


meeting**PACK**
2026

**BARRIER PACKAGING
SOLUTIONS:**

A Challenge for the
Circular Economy

21-22
APRIL



ainia  AIMPLAS

meeting**PACK**
2026

Advanced Packaging: The Perfect Balance Between Recyclability and Functionality

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Communication Workstream

Advanced Packaging Association

APA is a growing association of industry leaders across the packaging value chain



Founded in early 2024 to promote science-based sustainability and circularity in flexible packaging. Registered in Belgium, with HQ in Brussels

FULL MEMBERS:







SUPPORTING MEMBER:



SUPPORTED BY:



FOUNDING MEMBERS:





Activities linked with APA mission



Quantify **benefits of polyamide** in limiting food waste and reducing plastic usage

- Food packaging performance along the supply chain
- LCA studies



Demonstrate the recyclability of advanced packaging containing **polyamide** (through fact and experience-based approaches)

- Mechanical Recycling Industrial trials
- Reprocessing of materials containing polyamide for commercial application



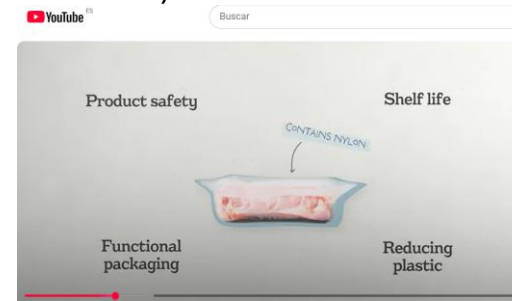
Communication along the entire value chain, connecting raw material producers, converters, brand owners, retailers, recyclers and legislators

- Technical articles, whitepapers and webinars published in APA website and social media
- Participation in conferences, round tables and trade shows
- Developing communication materials to reach national and European stakeholders



Industry-Policymaker Collaboration

- APA builds bridges between industry stakeholders and policymakers to encourage impactful environmental policies.
- Business case with the Finnish meat industry defending the need of Polyamide(<https://www.youtube.com/watch?v=2xSnkYK-2bo>)



Agenda

01

Demonstrating the benefits of films containing polyamide

02

Polyamide recognized as recyclable by D4R Guidelines and protocols

03

Demonstrating the recyclability of films containing polyamide at industrial scale

04

Key takeaways & call to action

Comparative assessment of PE/PA and PE/EVOH barrier films

Implications for food protection and food waste prevention



Material selection: Selection of 2 equivalent commercial bottom films available on the market & current top used by the food processor

Coextruded
PE/PA 200 um film



Coextruded
PE/EVOH 240 um film



Bottom selection: PE/EVOH 240um film not suitable for reliable sealing under evaluated conditions. Alternative commercial solution containing polyamide required to ensure consistent performance



Comparative assessment of PE/PA and PE/EVOH barrier films

Implications for food protection and food waste prevention



Material selection: Selection of 2 equivalent commercial bottom films available on the market & current top used by the food processor

Coextruded
PE/PA 200 μm film



Coextruded
PE/EVOH 240 μm film



Packaging production process: pork knuckles packed under standard industrial conditions (~380 bipacks)



Transport simulation tests: under ISO 4180:2020 & ASTM D4169-23 standards

Load (Drop)



Unload (Drop)



Transport (vibration & breaking)

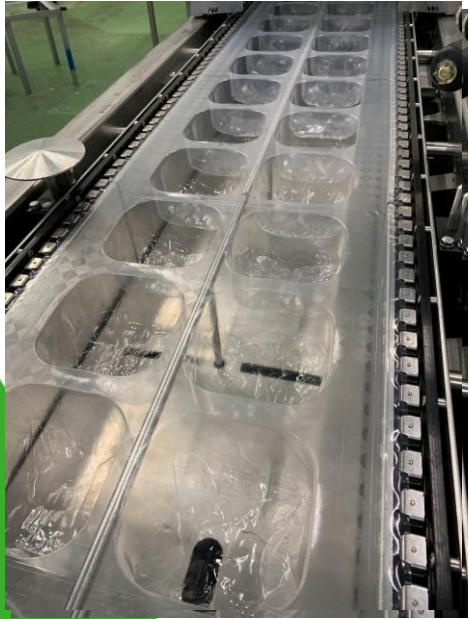
Performance evaluation: assessment of package failures throughout processing and transport steps

Inside the Industrial Process


PLATOS
TRADICIONALES

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THERMOFORMING

**FILLING &
SEALING**



**INTERNAL
PALLETIZATION**

PASTEURIZATION



**DRYING &
LABELING**



**FINAL
PALLETIZATION**

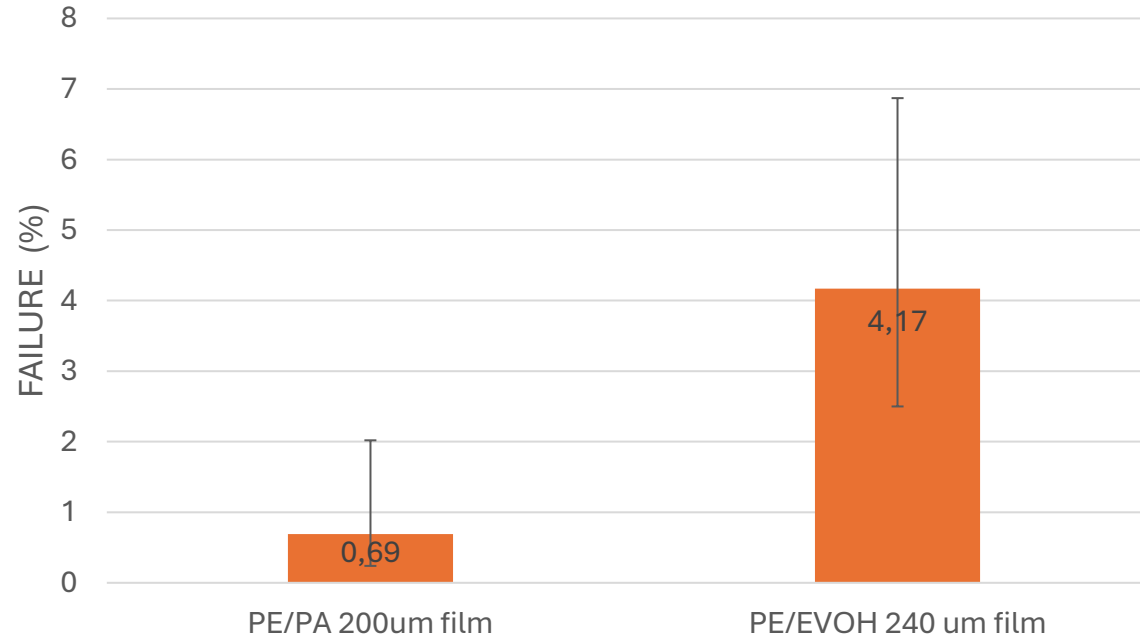


Failure % during processing

Packaging & pasteurization steps



Visual inspection along the process



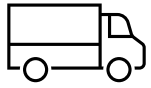
**6x less failures with
PE/PA film**

Improves process
reliability & lower risk
during packaging &
pasteurization

*Uncertainty was estimated with 95% Wilson
confidence interval, that is the most suitable
method for rare rejects as in this study*

Transport simulation

According to ISO 4180:2020 & ASTM D4169-23



Rotational Drop (Load & unload)



Vibration (Transport)

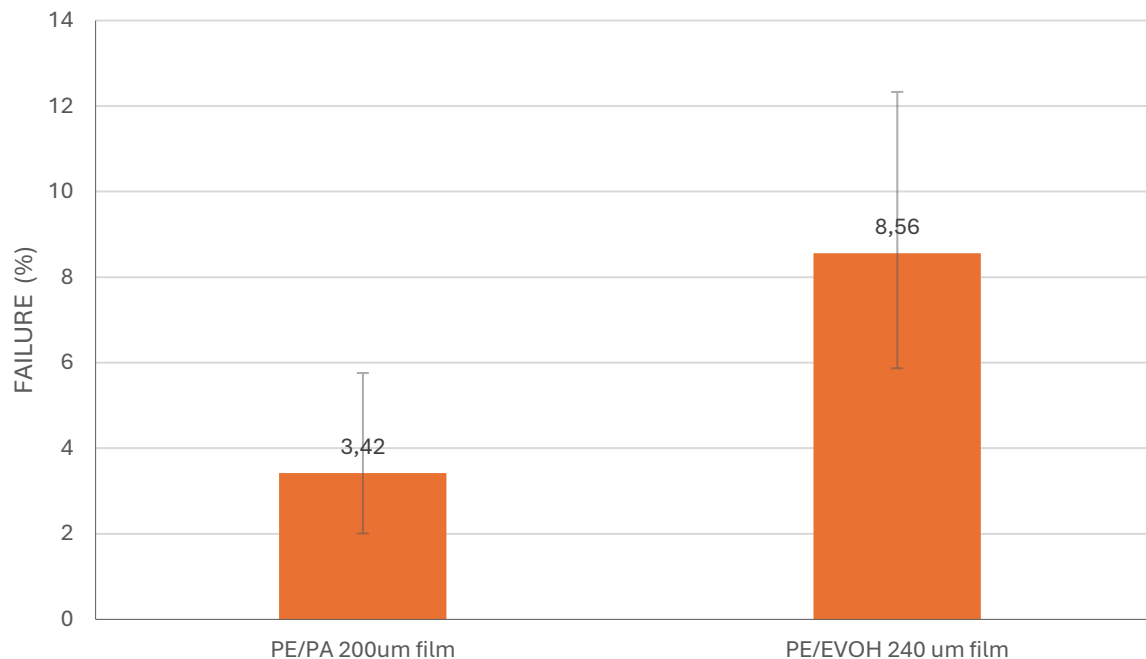


Horizontal Impact (Transport)



Failures % after transport simulation test

Visual and leak test inspection after the test

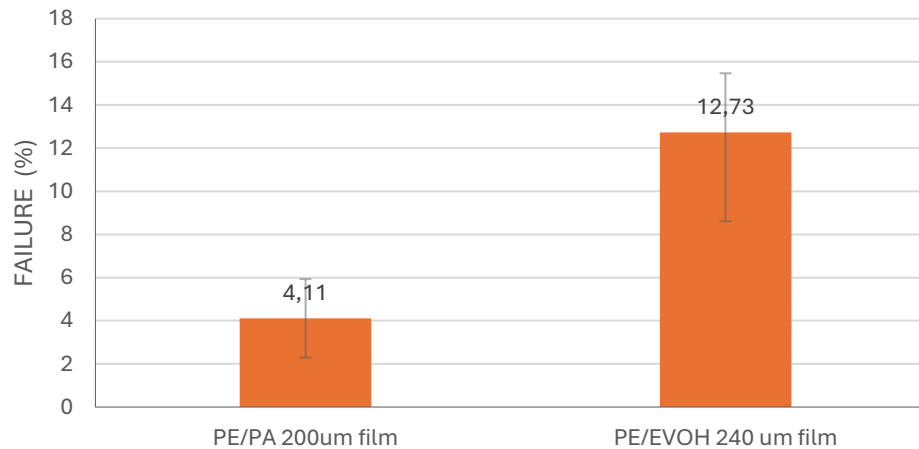


**2,5x less failures with
PE/PA film**

- ✓ Better mechanical resistance
- ✓ Improved packaging integrity
- ✓ Lower risk of product damage

Total failures % along the full process

Processing & transport simulation



**3x less failures with
PE/PA film**

- ✓ System-wide reliability improvement
- ✓ Reduced overall packaging risk
- ✓ Robust solution beyond sealing performance

Uncertainty was estimated with 95% Wilson confidence interval, that is the most suitable method for rare rejects as in this study

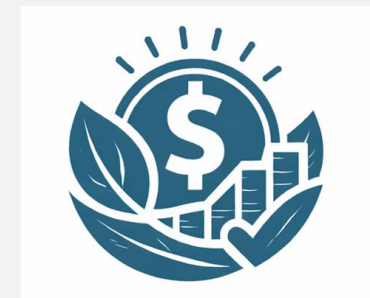
Potential savings thanks to PE/PA films



~11 Tons
Plastic savings*



~ 50 Tons
Food waste
savings**



~340.000 €
Food waste
savings***

**Based on a comparison of film thicknesses between 200 μ m and 240 μ m considering 1 million bipacks of pork knuckles*

*** Calculations are based on the failure ratio after pasteurization and transport, comparing a PA/PE bottom film (200 μ m) with a PE/EVOH bottom film (240 μ m) considering 1 million bipacks of pork knuckles*

**** The economic impact of food waste was calculated by accounting for losses after pasteurization and transportation, valued at the selling price*

LCA study to be published soon

Conclusions on demonstrating the benefits of advance packaging



MACHINABILITY

Films without polyamide couldn't be used as lid films in existing machine due to the **low thermal resistance**



MECHANICAL PROTECTION

Less failures during processing and transport simulation thanks to the polyamide presence



SAVINGS

Lower breakage ratio is directly related to **less plastic** usage, **food waste reduction** and **economic savings**



...And what about
the recyclability of
polyethylene films
containing
polyamide?



Polyamide recognized as recyclable by D4R guidelines and proven by independent protocols



CEFLEX Designed for recycling guidelines 2020

Further work will be undertaken in phase 2 to evaluate and agree a limit for PA in flexible packaging waste streams, as well as considering opportunities to sort and recycle structures containing PA.

Designed for recycling guidelines today

CEFLEX (October 2025)

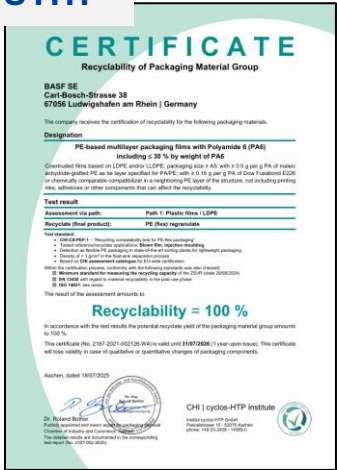
	PE FLEXIBLE	PP FLEXIBLE
GREEN CATEGORY	≤ 20 wt% PA6/66 coextruded with ≥ 9 wt% PE-g-MAH tie layer	≤ 35 wt% PA6 coextruded with ≥ 14 wt% PE-g-MAH tie layer
YELLOW CATEGORY	Between 20 wt% and 35 wt% PA6/66 coextruded with ≥ 9 wt% PE-g-MAH tie layer	≤ 20 wt% PA6 laminated with ≤ 3 wt% aromatic PU laminating adhesive

CEN STANDARD SERIES EN 18120:2026 (April 2026)

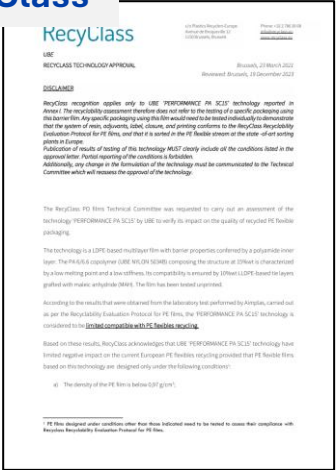
	PE FLEXIBLE	PP FLEXIBLE	PE RIGID
GREEN CATEGORY	≤ 10 wt% PA6/6.6 coextruded with 0.5 g/g PE-MAH and optionally a compatibiliser	-	≤10%wt PA6 and PA6/66 with tie layer PE-g-MAH 0.5g/gPA or compatibilizer
YELLOW CATEGORY	Between 10 wt% and 35 wt% PA6/6.6 coextruded, with 0.5 g/g PE-MAH and optionally a compatibiliser	≤ 20 wt% PA6/6.6 coextruded in presence of 0,5 g of PE-MAH tie layer per g of PA optionally compatibilizer	≤ 25 %wt PA6 and PA6/66 with PE-gMAH tie layer 0.5g/gPA

Independent recyclability protocols

CYCLOS HTP



RecyClass

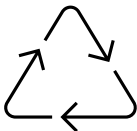


APR



Confirming recyclability of PE/PA films “in real life”

The **most ambitious industrial recycling** project of advanced packaging carried out to the date!



3

RECYCLING SITES & TECHNOLOGIES



5

FILM STRUCTURES



Commercial PIR PE film (mix of PE)



Coextruded PE/**PA6**
Coextruded PE/**PA6/66**
Laminated PE//**BoPA6**
Compatibilized laminated PE//**BoPA6**

>9000

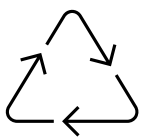
**Kg OF FILM
RECYCLED
AND
RE-EXTRUDED**

UBE



Reprocessing PA/PE films using PE processing conditions

Recycled pellets coming from coextruded films with different polyamide types led to high-quality commercial film production



1	2	3	4	5
PE PIR	PE/Coex PA6/66	PE/Coex PA6	PE//BoPA6	PE//BoPA6 + comp.



Good pellet shape and excellent appearance,
no difference PE/PA vs rPE

Good pellet shape and excellent appearance;
more yellowing. Laminates without
compatibilizer -> film with less quality

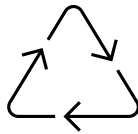


Airblown Extrusion Line



Conclusions on demonstrating the recyclability of advanced packaging

PE/PA films successfully recycled at scale across **three** different **sites** using **standard processing parameters**



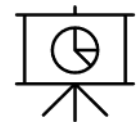
Commercial **quality** films obtained from the **recycled pellets**

Compatibilizer improve laminated structures



Inclusion of **polyamide** in **D4R guidelines**

Dozens of approvals already **available** in the market (**Cyclos, RecyClass, APR**)





advanced
packaging
association

Films **containing polyamide** are the **perfect balance** between **recyclability** and **functionality**.

What if your **polyamide containing** materials are **already recyclable**, and you simply do not know it yet? It is **time to investigate**.

The Value of Joining APA



- **Participate** in **studies** to support advanced packaging
- **Connect** with **industry actors** to create visibility, credibility, and momentum
- **Share expertise** and **raise awareness** among change makers in the EU
- Stay up to date with the **latest legislative developments**



Thank you very much!!!

