

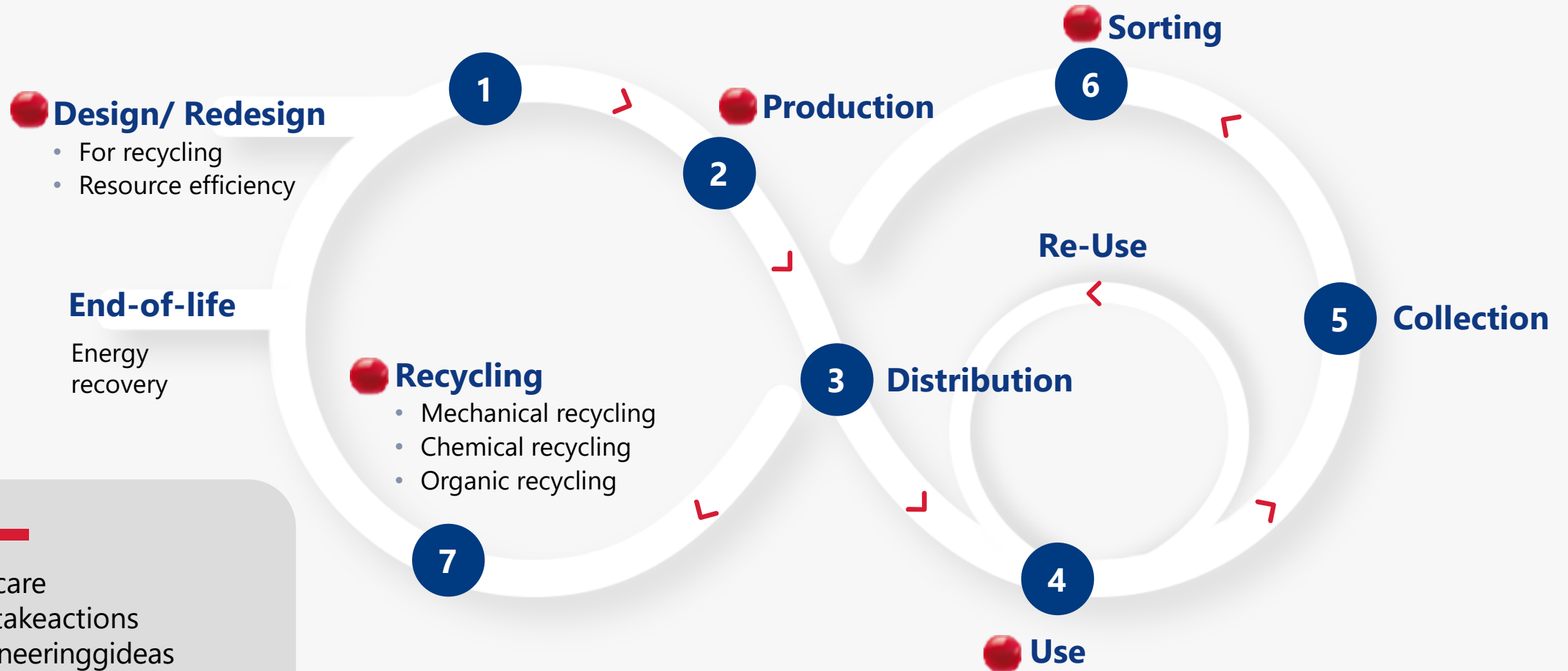
Ensure productivity and high quality processability of the final RPET application with **Sukano Masterbatches**

June 2021

Alessandra Funcia
HEAD OF SALES AND
MARKETING - SUKANO



We are part of **the solution**



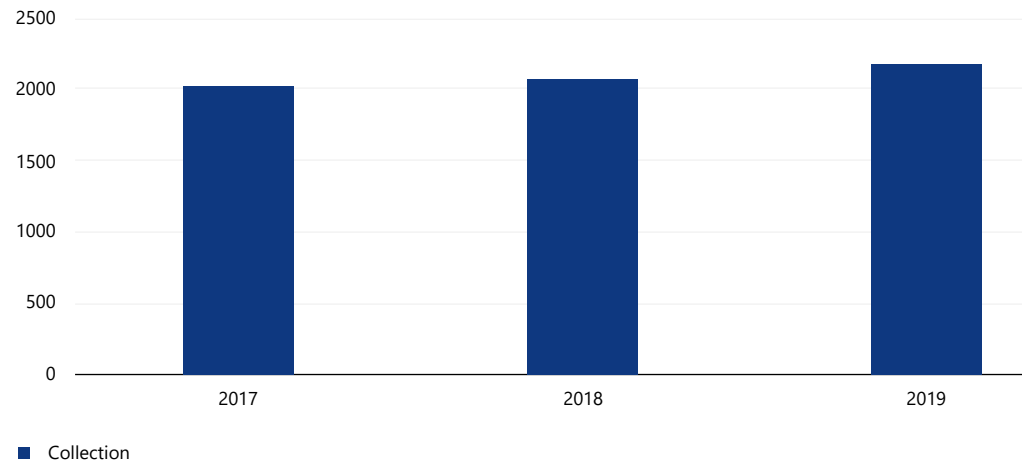
#wecare
 #wetakeactions
 #pioneeringideas
 #drivenbyexpertise

#wearepartofthesolution

European RPET market overview

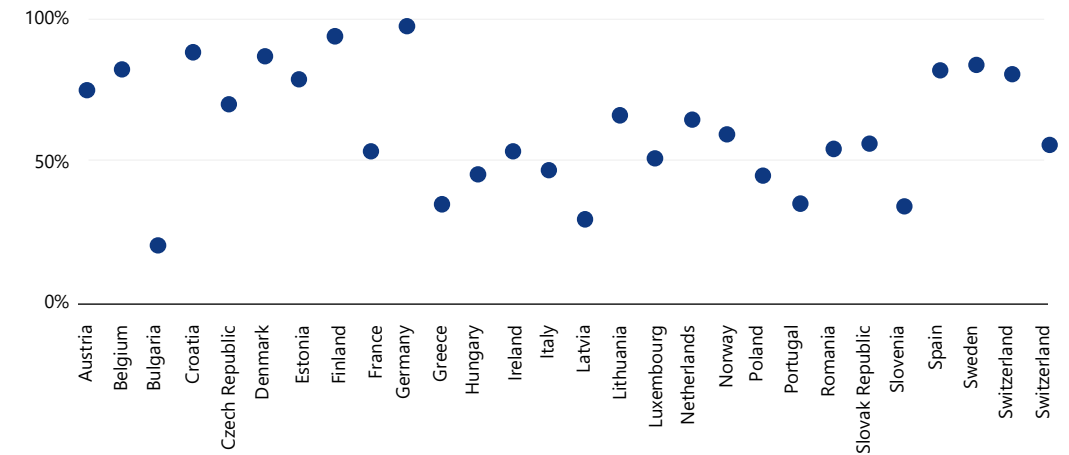
Growth in Europe PET Collection

European collection volumes current



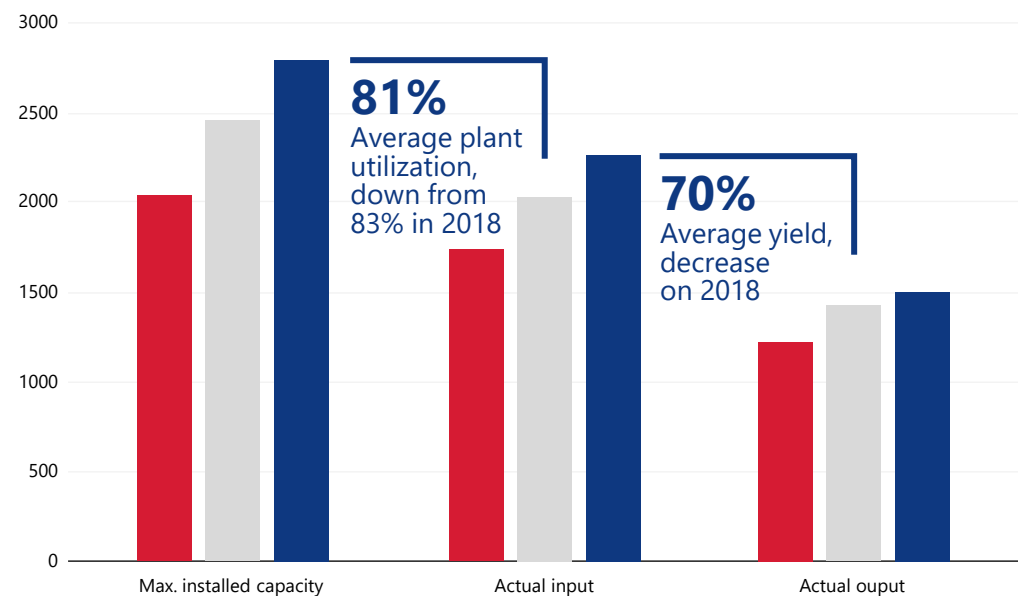
Lack of harmonisation in collection system produces varied rate across Europe

PET Bottle collection rates 2019



European RPET market overview

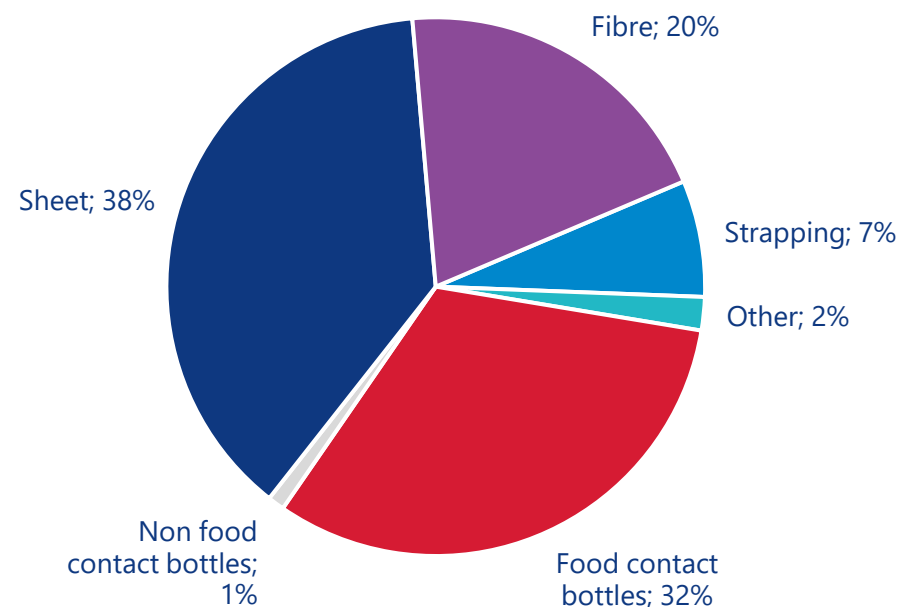
Reclamation capacities to 2019



Source: ICIS

■ 2017 ■ 2018 ■ 2019

Europe RPET end markets 2019



Source: ICIS

Why PET thermoforms recycling is a **Business opportunity**

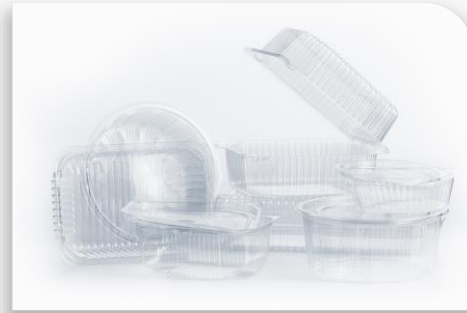


It's more than regulations and policies

There is an increasing demand of PCR from bottle industry after SUP implementation

Thermoforms, that have been one of the major consumers of rPET bottle flakes, are now looking for alternative sources of PCR with the aim of a true close loop

Recycling thermoforms is the final step in closing the already successful PET recycling loop.



Change in life style requiring more Packaging



Consumers are demanding a change



Major brands respond with 'sustainable packaging pledges'

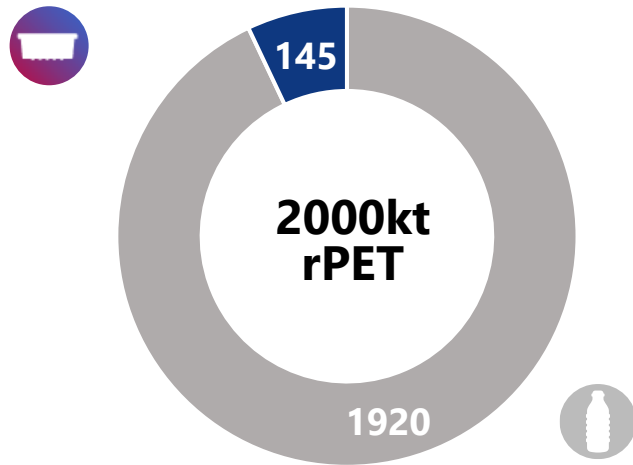


Higher PCR recycle content demand

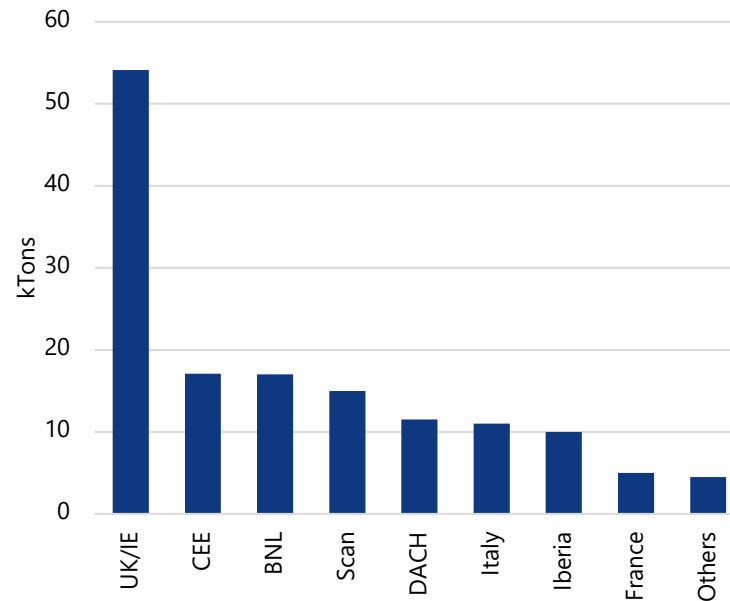
Landscape of PTTs recycling

Out of 1MTons PET sheet consumed in Europe just 15% is collected

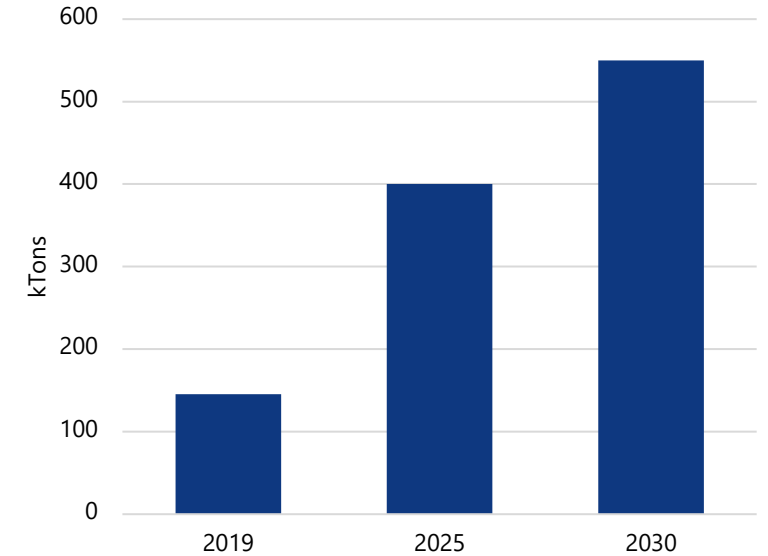
PET products collected & sorted (1)



PTTs collected in Europe (1)



PTTs collected for recycling projection (2)



Greater transparency of EPRs reporting is required in order to further improve the level of data confidence

Upcycling tray to tray

Crystallizer



Enabling tray to tray recycling

Upcycling mixed APET flakes into thermally stable rCPET food trays



Project description

Address existing challenge in recycling colored PET flakes currently downgraded to be used in straps, a high volume, low value and relatively demanding technical condition

Objective

Enhance mixed APET flakes by turning them into extrudable recycled crystalline rCPET to manufacture a thermostable tray.

R-PET Crystallizer

SUKANO® R-PET Nucleating Combimasterbatch for RPET **increases the crystallization** capacity of the RPET film and ensures faster and uniform crystallization

Results in a **higher processing window** and leads to a **temperature resistance of up to 200 ° C** in end application. A temperature-resistant color pigment **improves aesthetics**

Performance

Multiple additive package

LDR 2-7% according to performance required

Benefits

Wide processing windows

Easier processing

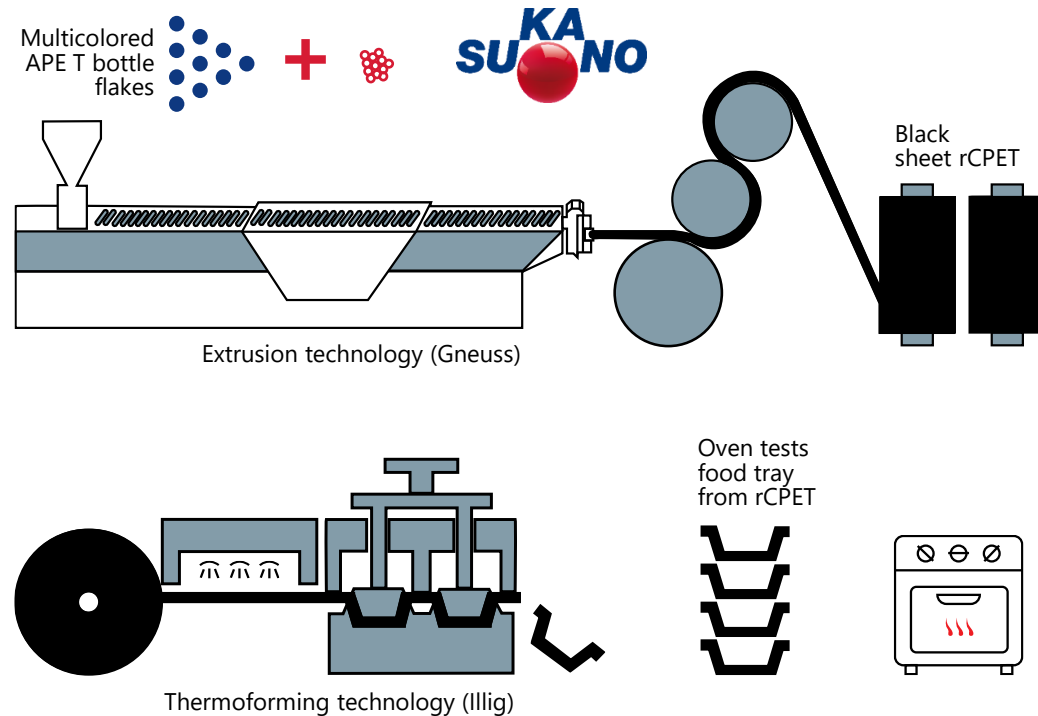
Improves aesthetics

Food compliant



rCPET trays stable at 200°C at least 20min

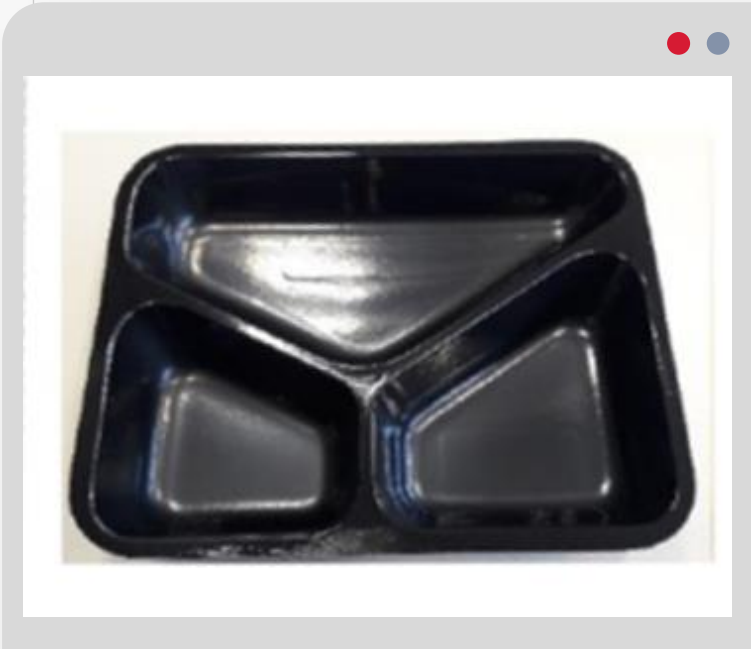
PROCESS OVERVIEW: FROM MULTICOLOR APET FLAKES TO CPET FOR OVEN-SAFE FOOD TRAYS



Intentionally and controlled modification of mixed APET flakes properties adding Sukano MB

- Elongation of molecular chain/
molecular **weight of PET polymer**
- Melt viscosity improvement during
extrusion to allow **further processing steps**
- Extension of processing window
allows **increased processing speed**
- Overall **more stable and superior** sheet quality
- Higher impact resistance** of the sheet and trays
- Opaque sheet**
- Thermally stable** colorants and additives
- Accelerated crystallization rates**
- Controlled crystallization** during thermoforming
- Food compliant**

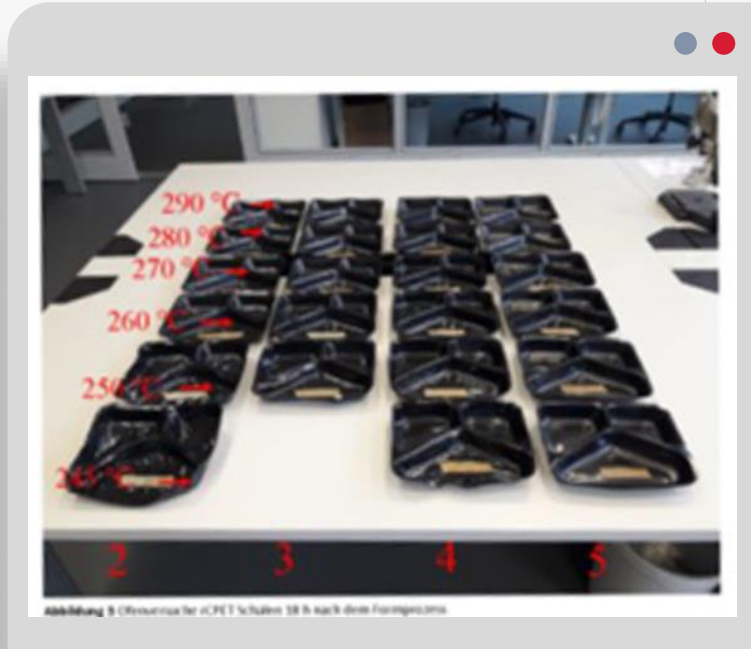
Results



^ **Before**
oven testing

KA
SU^{NO}

Driven by expertise



After oven testing
at 200°C for 20min ^

Color Correction

How to choose the most suitable anti-yellow masterbatch



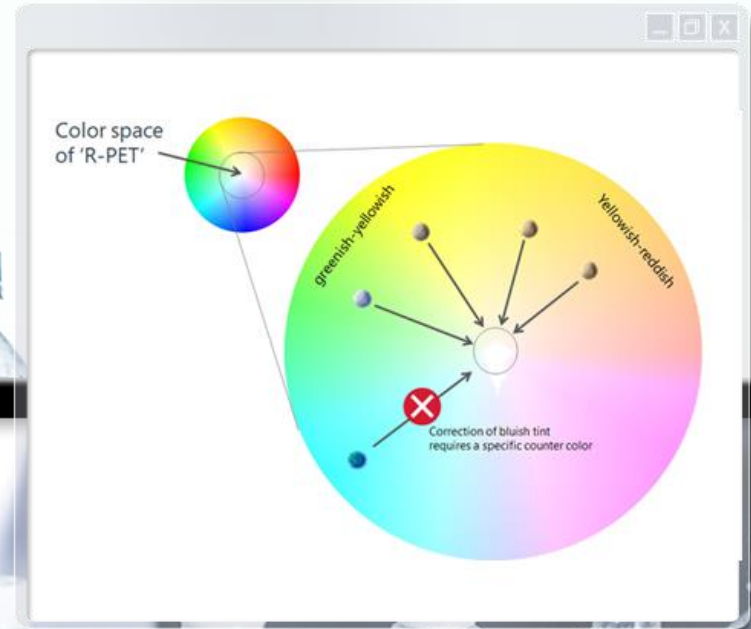
Anti yellowing



Color correction

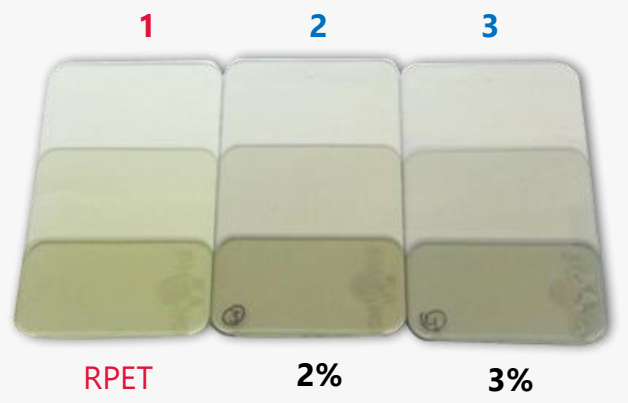


Driven by expertise

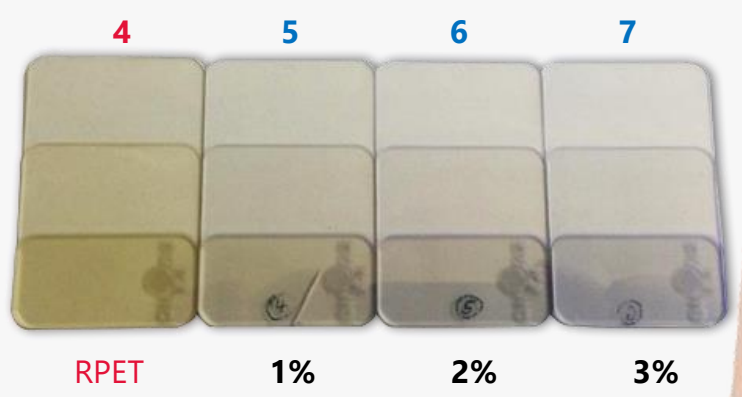


Color correction

MB effect



● FROM YELLOW → TO NEUTRAL



● Different results with same dosage starting from different RPET



White PET bottles recycling



150 ktons
Opaque PET bottles
ca 3-5% of total EU
PET bottles

PET plastic market data:

Global and European volumes



150 ktons

Opaque PET bottles

CA 3-5% of total EU PET bottles



Global plastics consumption ca 360 mio tons

ca 62 mio tons
plastics demand in Europe 2018



Global PET packaging consumption 30 mio tons

ca 5.3mio tons
PET consumption in EU-18

3.4 mio tons PET bottles and ca 1.0 mio tons
Trays and 0.9 mio tons imported

CAGR

-5.0% in the EU 2019
+2.0/3.0% in PET EU 2018

1.4 mio tons PET bottles recycled (2018)

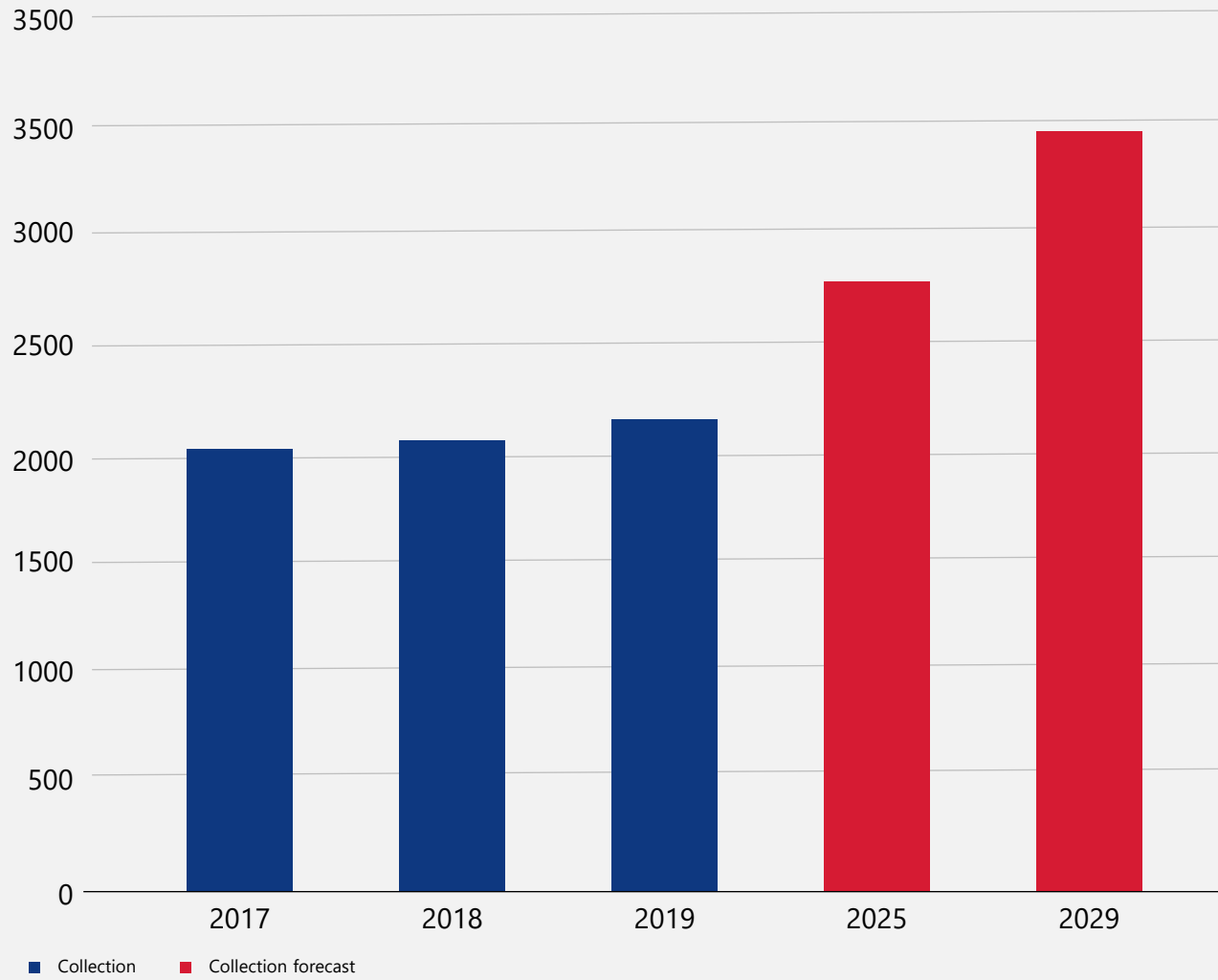
2.2 mio ton installed capacity in EU-18



PET demand
is still ahead other resin types

Growth projections:

Europe PET Collection



60%

Growth in collection volumes to reach SUP 2025 target

6%_{pa}

Average growth rate to achieve 2029 target

Bottle to bottle opaque PET bottle recyclable

Technically proven for the first time light barrier white opaque monolayer PET bottles recyclable



Objective

EPBP test protocol for recyclability applied to specific formulated mono layer white PET bottles using Sukano tailored made formulation



Specific formula addresses main recyclers concern

Non PET compatible **material excluded** (e.g. other resins, chemical barriers)

Recycling content of up to 100% back into food grade PET **bottle application**

Allows **dedicated white PET** stream to be established

Upscale end of life alternative is now reality



When design formulation expertise successfully

meets top edge blowing technology



Results



Stable melt viscosity, pressure and process were confirmed



High **quality melt filterability** indicated its purity and consistency



Stable color and highly similar to the initial virgin PET white bottles of the melt – even at 100 % RPET.



IV reported stable at 0.65 **throughout all stages** of recycled PET



SSP evidenced similar rate as for the virgin PET, lifting the IV to 0.7/0.8



No agglomerations were found



The **integrity of the light barrier** remained for extreme conditions: <0.1% light transmission @ 550nm

Used in PET monolayer bottles, and still be **processed at the same machine throughput**

Using Sidel's most recent generation of blow-moulders, EvoBLOW™

No impact on color, properties, functionality or production rates

Sukano's latest RPET innovations



**Upcycling
tray to tray**
Crystallizer



**White PET
bottles
recycling**



**Mono PET
trays for cold
applications**

Impact
modifier



**NIR detectable
black and
colors**



**Making RPET
recover original
properties**

IV Enhancers

Americas
(USA)

Europe
(HQ Switzerland)

Asia Pacific
(Malaysia)



Driven
by expertise



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