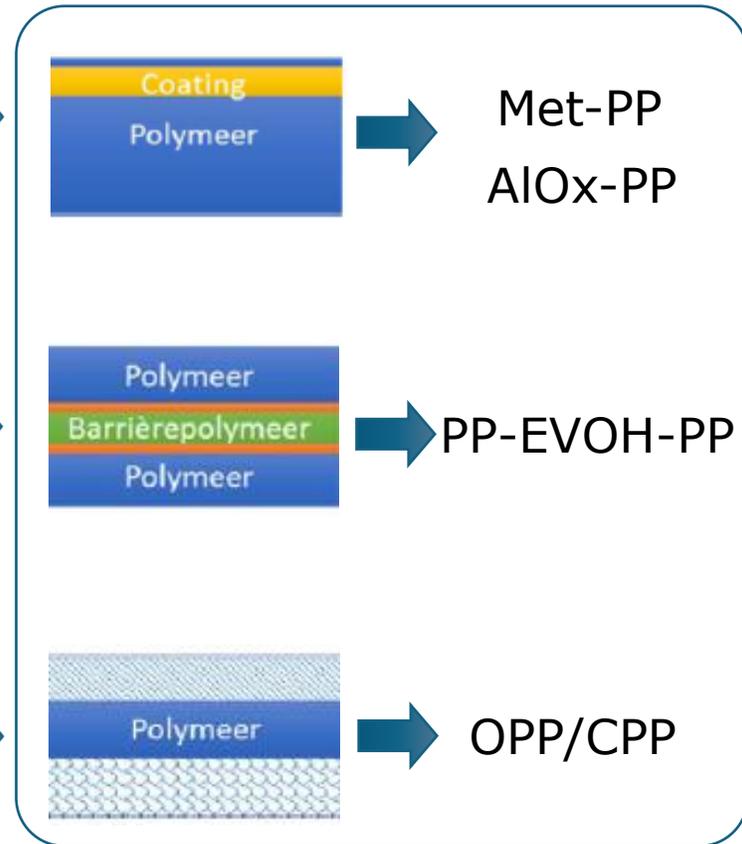


- Commercial sealable/barrier film
- Printable/sealable film (virgin)
- Printable/sealable film (with recycled content)
- Sealable/barrier film (virgin)
- Sealable/barrier film (with recycled content)

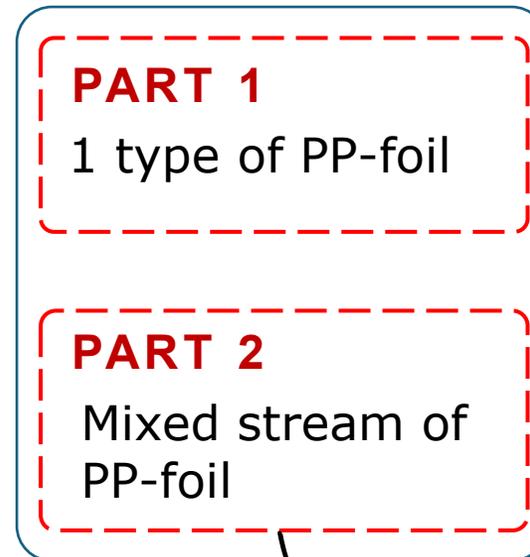
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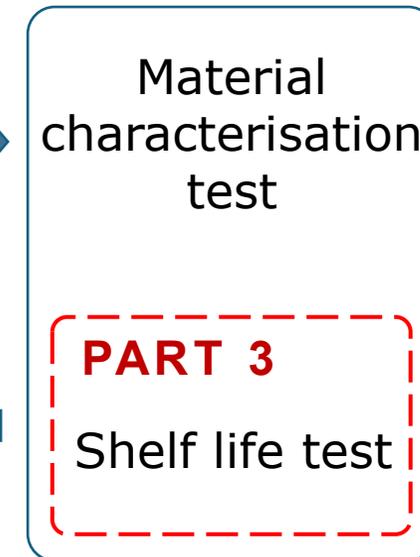
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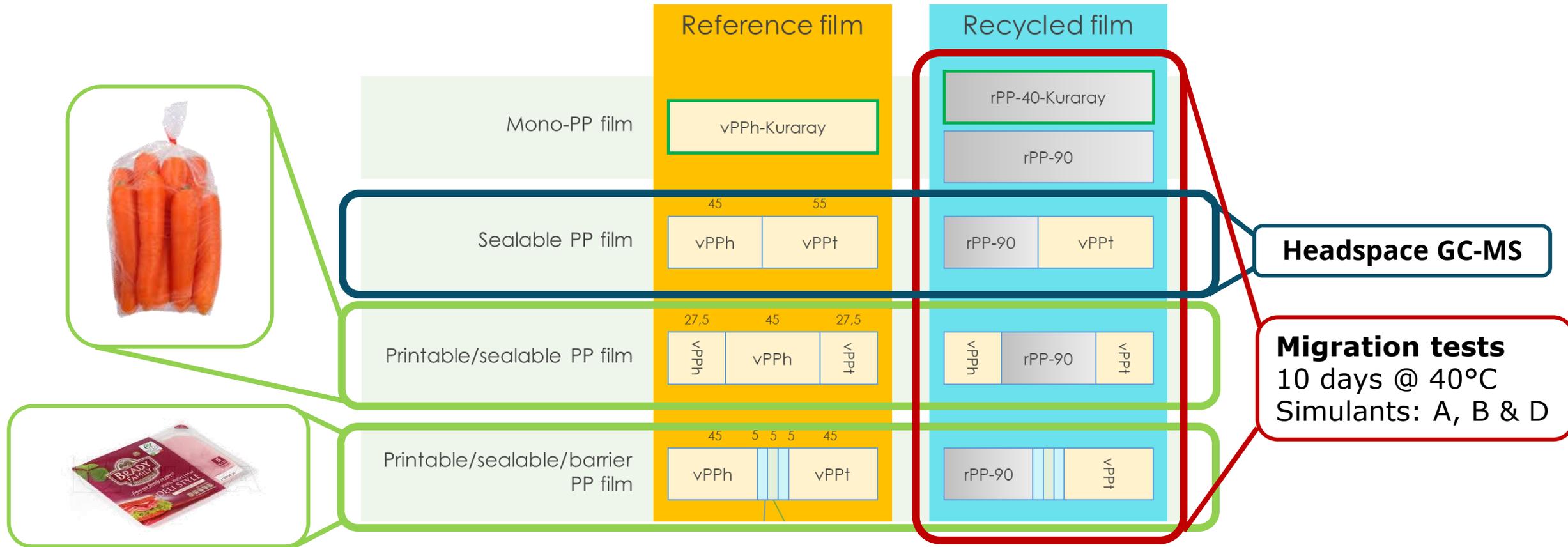


Main focus of today

Design  
Guidelines

# PART 3 – SHELF LIFE TEST

## OVERVIEW



# CONCLUSION

## Part 1 – individual films

- No major surprises, except for discolouration AlOx → due to primer
- Effect of recycling on properties compared to virgin?

**Mechanical**



**Sealing**



**OTR**

≈ virgin PP

**WVTR**



## Part 2 – mixed stream

- Incorporation of up to 40 w% recycled content in new structures.
- Properties of new multilayer structures?

**Mechanical**

≈ reference

**Sealing**



**OTR**



**WVTR**

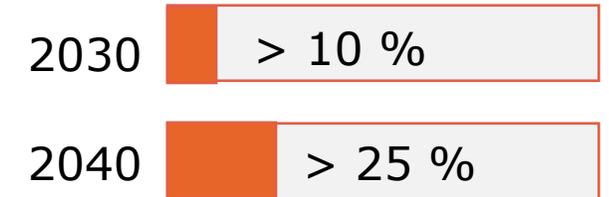


# CONCLUSION

## PPWR - RECYCLED CONTENT MINIMUM TARGETS



Contact sensitive plastic packaging (PET as major component)



Contact sensitive plastic packaging (all other than PET)



Single use plastic beverage bottles



Other plastic packaging

**Sufficient material on market?**

**Food contact?**

**Economically viable?**



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## CONTACT



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