PCR PET for food packaging. Facts and challenges.

Lisa Straub

Feb 22, 2012

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Solid state polycondensation plants for the **iV increase** and **decontamination** of PET **pellets** and **flakes** as

- stand alone unit
- after a pelletizing extruder
- in front of a production extruder.

deCON

viscoSTAR

- ✓ Adjustable iV increase
- ✓ Drying to less than 50 ppm moisture
- ✓ Decontamination for direct food contact (EFSA, FDA)
- ✓ Brand owner approvals and references
- ✓ Acetaldehyde content less than 1 ppm
- ✓ Increase of bulk density up to 30% (of flakes)
- ✓ Dedusting during production
- ✓ Excellent coloring due to the low process temperature

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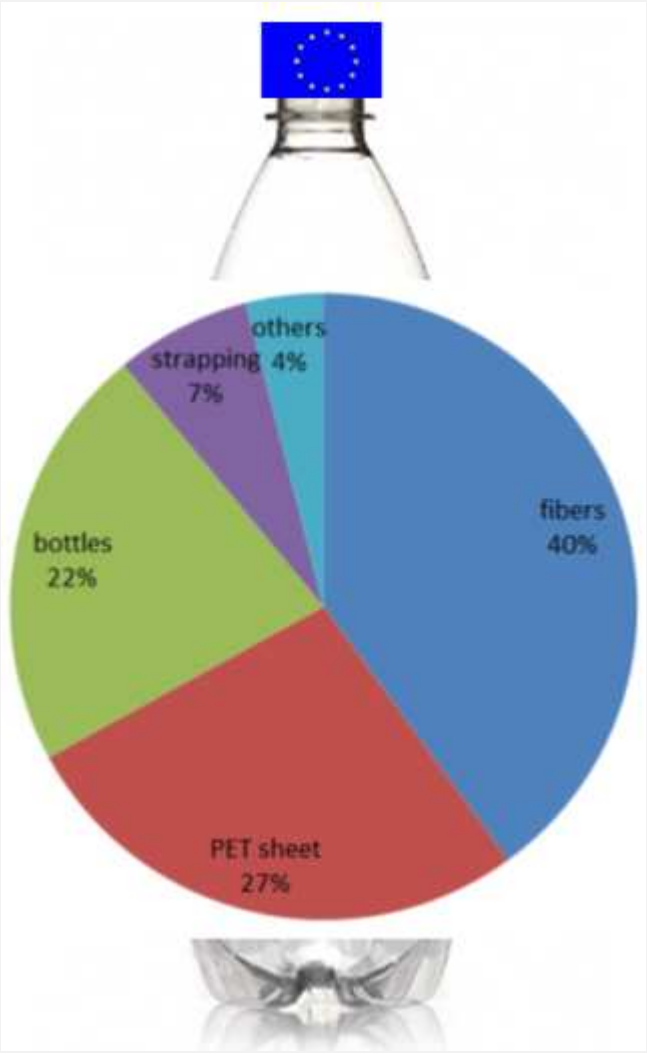
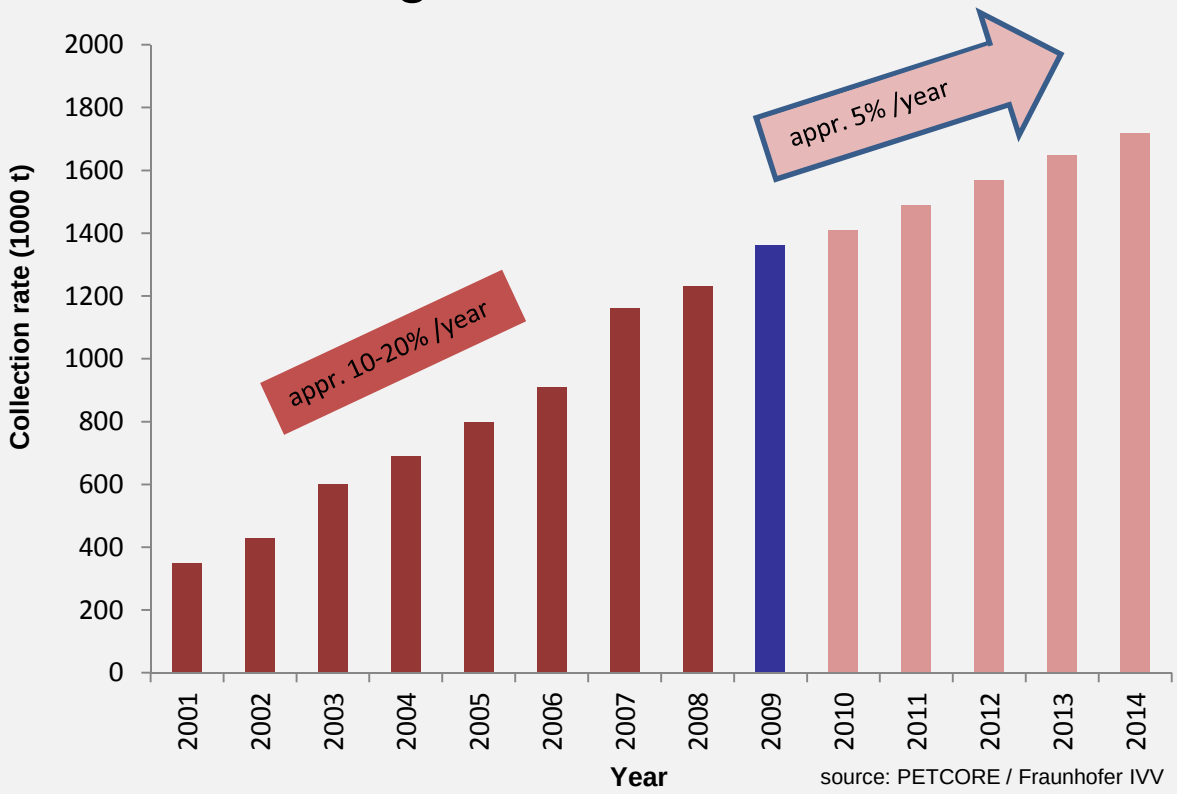
Coming soon: New location in 4113 St. Martin/Mkr.

EU PET market 2009



- ✓ **48 % collection rate**
- ✓ **49 % R-PET for packaging**
- ✓ **both figures on the rise**



source: PETCORE / Fraunhofer IVV

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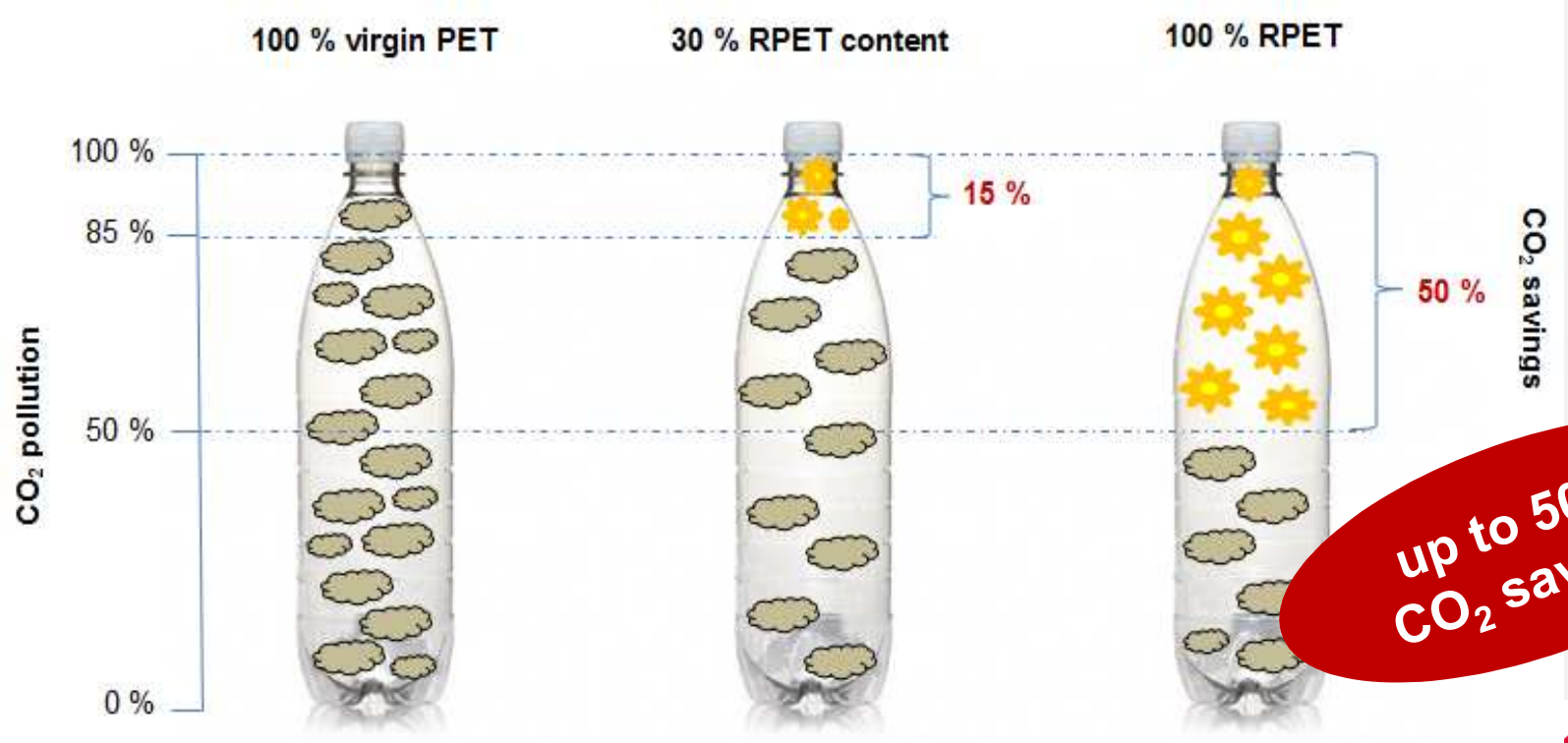
R-PET benefits approx. values for a typical 10.000 metric tn/y recycling plant

- ✓ **Job** creation → 100 (incl. collecting and sorting)
- ✓ **Crude oil** consumption → 10 million l
- ✓ **Landfill** reduction → 6 m³ / tn
- ✓ Production **Cost** reduction → dependent on virgin price
- ✓ **CO_2** foot print reduction → 15.000 tn CO_2 saving



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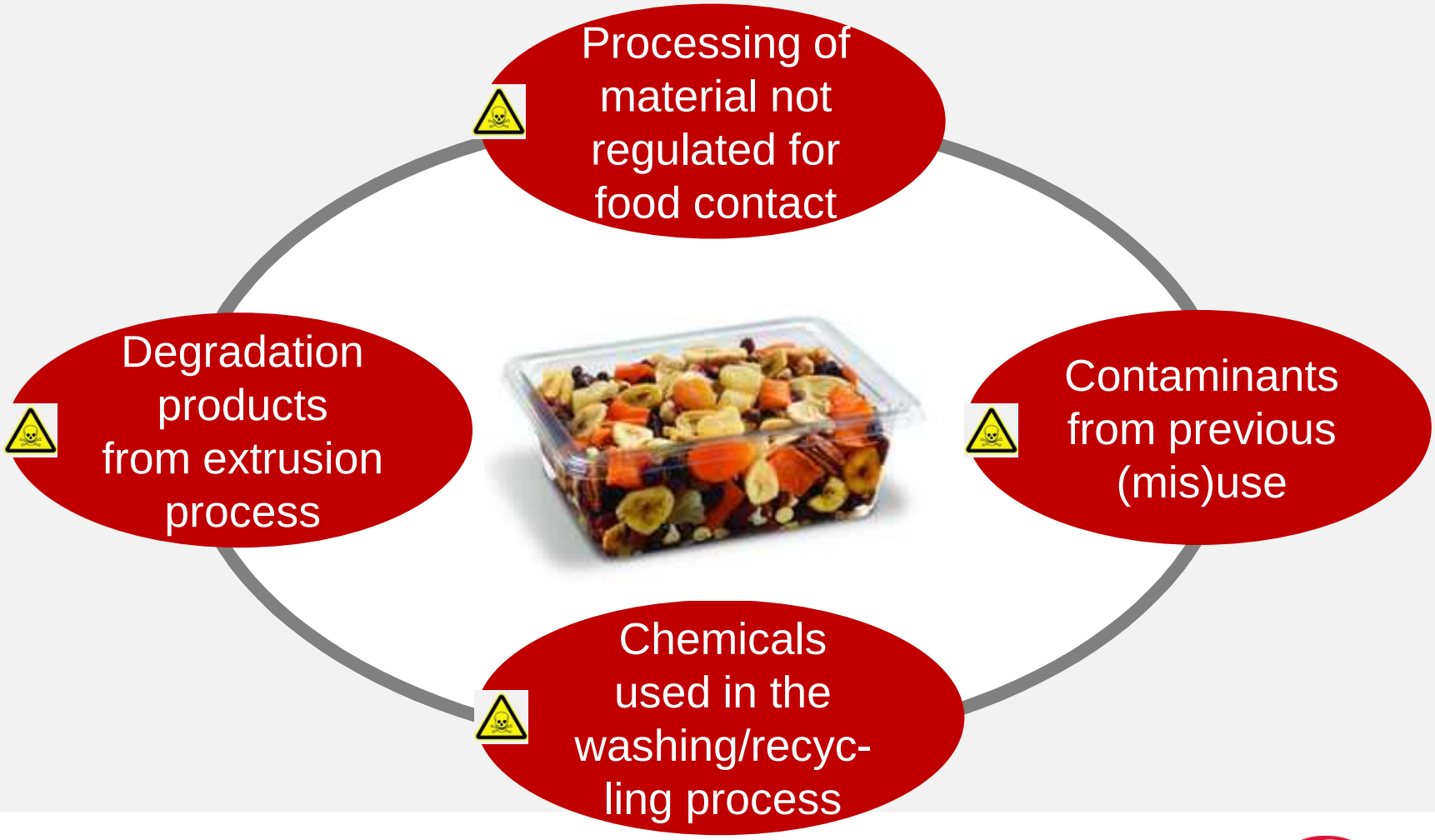
Migration of contaminants in R-PET



Cleansing efficiency of recycling processes

- Recycling processes must remove chemical substances to a point where *(EC 1935/2004, Art. 3)*
  - ✓ human health is not endangered
  - ✓ no unacceptable change in the composition of food occurs
  - ✓ no deterioration in smell or taste of food appears

EC 2023/2006
EU 10/2011
EC 282/2008
EFSA Evaluation criteria

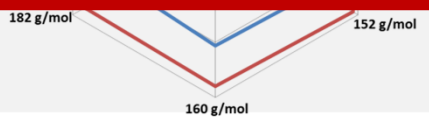
Challenge Test

Comparison of cleaning efficiency with EFSA criteria

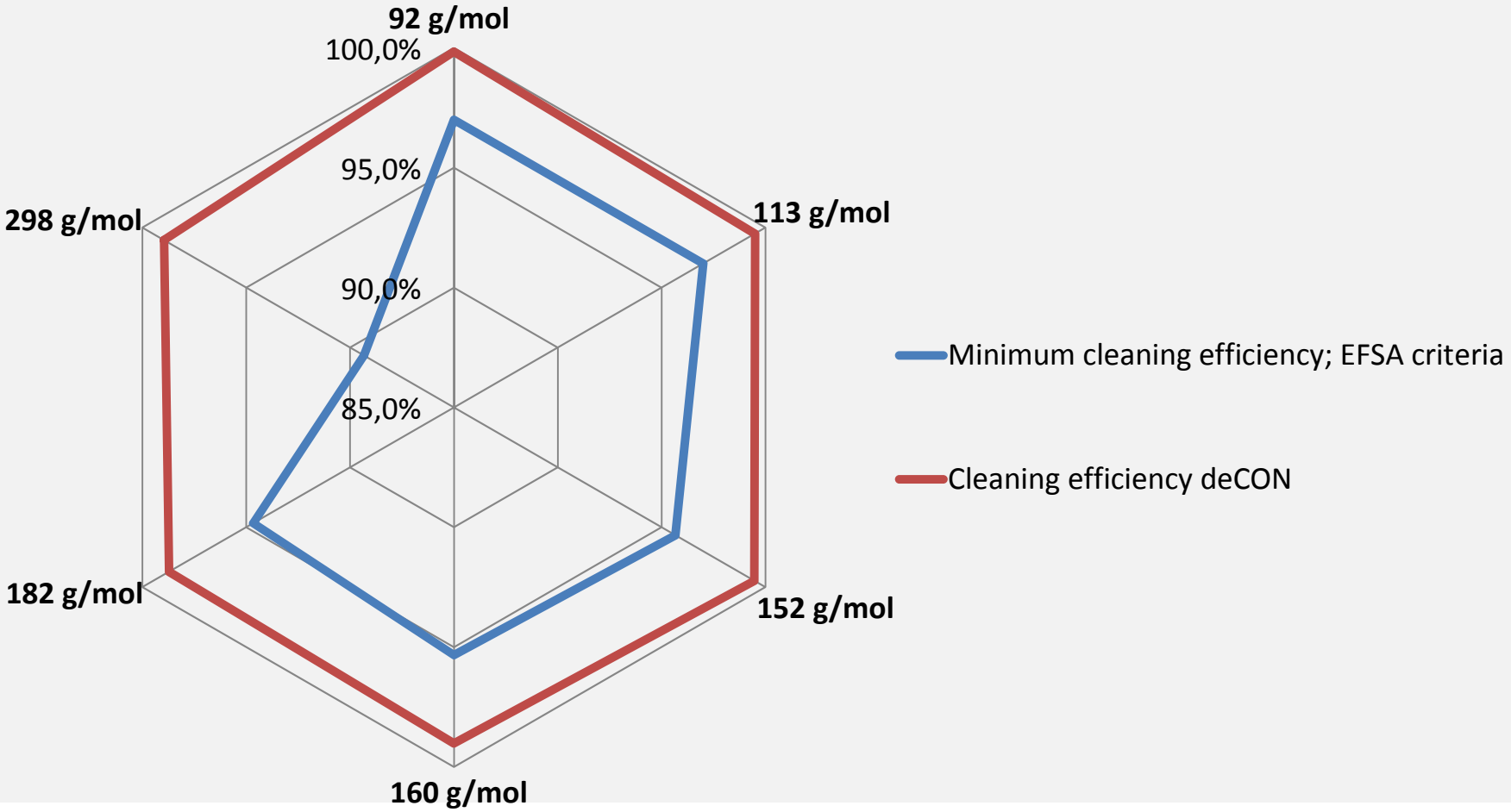
Authorization of recycling process acc. to EC 282/2008

Exceptions from EC 282/2008:
- Chem. depolymerization
- Inhouse waste acc. to EU 10/2011
- **Material behind functional barrier**

Migration limits & cleaning efficiencies



Required cleaning efficiencies for 6 challenge test substances

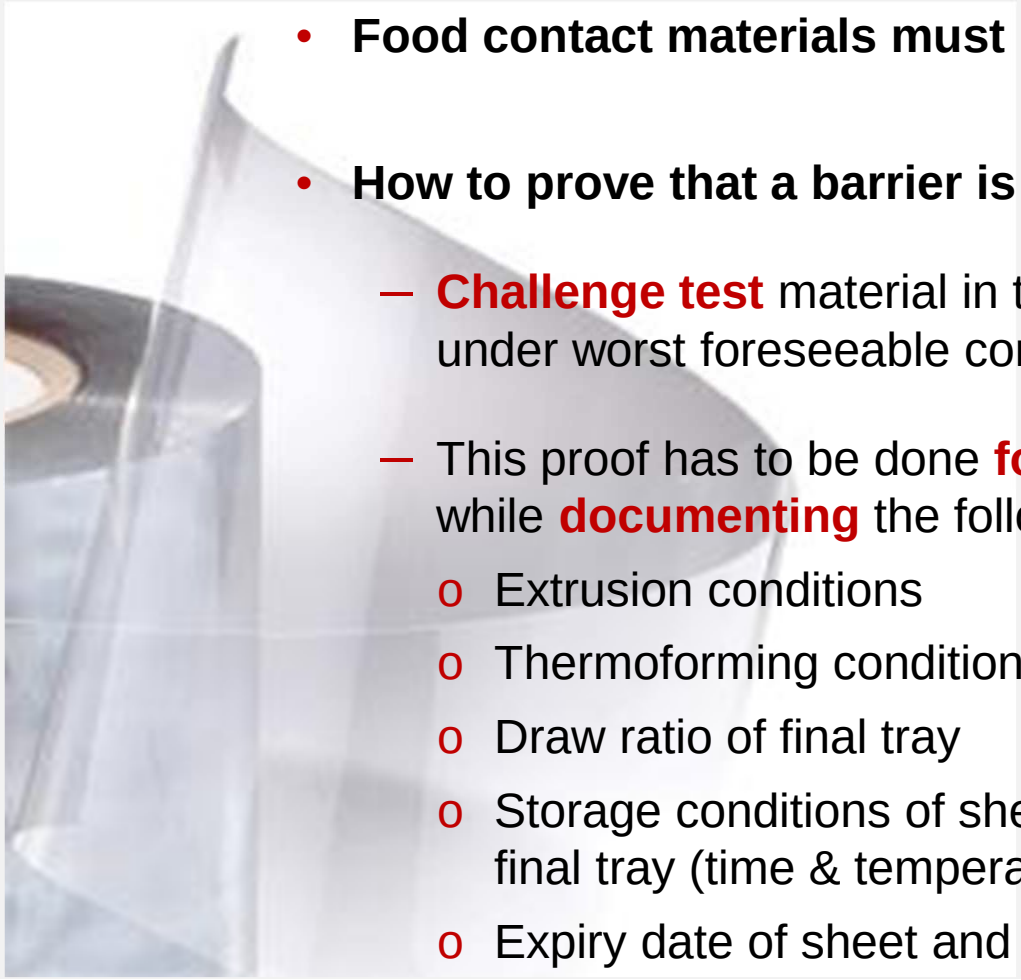


Functional barrier

"A barrier consisting of one or more layers of any type of material which ensures that the final material or article complies with Art. 3 of Regulation (EC) No 1935/2004 and EU No 10/2011."

EU No 10/2011, Article 3 (15)

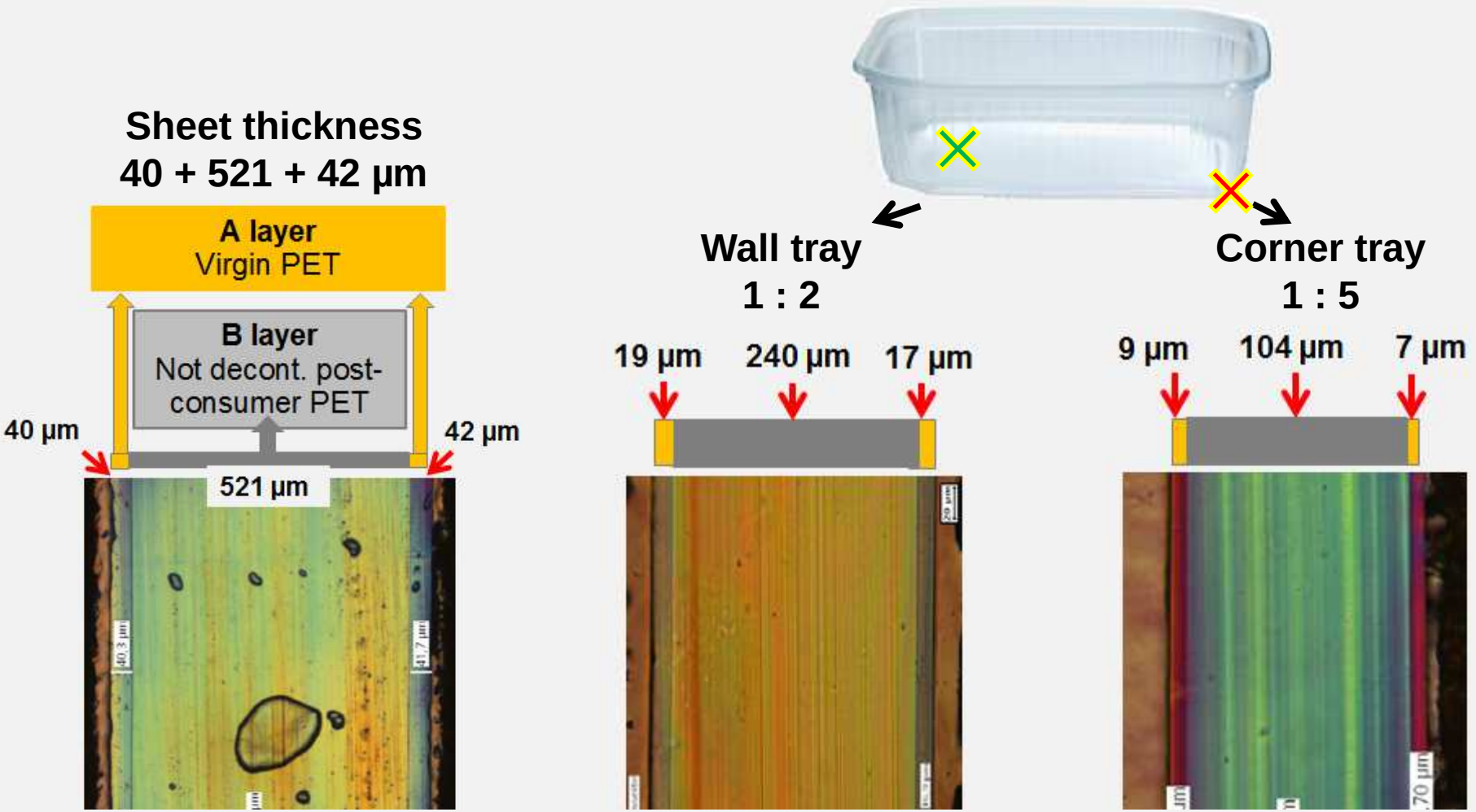
„Functional barriers“ in ABA PET sheet **no alternative**



- **Food contact materials must not harm human health.**
- **How to prove that a barrier is functional ?**
  - **Challenge test** material in the B layer and migration modeling under worst foreseeable conditions of use
  - This proof has to be done **for each individual extrusion line** while **documenting** the following variables:
    - Extrusion conditions
    - Thermoforming conditions
    - Draw ratio of final tray
    - Storage conditions of sheet and final tray (time & temperature)
    - Expiry date of sheet and tray

Documentation not feasible in praxis!

Microtome cut shows reduction in layer thicknesses



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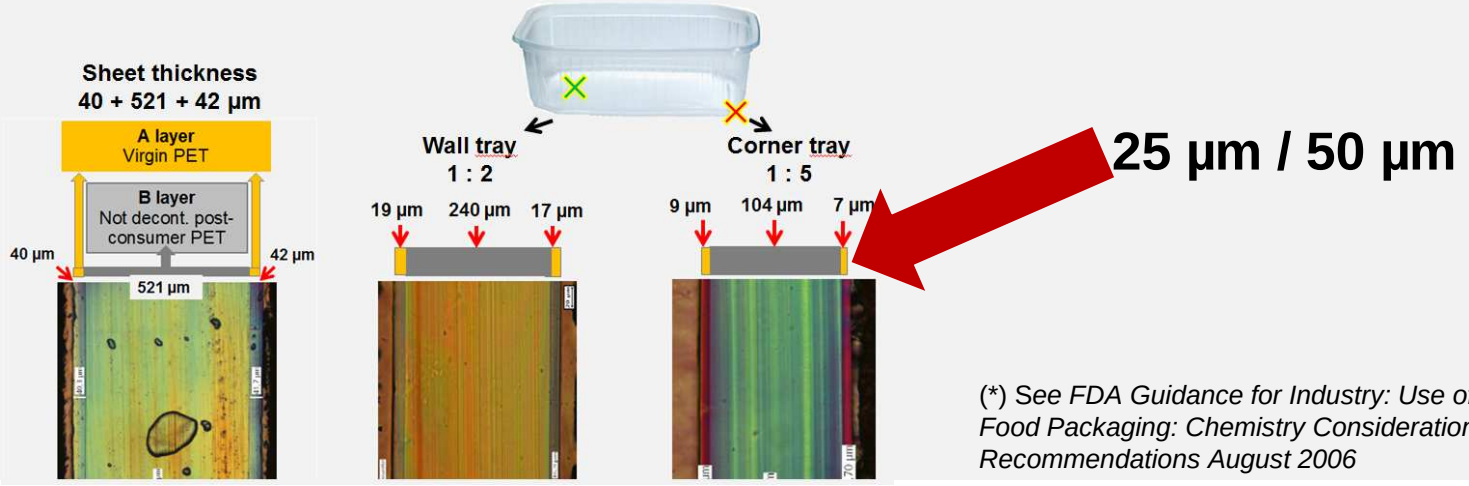
Misinterpretation FDA: Limit for final tray!

In contrary to EFSA, FDA specifies the thickness of an effective barrier layer: “Virgin PET is an effective barrier to contaminants that could potentially migrate from a recycled plastic inner layer under the following conditions:

- at a thickness ≥ 25 µm at room temperature and below
- at a thickness ≥ 50 µm at higher temperatures” (*)

NOTE:

25 µm / 50 µm refer to the barrier thickness at the thinnest spot of the final tray (corner) - not to the layer thickness in the sheet!



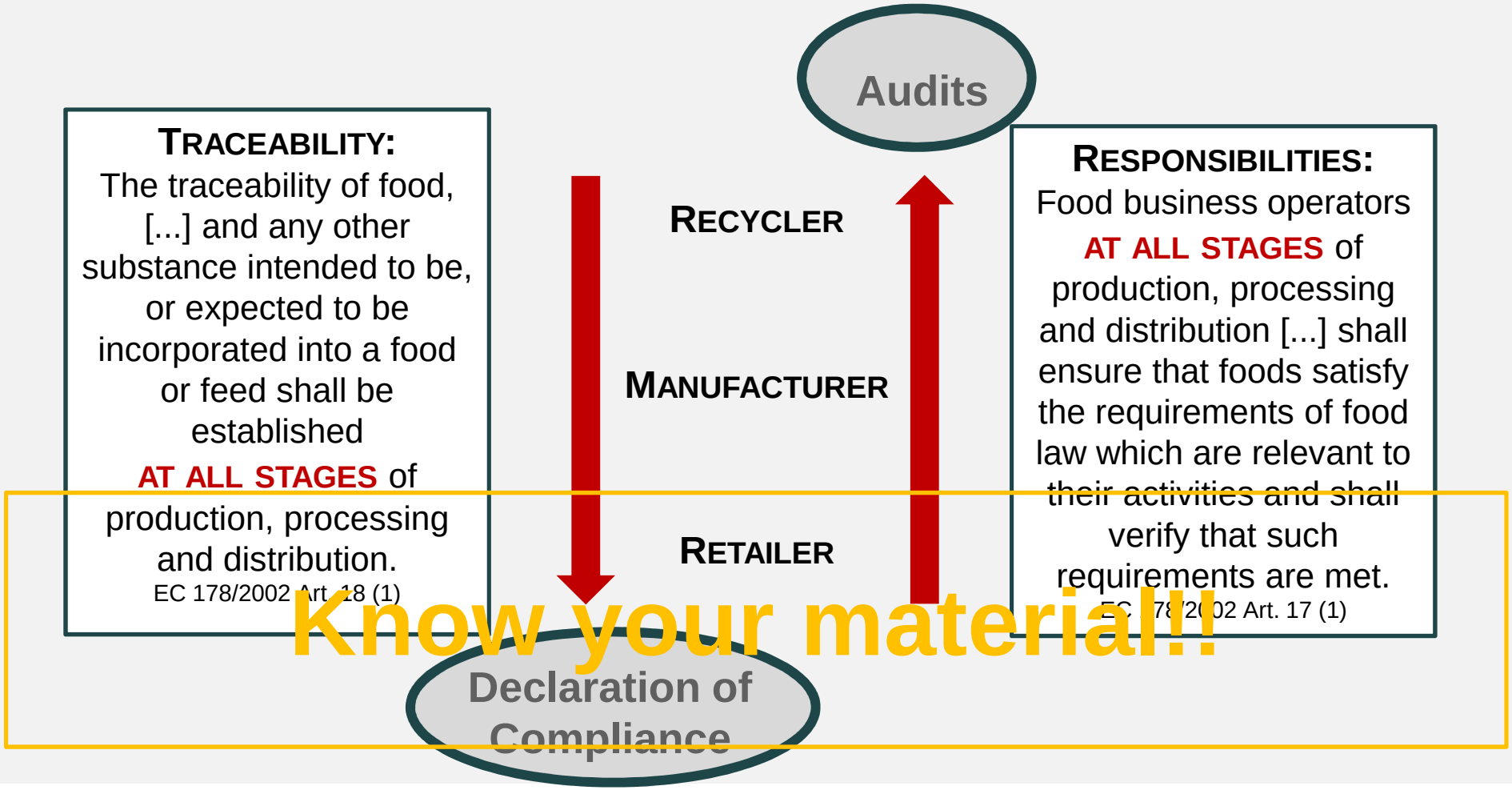
(*) *See FDA Guidance for Industry: Use of Recycled Plastics in Food Packaging: Chemistry Considerations Contains Nonbinding Recommendations August 2006*

Same requirements for 3-layer PET and PCR material → EC 282/2008!

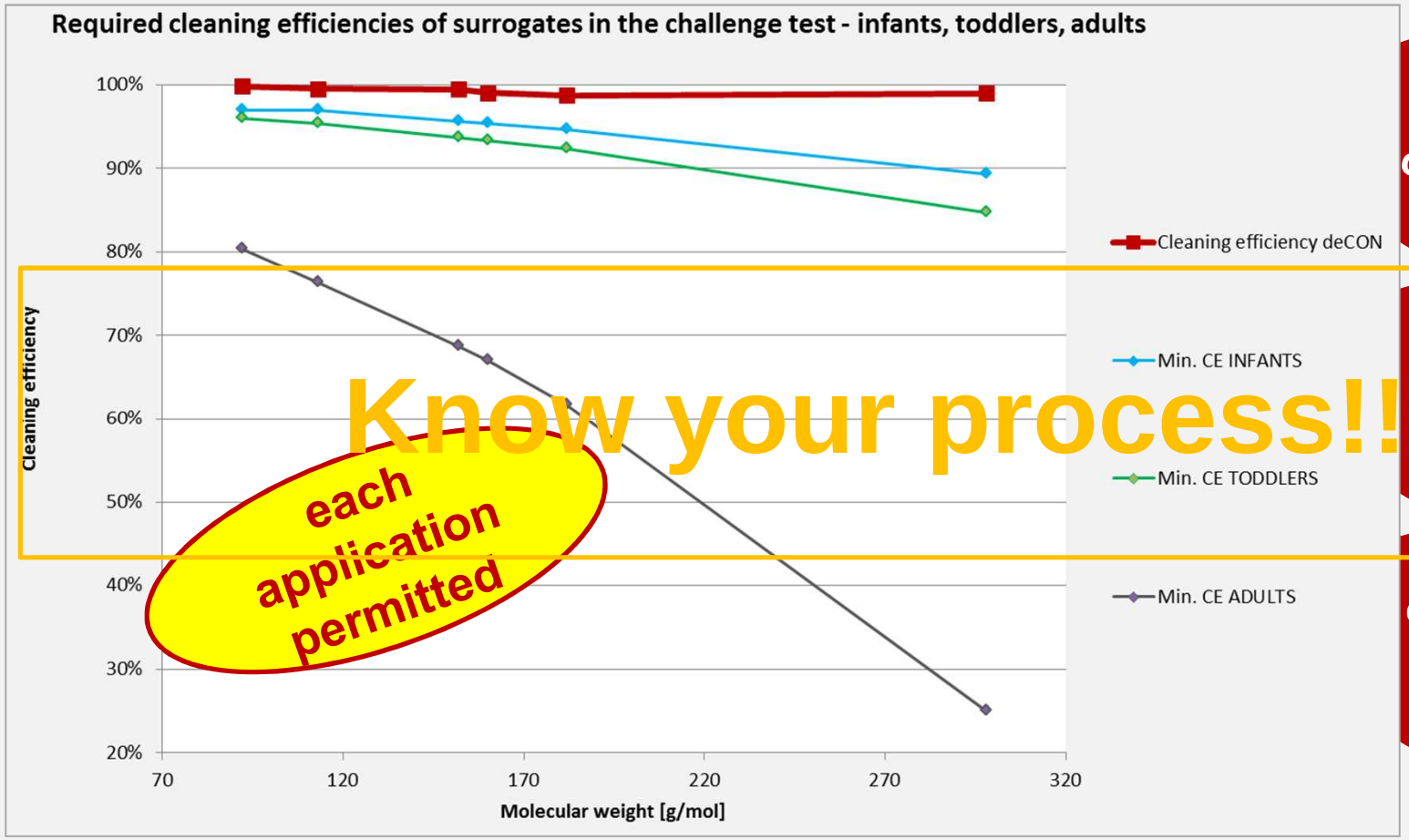
The market will start to **set standards**! As soon as sheet is controlled like b-t-b, 3-layer sheet with FB is no longer acceptable!

Supermarkets will require packaging which is **proved to be safe**!

Food safety across the whole supply chain



viscotec: 99 % Cleaning efficiency - food grade without compromise.



Know your process!!

each application permitted

No mixture: 100% contaminated material

No pre-washing

Only contaminated material is measured

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Gas Chromatography and Mass Spectrometry

We identify and quantify the compounds in your PET material
(AA, limonene, ethylene glycol, etc.)

- ✓ Regular material tests for our customer acc. to GMP
- ✓ Consistent self control
- ✓ ***food grade without compromise.***

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viscotec recommendation on FCM made of R-PET

Supplier guidelines for supermarkets and manufacturing guidelines for plastic packaging manufacturers

- ✓ Recycled plastics used in direct or indirect food contact shall derive from a super cleaning process acc. to EC 282/2008, **whether or not the recyclate is used between layers** of virgin polymer.
- ✓ Each super cleaning process has to be **EFSA approved**.
- ✓ Recycled plastics used in direct or indirect food contact must be **traceable**. Therefore, each process step of manufacture must be consistently **controlled**, **documented** and **auditable** acc. to EC 2023/2006. Records of each process step shall be kept for ½ year.

Challenges in the R-PET sheet market

- ***Convince packaging manufacturers***
  PRO super-cleaning, CONTRA ABA
- ***Sensitize retailers***
  Increase awareness for the different qualities of R-PET products
- ***Boost official controls***
  Support EFSA & Member State Authorities
- ***Enhance thermoform recycling and increase availability of R-PET***
  - **Sorting**: Personnel training and optical sorting technologies to keep contamination levels low (PET trays difficult to separate from other polymers)
  - **iV Fluctuations**: Separate PET thermoforms and bottle recycling or improve recycling technologies?
  - Food legislation **compliance**: Guaranty for European or US input stream?

viscotec. food grade without compromise.

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