ULTRA POLYMERS

a Spirit of Partnership

Future of Polymers

EPR, PFAS & Circularity Event

About the day...

| Order of the Day

Morning | Speakers and Presentation Topics

9:30 AM – Stuart McCaig | Welcome Address
Introduction on challenges and opportunities shaping the future of plastics

9:40 AM – Yannick Martinez | DOMO Chemicals
Engineering Sustainability: Closing loops in high-performance materials

10:00 AM – Caleb Choe | Samyang
Flame-Retardant PC in a Circular World: Tackling PFAS and beyond

10:20 AM – Laura Shahbenderian | Ravago
Sustainability-Linked Loans: Driving Financial & Environmental Returns

10:40 AM – Refreshment Break & Table Top Networking

11:00 AM – Lee Nurse | Volution
From Prime to 100% PCR: A converter's journey to full circularity

11:20 AM – Dave Ware | AO Recycling
Recycling from the Retail Frontline: Building a circular electronics model

11:40 AM – Larsen Kolberg | BASF
BASF's Sustainability Toolbox

12:00 PM – Panel Discussion

12:30 PM – Lunch & Table Top Networking

Afternoon | Speakers and Presentation Topics

13:30 PM – Andrew Dixon | Eunomia
EPR & Packaging Waste in the UK: What you need to know

13:50 PM – Andrea Del Forno | LyondellBasell
Circular and low carbon solutions for your business

14:10 PM – Nat Spencer | Jaguar Land Rover
Automotive Sustainability: Future materials, future supply chains

14:30 PM – Patrick Todd | Oceanworks
From Ocean to Opportunity: Making recycled content work for your brand

14:50 PM – Refreshment Break & Table Top Networking

15:10 PM – Frank Eisentraeger | INEOS Styrolution
How EFSA approval is possible on mechanically recycled PS

15:30 PM – Helen Jordan | British Plastics Federation (BPF)
PFAS, Policy & Packing Waste: Where regulation meets reality

15:50 PM – Veronica Edmunds | Haitian
Efficient Moulding Machinery: Cutting emissions through technology

16:10 PM – Panel Discussion & Closing Remarks

16:45 - 17:30 PM – Drinks, Conversations & Goodbyes

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About the day…

Tabletop innovation zone with opportunity to collaborate:

Wells: Specialist performance masterbatches

Gunther: Innovative hot and cold runner technology

PDS Vision: Supporting customers in digital transformation

Sierra 57: Recruitment experts for the polymer industry

Haitian: Energy efficient machinery

Ravago: PCR & PIR polymer solutions

Ultrapolymers: FREE access to our Digital Learning Academy

Who are Ultrapolymers?

ULTRA|POLYMERS|
a Spirit of Partnership

About Ultrapolymers

Our journey of distributing polymers began in the 1980's and since 2002 we have been a proud member of the Ravago Group, who today are one of the world's largest independent recyclers of plastics, founded in Belgium during the 1960's.

With such a strong identity built around recycling, sustainability is in our DNA and something that Ultrapolymers has been championing and promoting for a number of years. Today, we are pleased to be able to offer one of the widest portfolios of sustainable materials available.

Sustainability is not just about using recycled materials. By drawing on our technical expertise, we also help customers design for manufacture, supporting part integration, recyclability and light weighting.

We really appreciated your attendance at our first ever Sustainability Event and hope you found the day insightful. We would be delighted to partner with you for any upcoming projects or to discuss any topics you found particularly interesting.

Thank you, the Ultrapolymers Team.

ULTRA|POLYMERS
a Spirit of Partnership

DOMO

caring is our formula

Engineering Sustainability

Closing loops in high-performance materials

Yannick Martinez

INTRODUCTION

DOMO CHEMICALS AT A GLANCE:
EUROPE ROOTED, GLOBALLY DRIVEN

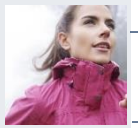
UPSTREAM INTEGRATION » **BASE POLYAMIDES** » **ENGINEERED MATERIALS**

PA6 Intermediates
Phenol, Cyclohexanone and Caprolactam

PA66 Intermediates
HMD and AA | ALSACHIMIE

DOMAMID®
(+co-polymers)

STABAMID®
(+co-polymers)



TECHNYL®

TECHNYL® 4EARTH®
Sustainable polyamide

NYLEO®
Nylon 66 Performance Fibers

SUSTAINABILITY ROADMAP

DOMO'S AMBITION ON SUSTAINABILITY IS DEFINED AROUND **3 LONG-TERM COMMITMENTS**

Our ambition:

DOMO pursues a strategy of sustainable value growth and wishes to be, in 2030, a benchmark in sustainable development and social responsibility, and be recognized among the best in our industry.

PLANET CARE

Contributing to the fight against climate change

We are investing in CO2 emissions reductions, delivering on our ambition to be a GHG scope 1 & 2 net zero company by 2050, as well as managing and mitigating our impact on water and waste.

Our contribution to the UN's sustainable development goals:

PARTNER OF CHOICE

Moving towards a lower CO_2, circular and bio-based solutions portfolio

We want to offer an ever-greater range of recycled and carefully engineered products and applications that can help them to reduce their own emissions, without compromising on performance.

Our contribution to the UN's sustainable development goals:

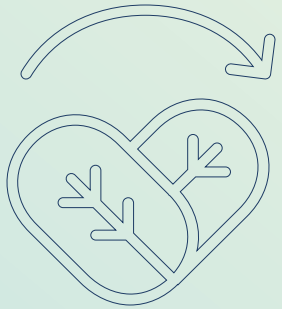
RESPONSIBLE EMPLOYER

Being an attractive company and a great place to work

We are committed to maintaining and further accelerating our status as an employer of choice and creating valuable relations with all our stakeholders, including all employees and contractors.

Our contribution to the UN's sustainable development goals:

WORLDWIDE SUSTAINABILITY AGENDA



DOMO gets EcoVadis Platinum rating for 2024!

"In two years, we went from the top 25% to the top 2%, placing DOMO among the industry's best. This demonstrates our commitment to our ambitious 2030 agenda, being part of the industry benchmark in sustainability."

Yves Bonte
Chief Executive Officer DOMO / Chair of the Board of Directors

PIONEERING CIRCULARITY

DOMO

PIONEERING CIRCULARITY

DEDICATED RECYCLING PROCESSES & CONTINUOUS REGENERATION

MECHANICAL RECYCLING

MOVE 4EARTH® PATENTED RECYCLING

DOMO

caring
is our formula

DOMO

RECYCLED & BIOCIRCULAR OFFERING

Partnership-based technologies

Mass Balance ISCC+ Certified

Used Cooking Oil (UCO)

- PA6 & PA66

VIMAR group

Depolymerization technology

Fishing Nets

- PA6

SIEMENS

Exploring technology

Dissolution technology

Plastic Parts

- PA6 and PA66

Audi

In-house technologies

Move 4EARTH® Patented technology

Coated Airbags

- PA66

SOGEFI

Standard Mechanical technology

Textile – Uncoated Airbags Film Fishing Nets

- PA6 and PA66

martor
THE SAFER WAY TO CUT

PIONEERING CIRCULARITY

FEEDSTOCK SOURCES

	Mass-Balance	Depoly-merization	Separation	Mechanical	Direct Allocation
Post-Industrial **(PIR)**	**Glass Fiber with ISCC+**	**PA6**	**PA66 airbags** (Proprietary M4E technology)	**PA6 & 66** (fibers & films – carpets/airbags)	
Post-Consumer **(PCR)**	**PA6 ISCC+** (end-of-life tires)	**PA6**		**PA6** (fishing nets)	
BIO-Based	**Biocircular PA6 ISCC+** (Used Cooking Oil UCO, Bio-Ammonia)				**PA6.10** (castor oil)

PIONEERING CIRCULARITY

PCR OFFERING: **PA6 IN FOCUS**

Mechanical

- for **Black or Dark grey compounds**

Quality range available: similar to C1E & C2E PIR performance

Chemical **(Depoly)**

Chemical **(ISCC+)**

- for **Niche solutions**
- for **Application with certification** (e.g. UL, Food Contact)
- for **Colored applications**

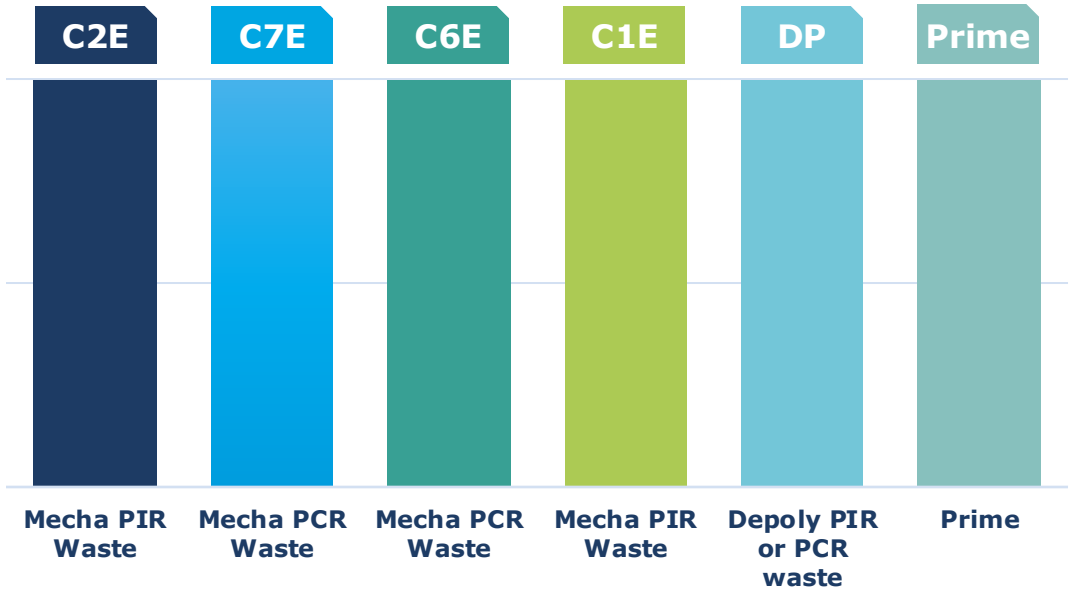
Fit for all applications, drop-in to prime solutions

PIONEERING CIRCULARITY

MECHANICAL PERFORMANCE FROM PCR

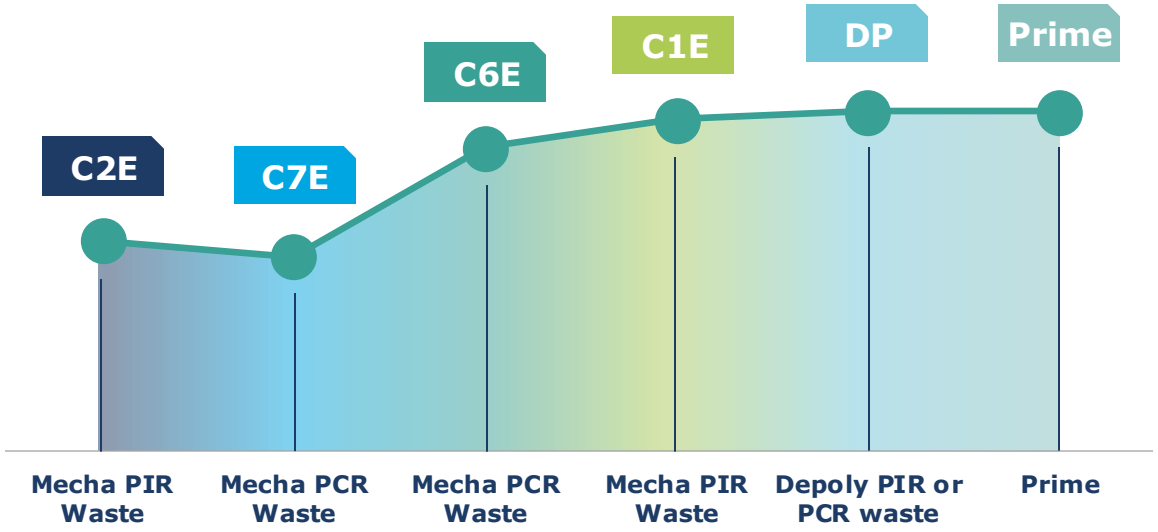
TECHNYL® 4EARTH®
Sustainable polyamide

Tensile Modulus *(MPa)*



Charpy Unnotched *(kJ/m²)*

Recycled content can be optimized to meet the performance requirements of each customer



DOMO

NB: Data from CxE= PA6 30GF with 100% of polymer from recycled feedstock

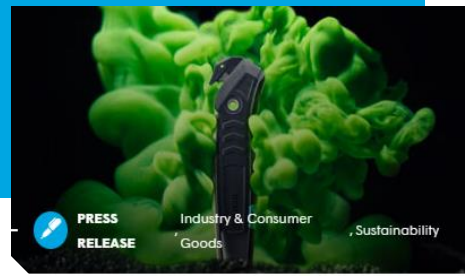
caring is our formula

PIONEERING CIRCULARITY

SUCCESS CASES

SUSTAINABLE SAFETY KNIVES

CONSUMER GOODS



MARTOR opts for **DOMO's TECHNYL® 4EARTH® sustainable polyamide** for ECO line of knives.

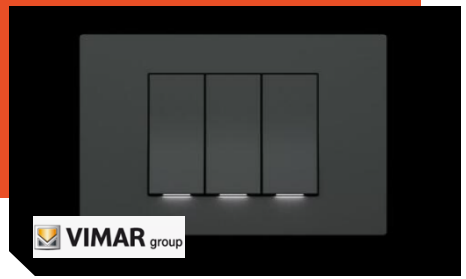
SUSTAINABLE FAN & SHROUDS

MOBILITY

TECHNYL® 4EARTH® wins the Plastic recycling award India 2024.

ELECTRIC SWITCHES

ELECTRIC & ELECTRONIC



More sustainable solutions **in electrical and electronics.**

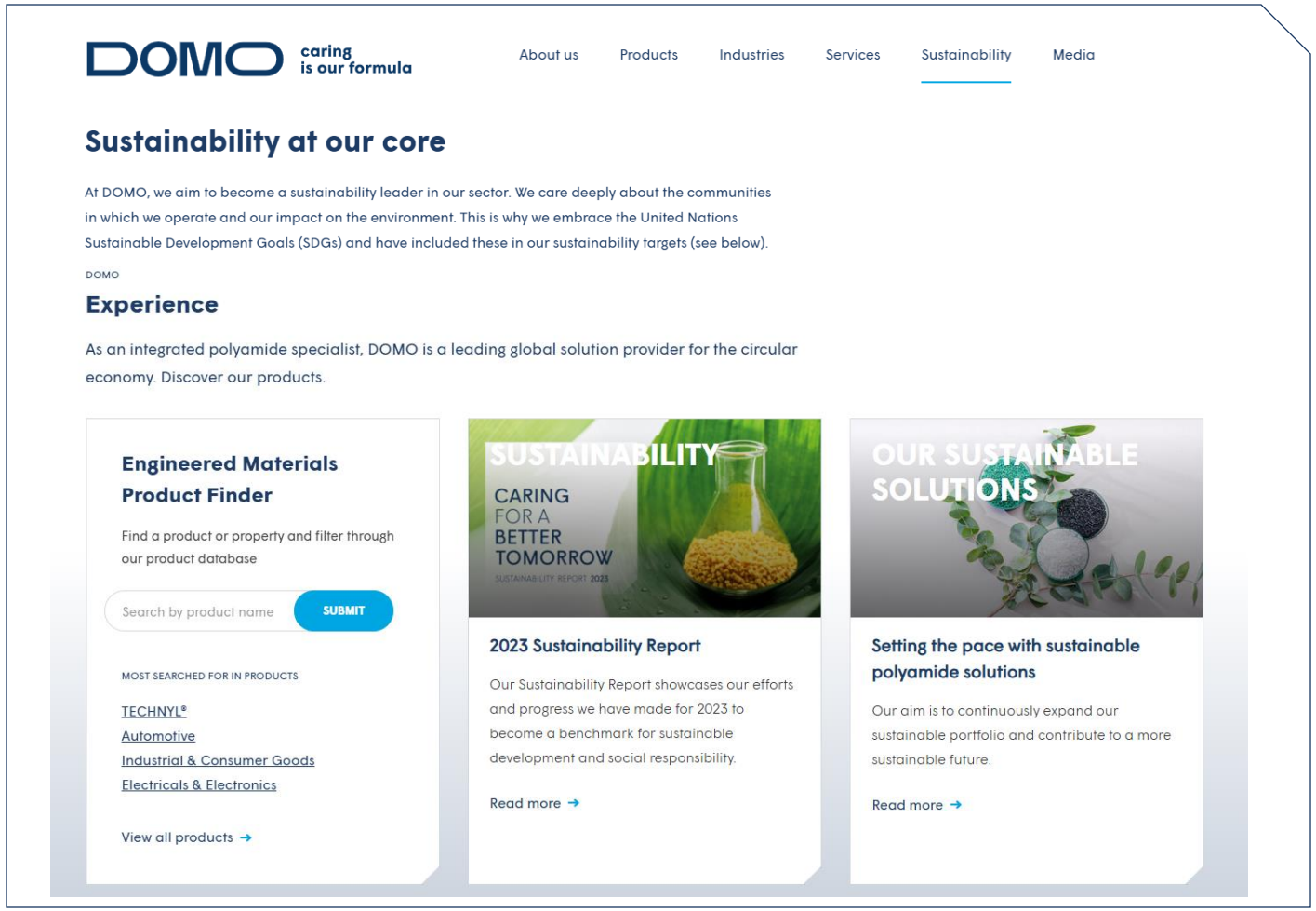
RESIDUAL CIRCUIT BREAKERS

SAFETY PRODUCTS

Siemens and DOMO Chemicals join forces to drive sustainability in the electrical industry.

PIONEERING CIRCULARITY

FOR MORE INSIGHTS ON OUR OFFERING VISIT **WWW.DOMOCHEMICALS.COM**



Up to 100% recycled content

- From 30 to 90% CO2 reduction
- Mechanical performance matching application needs
- Dark colors

More information →

From 20 to 50% recycled content

- From 20 to 25% CO2 reduction
- Prime Similar Performance
- FR and hydrolysis resistant grades available
- Unlimited color choice

More information →

Up to 100% recycled content

- From 16 to 34% CO2 reduction
- Prime identical Performance
- No re-homologation needed
- Virtually all products available

More information →

From 59 to 63% bio-based content

- Excellent Product Performance
- Unlimited color choice

More information →


THE INDUSTRY
MUST ACT NOW
AND TOGETHER
READY TO PARTNER

SAMYANG

Flame Retardant PC

Tackling PFAS for a Circular World

Caleb Choe

SAMYANG
SUSTAINABLE SOLUTIONS

For ENGINEERING PLASTICS

SAMYANG

SAMYANG at a Glance

Soaring Beyond "**100 Years**"
A Global R&D Innovator

Established: 1924

Revenue: USD 4.57 billion (as of 2023)

Employees: Approx. 3,500

Businesses: **Chemical**, Food, Biopharmaceutical, Packaging

Location: Seoul (HQ, Korea), Chicago/San Diego (US),
, Jászberény (Hungary), Shanghai (China), Vietnam

*The revenue is calculated by a simple sum of affiliated companies within the group which may vary from the official announcement

[Samyang Chemical Affiliates]

Samyang Corporation	Samnam Petrochemical	Samyang Kasei	Samyang Innochem
Headquarter (South Korea)	TPA (Terephthalic acid)	Polycarbonate	BPA (Bisphenol-A) ISB (Isosorbide)

KCI	NC Chem	Verdant (US)	Samyang Fine Technology
Ingredients for Personal Care	Materials for Semiconductor Tech	Ingredients for Personal Care	Ion Exchange Resin

Samyang’s overseas business

Samyang EP Hungary

Wide range and eco-friendly Engineering Plastics for **Automotive, E&E and C&I** market

Quick View

Establish	Revenue	Employee
2011 year	40 M EUR	75 person

Extruder	R&D	Worker
3+2 Line	120 project	3+1 shift
Capa. 20,000 MTA		

Product portfolio

PC	PC, PC Compound	TRIREX
Si-PC	Si-PC, Si-PC Compound	TRIREX S-
Polymer alloy	PC/ABS, PC/PBT, PC/PET compound	TRILOY
TPEE	TPEE, TPEE Compound	TRIEL
PBT	PBT Compound	TRIBIT
PET	PET Compound	TRIPET
PA	PA Compound(PA6, PA66, PA12)	TRAMID
PP	PP Compound	TRILEN
ABS	ABS Compound	TRIBS

※ PCR (Post Consumer Resin) PC / OBP (Ocean Boundary Plastic) PA
CR (Chemical Recycling) PC & PBT

Certification

IATF 16949 · ISO 14001:2015 · ISO 14001:2015 · UL · REACH · RoHS · SVHC · ISCC PLUS

AM BU's Customers – E&E

SAMSUNG LG dyson logitech NOKIA ERICSSON PHILIPS Meta

TRILOY®
PC/ABS/Mineral
TRIECO®
PC/ABS/Mineral

UHD

TV

TRILEN®
PP/Glass-fiber

TRIBS®
METALINUS ABS

Refrigerator

TRIREX®
Si-PC

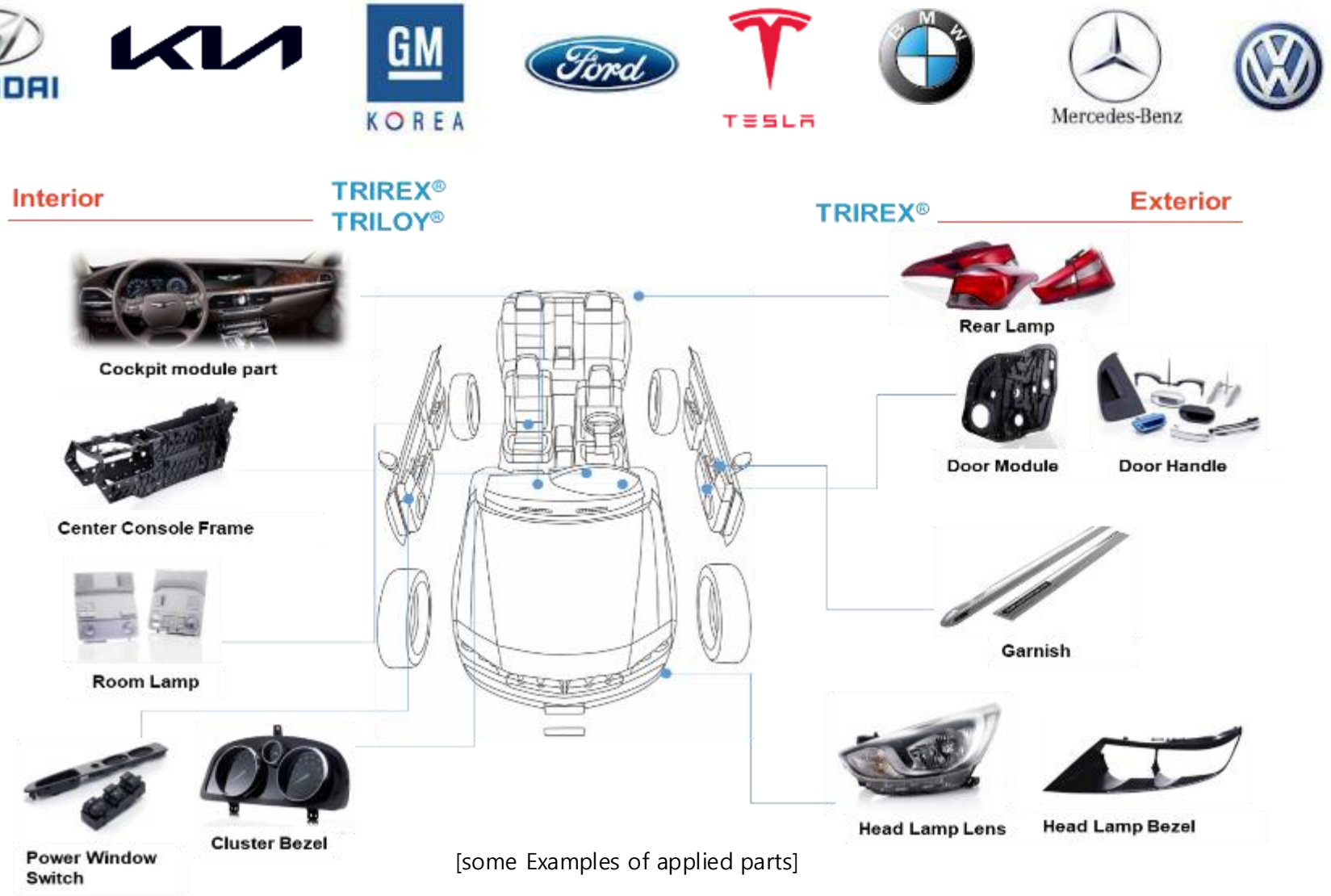
Hair Dryer

TRIREX®
Si-PC

Smart Glass

[some Examples of applied parts]

AM BU’s Customers - Automobile



[some Examples of applied parts]

AM BU's Customers – Consumer goods

Keurig DrPepper BOSCH Tupperware® Landis+Gyr

Bicycle helmet

Coffee Machine

Goggle Trip

Desk chair mesh

Smart lock

[some Examples of applied parts]

Table of Contents

PFAS-Free Solution

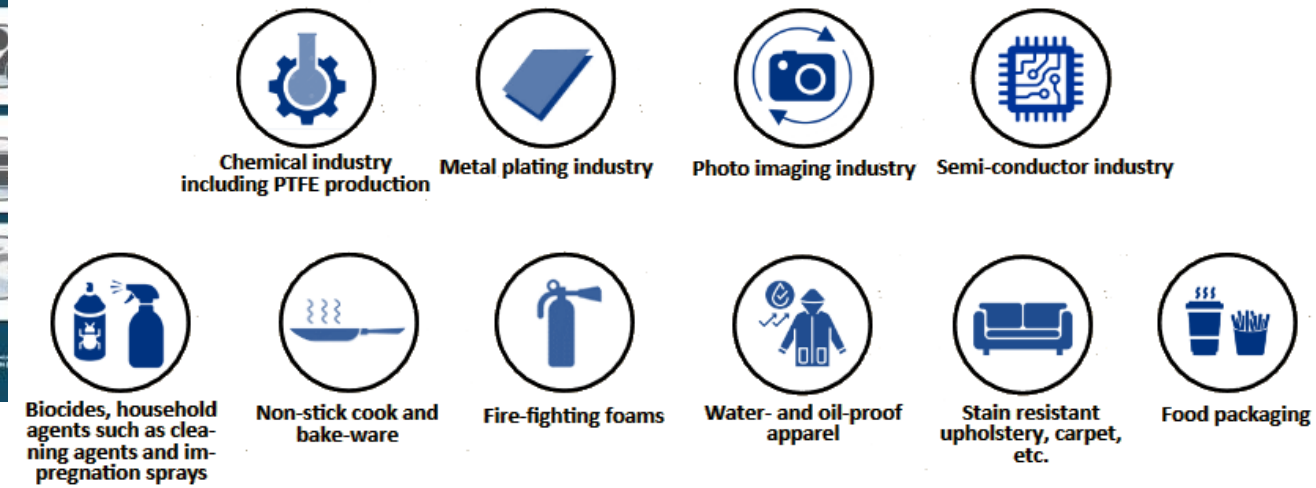
SAMYANG

PFAS-Free Solution

What is PFAS

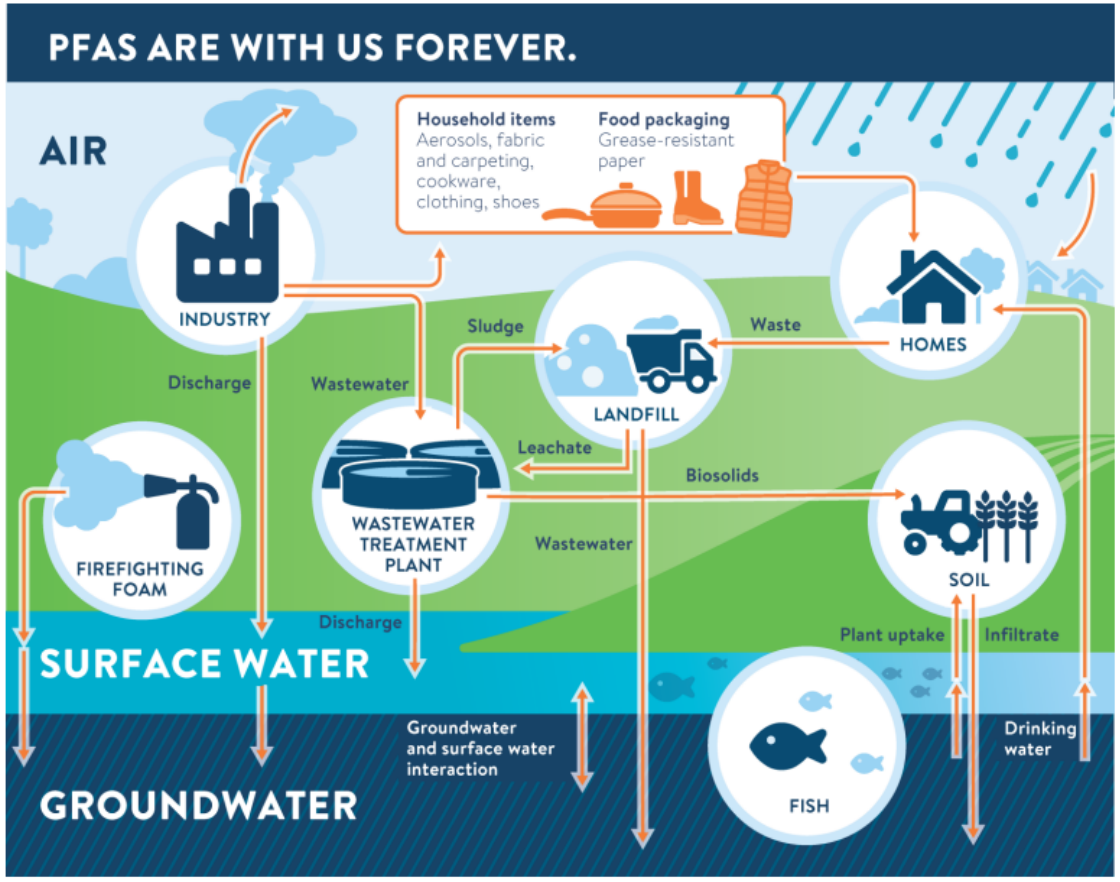
PFAS (per- and polyfluorinated substances) - Forever Chemicals

Per-and polyfluoroalkyl substances (PFAS) are a large class of thousands of synthetic chemicals that are used throughout society. However, they are increasingly detected as environmental pollutants and some are linked to negative effects on human health.



PFAS-Free Solution

PFAS exposure routes and risks



https://water.unl.edu/article/drinking-water-wells/and-polyfluoroalkyl-substances-pfas-facts-related-drinking-water

PFAS is a major environmental threat because it doesn't break down naturally in the environment.

Consequently, **PFAS disperses via atmospheric and aquatic pathways**, resulting in ecological contamination and bioaccumulation in flora and fauna.

When people eat food with **PFAS** in it, it can stay in their bodies for a long time and might make them sick, **causing cancer and problems with their immune system**.

Also, **PFAS** can pass from mother to baby before birth and can **hurt the liver, cause cancer, and affect how well the thyroid works.**

PFAS-Free Solution

EU PFAS Regulation Status and Future Outlook

- **ECHA Annex XV Restriction Report, February 7, 2023 Proposal for a Restriction, Per- and Polyfluoroalkyl Substances (PFASs)**

Restriction Option (RO) for PFAS	Scope	Requirement	Remark
RO1	Full ban	Prohibited	Enters into force after a transition period of 18 months No derogations
RO2	Substances on their own	Prohibited	Enters into force after a transition period of 18 months 5 or 12 years for derogations after transition period ends Time-unlimited derogations only for specific uses
	Constituent of another substance Mixtures Articles	≤ 50 ppm for PFASs, including polymeric PFASs*	

PFAS-Free Solution

Samyang Solutions

In the field of engineering plastics, PFAS substances have been instrumental in providing flame resistance

Our innovation initiative encompasses PFAS-free alternatives across multiple polymer categories: PC, PBT and mPPO

Our dedication to maintaining superior quality standards remains constant.

SAMYANG corp operates under ESG principles, dedicated to developing a comprehensive product portfolio that protects both human health and environmental sustainability

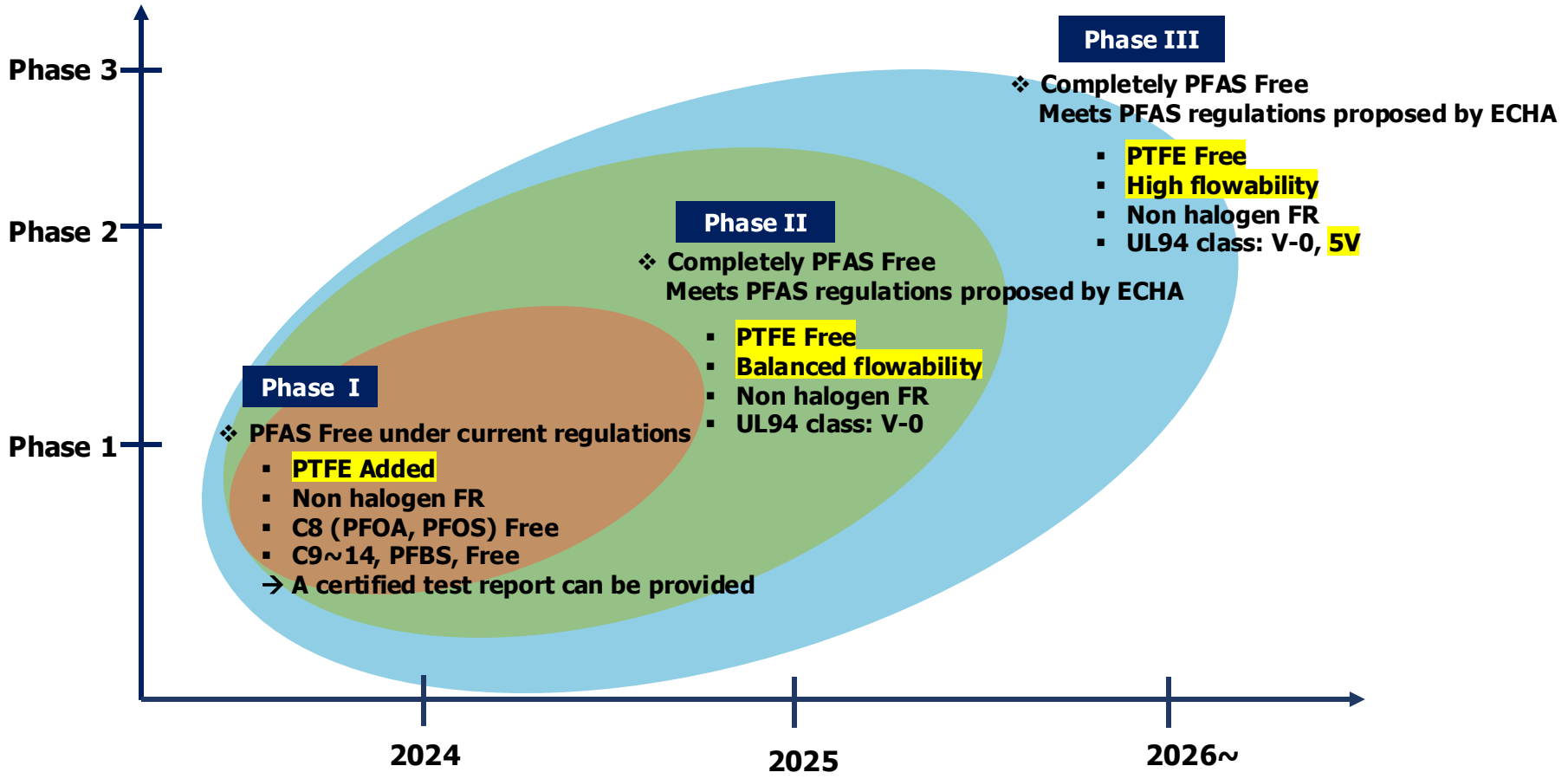
PFAS-Free Solution

Samyang Product Development Roadmap

Samyang will continue to comply with each country's regulations and currently has materials that meet PFAS regulations.

In the future, additional regulations on PTFE (Polytetrafluoroethylene) anti-dripping agents are expected from ECHA/EPA.

So, we are preparing PTFE Free Solution Roadmap as the next step.



PFAS-Free Solution

Samyang Product Development Roadmap

- **Samyang is expanding its PFAS-free portfolio by applying its innovative flame-retardant technology to a wide range of materials**

<table>
<tr><th rowspan="3">Materials</th><th colspan="10">SAMYANG PFAS-Free ENGINEERING PLASTICS</th></tr>
<tr><th colspan="6">Un-reinforced</th><th colspan="4">Reinforced (%)</th></tr>
<tr><th></th><th>UL-94</th><th>0.75mm@V-0</th><th>1.0mm@V-0</th><th>1.5mm@V-0</th><th>2.0mm@V-0</th><th>GF(%)</th><th>10</th><th>20</th><th>30</th><th>40</th></tr>
<tr><td rowspan="5">PC (TRIREX)</td><td rowspan="3">Transparent*</td><td>General (Extrusion)</td><td rowspan="5">In development</td><td>SF3-3026T10 (MI: 0.6)</td><td>SF3-3026T15 (MI: 0.8)</td><td>SF3-3026T20 (MI: 1.2)</td><td rowspan="3">General</td><td rowspan="3">PF3025G10 V-0@1.5mm</td><td rowspan="3">PF3025G20 V-0@1.5mm</td><td rowspan="3">PF3025G30 V-0@1.5mm</td><td rowspan="3">PF3025G40 V-0@1.5mm</td></tr>
<tr><td>General (Injection)</td><td>PF3025TR10 (MI: 5)</td><td>PF3025TR15 (MI: 8)</td><td>-</td></tr>
<tr><td>High-Flow (Injection)</td><td>PF3020TR10 (MI: 22)</td><td>-</td><td>-</td></tr>
<tr><td rowspan="2">Opaque</td><td>General (Injection)</td><td>-</td><td>PF3025Q15 (MI: 6)</td><td>-</td><td rowspan="2">High-Flow</td><td colspan="4" rowspan="2">In development</td></tr>
<tr><td>High-Flow (Injection)</td><td>-</td><td>PF3022Q15 (MI: 12)</td><td>-</td></tr>
</table>

*** Melt Flow index (300°C/1.2kg): General: 10g/10min ↓, High-Flow: 11g/10min ↑**

*** Transparent: Haze 2% ↓**

PFAS-Free Solution

Samyang Product Development Roadmap

• **Samyang is expanding its PFAS-free portfolio by applying its innovative flame-retardant technology to a wide range of materials**

Materials	SAMYANG PFAS-Free ENGINEERING PLASTICS					
	Un-reinforced	Reinforced (%)				
		GF(%)	10	20	30	40
PC+ABS (TRILOY)	In Development	In Development				
PC+PBT (TRILOY)	In Development	In Development				
PBT (TRIBIT)	In Development				PF1500GN30 V-0@1.5mm (MI: 30) [1]	
mPPE (TRIPPE)	In Development		EV856GN10 V-0@0.8mm (MI: 13) [2]			
PA (TRAMID)	In Development	In Development				

* Red letter: Development completed

Melt Flow index: [1] (250°C/5.0kg), [2] (285°C/5.0kg)

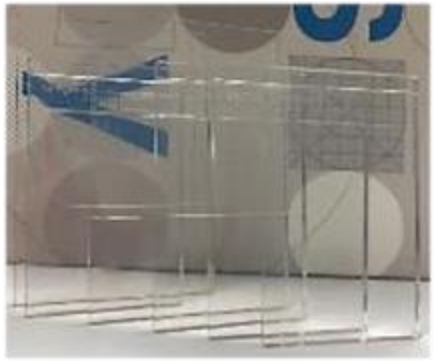
PFAS-Free Solution

Samyang's PFAS-free Polycarbonate Products

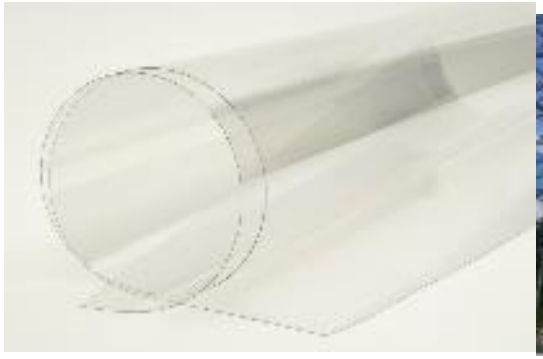
TRIREX SF3-3026T10, SF3-3026T15, SF3-3026T20

◈ Characteristics

- **Halogen, PFAS free**
- **Extrusion / Injection**
- **Transparent**
- **No flame-retardant additives used (Br, Cl, P, F free)**
- **Low temperature impact, chemical resistance**



◈ Application



Transparent Film

Soundproof panel

PFAS-Free Solution

Samyang's PFAS-free Polycarbonate Products

TRIREX PF3025TR10, PF3025TR15, PF3020TR10

◈ Characteristics

- **Halogen, PFAS free**
- **Injection**
- **Transparent**
- **Good mold-ability**
- **Chemical resistance**

◈ Application

Home appl.

Enclosure Housing

Face shield

Building interior

PFAS-Free Solution

Samyang's PFAS-free Polycarbonate Products

TRIREX PF3025Q15, PF3022Q15

◈ Characteristics

- **Halogen, PFAS free**
- **Injection**
- **Opaque color**
- **Good mold-ability**
- **Low temperature impact**
- **Chemical resistance**

◈ Application

Charger

Junction Box

Medical

HSG

Electric Vehicle Battery Charger

PFAS-Free Solution

Samyang's PFAS-free PBT Products

TRIBIT PF1500GN30

◈ Characteristics

- **Halogen, PFAS free**
- **Good mold-ability**
- **Good dimension stability**
- **Good Mechanical property**
- **High Heat Resistance**

◈ Application

Ev connector

Toaster HSG.

PFAS-Free Solution

Samyang's PFAS-free mPPE Products

TRIPPE EV856GN10

◈ Characteristics

- **High Strength & Modulus**
- **Dimensional Stability**
- **Low Warpage**
- **Flame Resistance**
- **Chemical Resistance**
- **High Heat Resistance**

◈ Application

Busbar Frame

Cylindrical
Battery Tray

Eco-friendly Materials

SAMYANG

Plastic waste at the Thilafushi waste disposal site, ***Maldives!***
photographed by Mohamed Abdulraheem (the World Bank)

Eco-friendly Materials

1. Recycle Materials

√ Market Requirements: Sustainability, Quality and Performance, High PCR Content

PCR-PC	PCR-PA6	PCR-PA66
Mechanical Recycled Head lamp, Water Bottle…. Transparent / Opaque	Mechanical Recycled Fishing net Opaque	Mechanical Recycled Air Bag Opaque

Eco-friendly Materials (Polycarbonate)

1. Recycle Materials (PC)

What is PCR?

■ **PCR (Post Consumer Recycled) or PCM**

Products collected by waste after consumers used.

→ **Waste reduction effect**

→ **Less CO_2**

→ **Eco-Friendly**

Eco-friendly Materials (Polycarbonate)

1. Recycle Materials (PCR)

Sources of PCR?

Certificate

TÜVRheinland

Certificate no. TA 50449992 01

License Holder:
Shanghai Asell Material Technology Co.,Ltd.
Building 2, No.398, Gangqing Road, Xiankunshan Town, Songjiang District, Shanghai P. R. China

Manufacturing Plant:
NINGBO ZHONGJIAN PLASTIC CO.,LTD, SCIENCE AND TECHNOLOGY DISTRICT XIWU, DINGHUA, NINGBO, ZHEJIANG PROVINCE P. R. China

Test report no.: 27981-1AN 38108468 001 Client Reference: 60132886/J.L.

Tested to: ISO 14021:2016

Certified Product: Recycled PC License Fee - Units

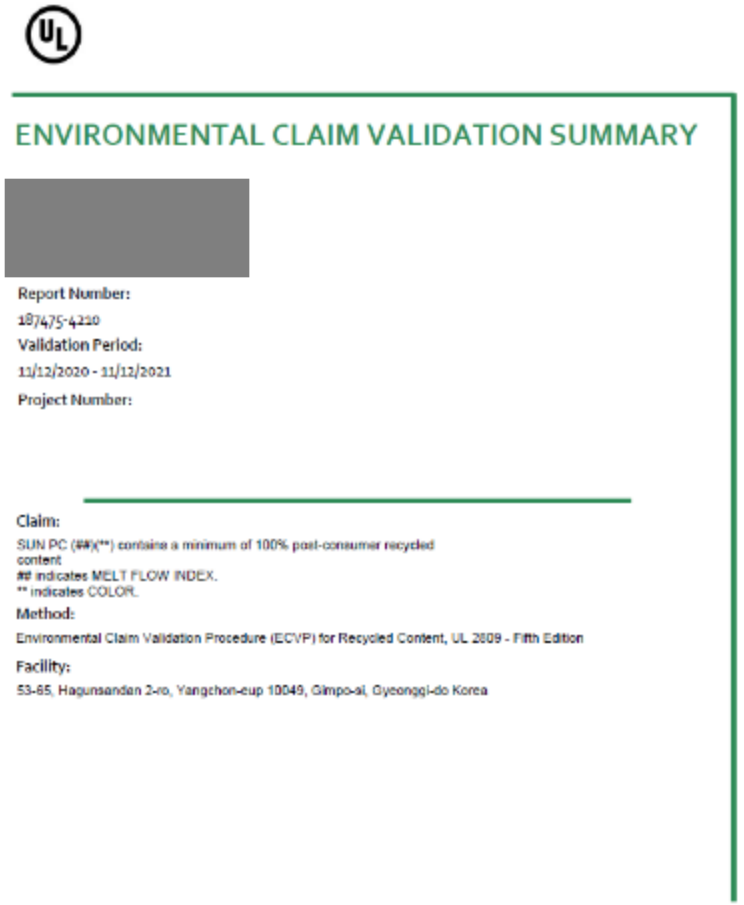
Type Designation: Recycled PC pellets(PC 3011, PC 2010, PC 6008)
Compliance and has been verified in accordance with ISO 14021 Article 5.1 General, 7.7 Recyclable, 7.8 Recycled content.
Remark:
1. The plastic recycling rate for year 2018 are PC post consumer recycled material: PC 3011, PC 2010, PC 6008: 100%
2. For details of hazardous substance refer to test report No. 238108468a 002

This certificate is valid for maximum 3 years.
Appendix: 1

Licensed Test mark: TÜV Rheinland Taiwan Ltd. Signature Date of Issue (day/month/year) 31/10/2019

PCR PC_TUV Certification.

Semiconductor Tray



ENVIRONMENTAL CLAIM VALIDATION SUMMARY

Report Number:
187475-4210
Validation Period:
11/12/2020 - 11/12/2021
Project Number:

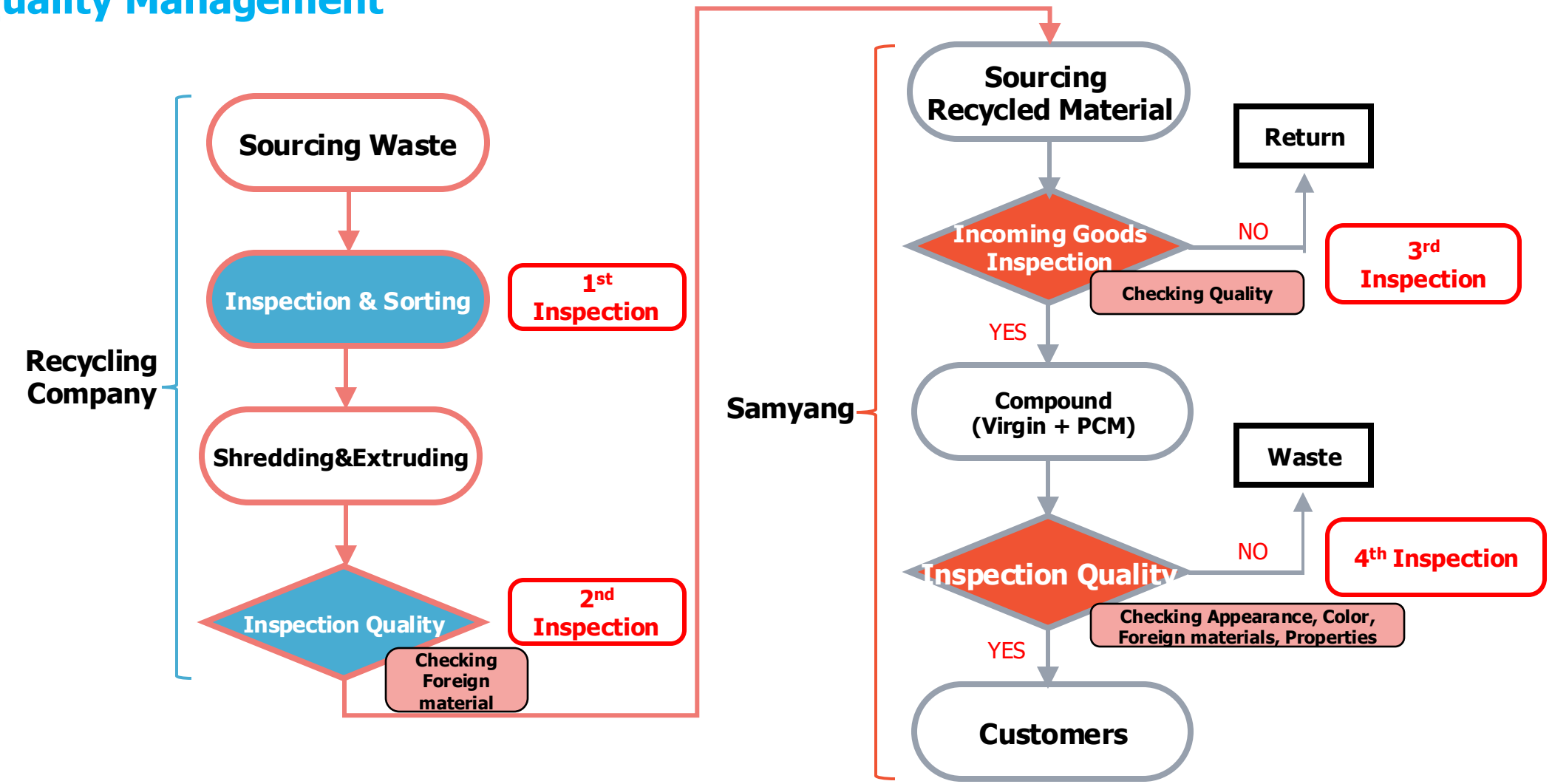
Claim:
SUN PC (##)(**) contains a minimum of 100% post-consumer recycled content
indicates MELT FLOW INDEX.
** indicates COLOR.
Method:
Environmental Claim Validation Procedure (ECVP) for Recycled Content, UL 2809 - Fifth Edition
Facility:
53-65, Hagunsandan 2-ro, Yangchon-eup 10049, Gimpo-si, Gyeonggi-do Korea

PCR PC_ECV Certification.

Eco-friendly Materials (Polycarbonate)

1. Recycle Materials (PCR)

Quality Management



Eco-friendly Materials (Polycarbonate)

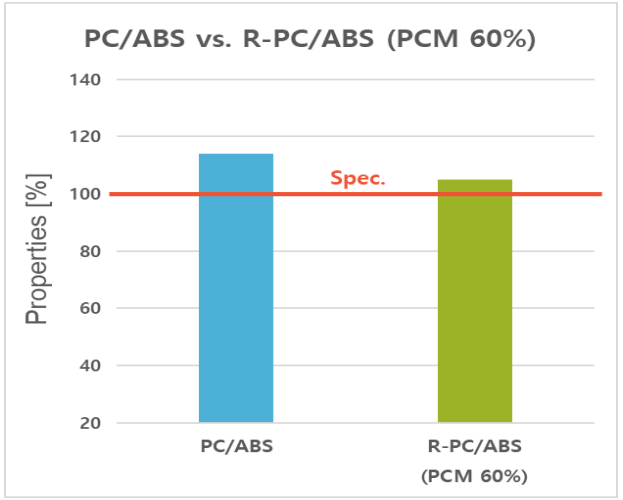
1. Recycle Materials (PCR)

	Grade	Recycled Contents	UL Flame Class	Characteristic
PC	TRIREX EM3017PN8	98%	0.75㎜ / HB	
	TRIECO 3D03	90%	0.8㎜ / V-0	
	TRIREX MRJ3022U			
	TRIECO 3D53	50%	0.8㎜ / V-0	
	TRIREX 3025N1-35		1.0㎜ / V-0 2.0㎜ / V-0&5VB 3.0㎜ / V-0,5VA	
	TRIREX 3025GW15		1.5㎜ / V-0	
	TRIECO 3D25PND	20%	1.0㎜ / V-0	
	TRIECO 2D28SB		0.75㎜ / HB	
PC Alloy	TRILOY MRJ490N	85%	1.0㎜ / V-0	RPC 75%+OB-PET 10%
	TRIECO 2D63	50%	1.0㎜ / V-1 ; 1.5㎜ / V-0&5VB	PC+ABS
	TRILOY EM210NHFT	34%	1.5㎜ / V-0	PC+ABS
	TRIECO 2D43	30%	1.5㎜ / V-0	PC+ABS
	TRIECO 2D33		1.5㎜ / V-0	PC+ABS
	TRILOY EM230TN(XX)		0.8㎜ / V-0	PC+ABS
	TRILOY EM210G(e)	20%	1.5㎜ / V-1 ; 3.0㎜ / V-0	PC+ABS
	TRIECO US3D22G10		0.75㎜ / HB	PC+GF
	TRIECO SM3-3D10H		0.7㎜ / HB	Si-PC
	TRIECO 2D16AG20	10%	1.5㎜ / V-1 ; 3.0㎜ / V-0	PC+ABS+GF
	TRIECO 2D13		1.0㎜ / V-1 ; 1.2㎜ / V-0	PC+ABS
	TRIECO 2D10T20		1.0㎜ / V-0	PC+ABS+ED

Mechanical Recycled Polycarbonate alloy

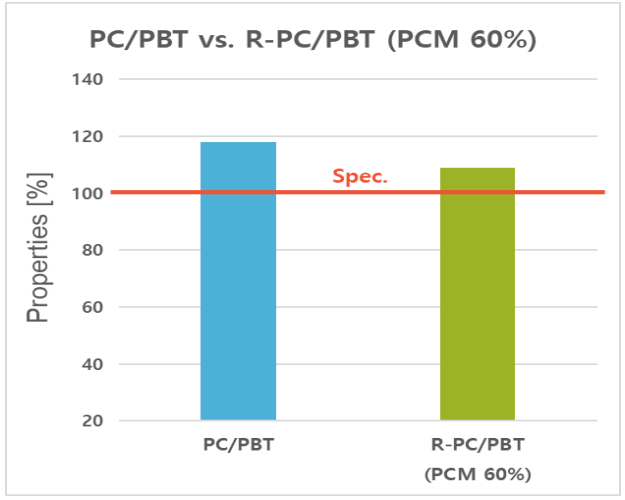
Mechanical Recycled Polycarbonate Alloy

R-PC/ABS (PCM 60%)



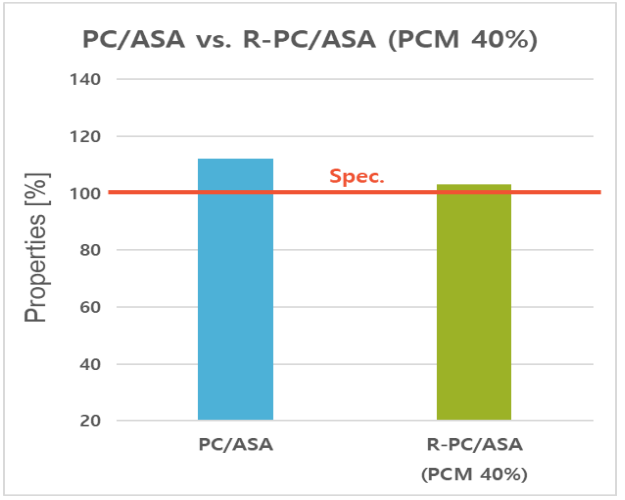
Console Tray

R-PC/PBT (PCM 60%)



Center Front PNL

R-PC/ASA (PCM 40%)



Glove Box Handle

samyang

Eco-friendly Materials (Polyamide)

Recycling

Discarded Fishing nets
PA6 Comp'd

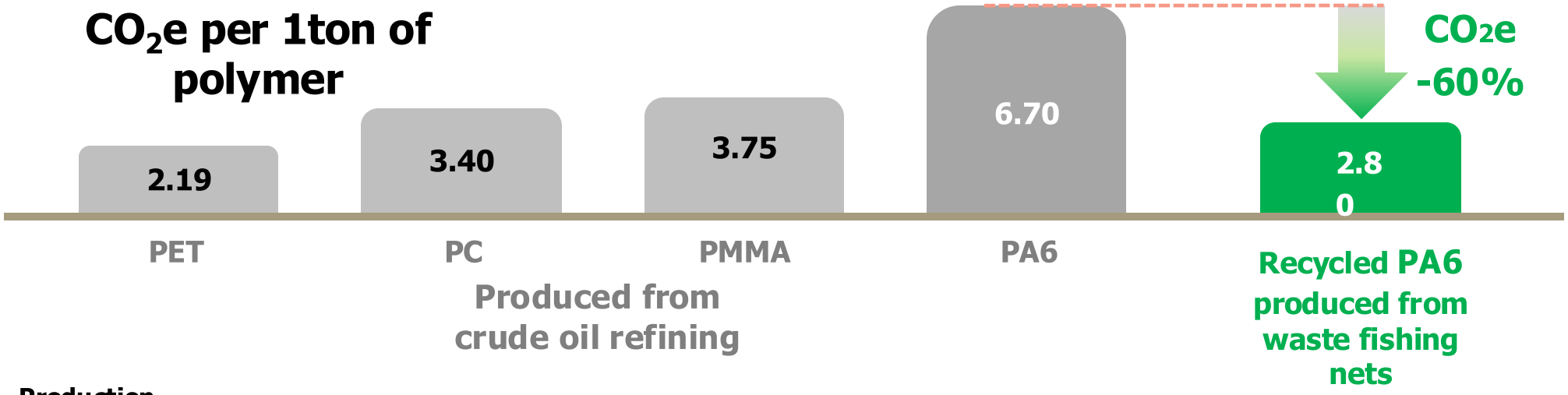
Recycling

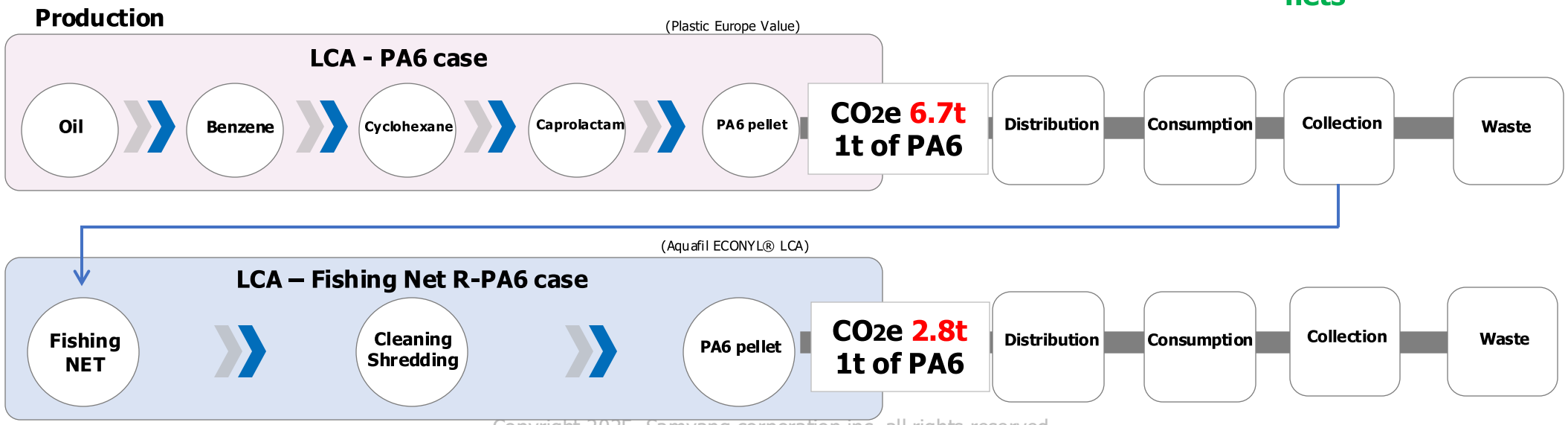
End-of-Life Vehicle Airbag
PA66 Comp'd

Eco-friendly Materials (Polyamide)

2. Recycle Materials (PA)

Why recycle waste fishing nets?

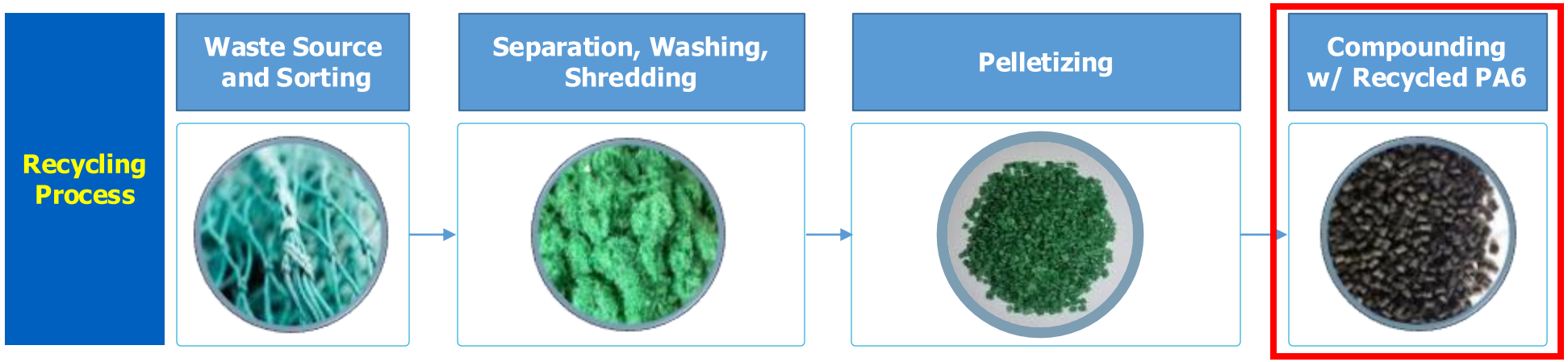




Eco-friendly Materials (Polyamide)

2. Recycle Materials (PA6)

Properties of Recycled PA6 compound



Samyang's TRIECO provides the equivalent mechanical properties to virgin.

Eco-friendly Materials (Polyamide)

2. Recycle Materials (PA6)

Recycled PA6 compound

Grade	Description	Recycled PA6 Contents	Application	Specification
TRIECO 4D40G30 BK (OCEAN)	PA6 GF30%	35%	**Air cleaner** Bracket console mount	General grade
TRIECO 4D46M20 BK (OCEAN)	PA6 GF7% + MF13%	40%	**Engine cover**	Mineral reinforced
TRIECO 4D20G15 BK (OCEAN)	PA6 GF15% (Non coating)	20%	**Door handle bracket**	General grade
TRIECO 4D21G15 BK (OCEAN)	PA6 GF15% (Coating)	20%	**Door frame finisher**	Chemical resistance
TRIECO 4D43G30 BK (OCEAN)	PA6 GF30% (Flame retardant)	30%	On progress	Frame resistance (1.5t V-0)
TRIECO 4D40G40 BK (OCEAN)	PA6 GF40%	40%	Sun visor arm	High impact strength
TRIECO 4D40G50 BK (OCEAN)	PA6 GF50%	35%	On progress	High impact strength
TRIECO 4D51G15 BK (OCEAN)	PA6 GF15%	50%	On progress	High recycle contents
TRIECO 4D51G30 BK (OCEAN)	PA6 GF30%	50%	On progress	High recycle contents

Eco-friendly Materials (Polyamide)

3. Recycle Materials (PA66)

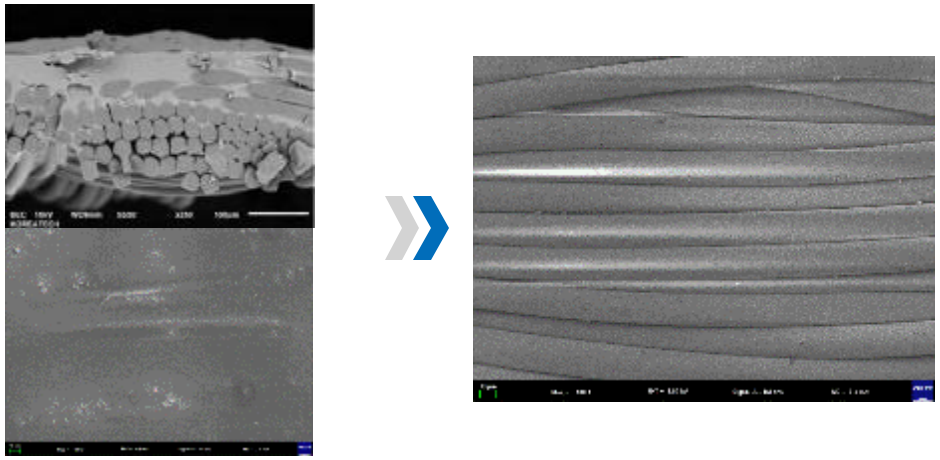
Recycling process of PA66 from waste airbags

Collecting airbags from scrapped car

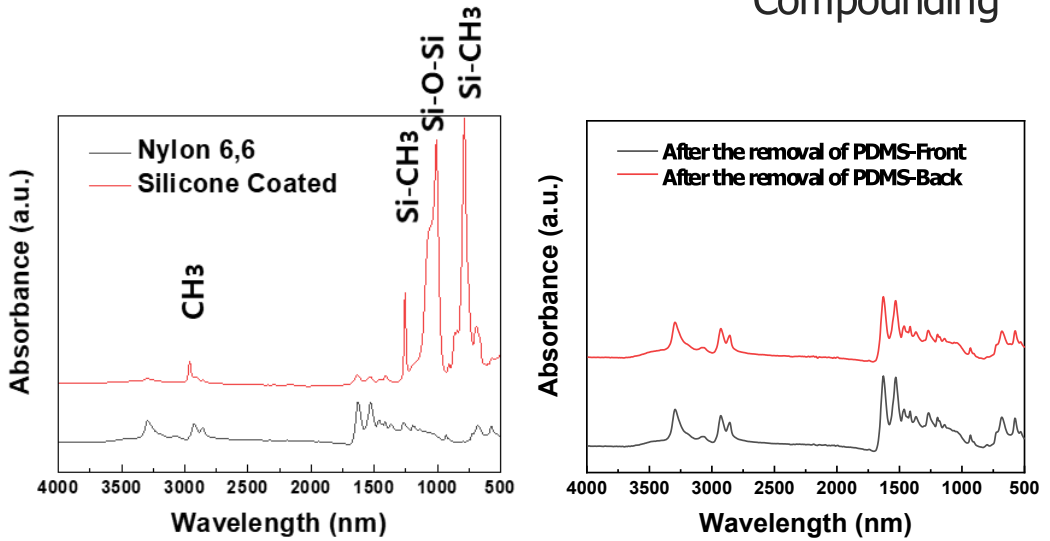
Shredding & **PDMS removal**

PCM Pelletizing

Recycling PA66 Compounding



[Cross-section & Top-view images of Airbag fabric]



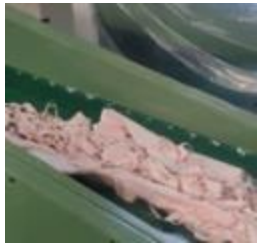
[Removing PDMS coating effectively is an important process]

Eco-friendly Materials (Polyamide)

3. Recycle Materials (PA66)

Properties of Recycled PA66 product

	Properties	Unit	Standard (ISO)	Ref) Airbag fabric	After Coating Removal
Physical	Specific gravity	-	1183	**1.14**	**1.14**
	MI(@275°C, 2.16kg)	g/10min	1133	**28**	**27**
Mechanical	Tensile strength	MPa	527	**80**	**78**
	Tensile elongation	%	527	**17**	**15**
	Flexural strength	MPa	178	**107**	**104**
	Flexural modulus	MPa	178	**2,650**	**2,600**
	Notched Izod impact	kJ/m^2	180/1eA	**5.2**	**4.3**
Thermal	HDT(@1.8MPa)	°C	75	**71**	**71**



Shredding

PDMS removal (Solvent+Cat.)

Rinse with Water

Drying

Extrusion & Evaluation

Samyang's waste airbag recycled PA66 provide the equivalent mechanical properties to virgin.

SAMYANG

Sustainability-Linked Loans

Driving Financial & Environmental Returns

Laura Shahbenderian

Agenda

1. What are SLL's?
2. SLL process
3. Fee structure
4. Ravago KPIs
5. Key take-aways from our own SLL experience

What are SLL’s ?

- Sustainability-Linked Loans (SLLs) are a type of financing mechanisms where the borrower's **ESG performance is directly** tied to the terms of the loan — ie. **the interest rate**.
  - Set up with banks or syndicates

- General principle is that the interest rate **goes up or down according to ESG KPI performance levels**

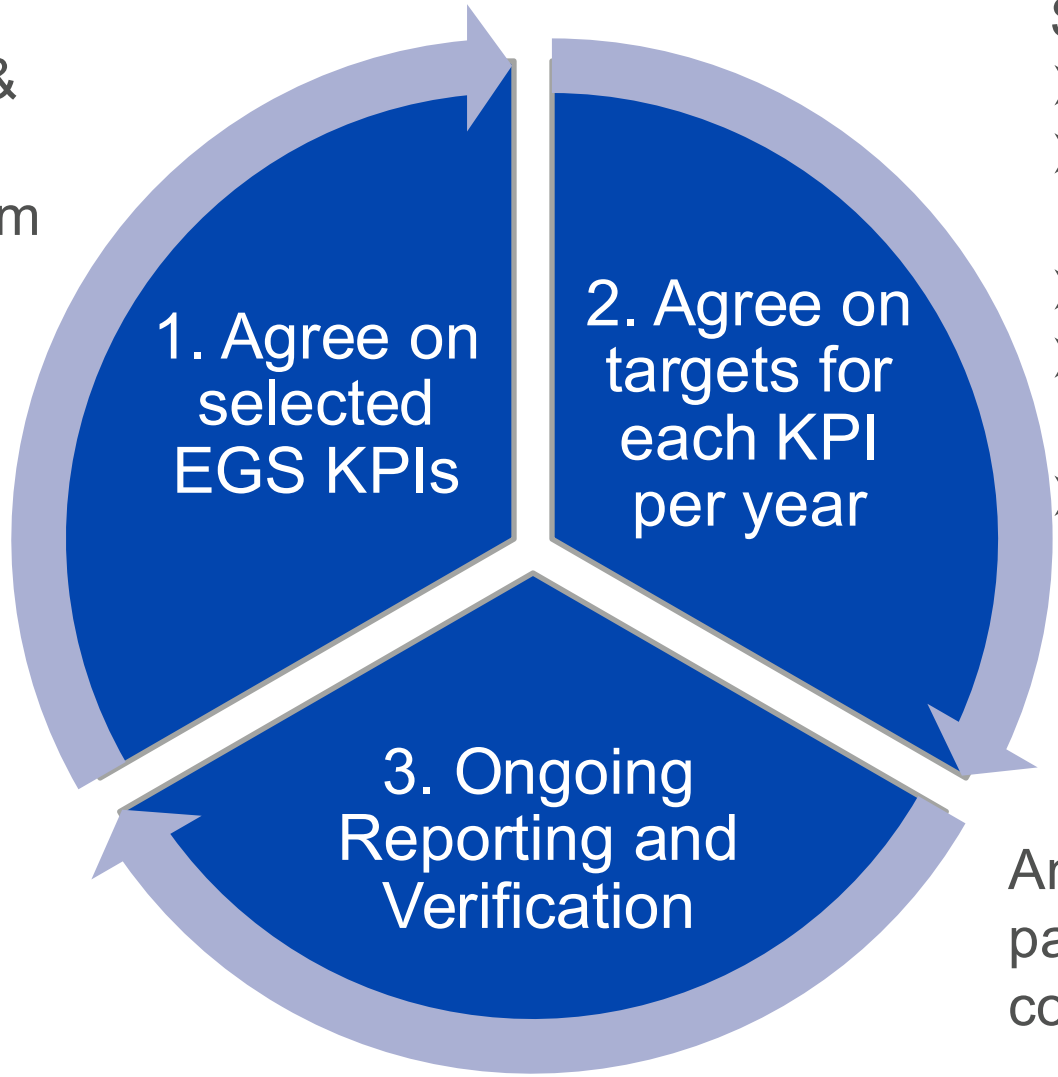
What difference with green bonds or SLB?

Aspect	Sustainability-Linked Loan (SLL)	Sustainability-Linked Bond (SLB)	GSSS Bond (Green/Social/Sustainability Bond)
Type of Instrument	**Loan**	**Bond**	**Bond**
Use of Funds	**General corporate purposes**	**General corporate purposes**	**Specific green, social, or sustainability projects** only
Impact on Pricing	**Reward or penalty** (up/down interest) based on KPI performance	**Penalty only** (coupon goes up if KPI missed)	**No performance-linked pricing** — impact comes from project eligibility
Lender/Investor	Banks or syndicates	Capital market investors	Banks or development finance institutions
Disclosure	**Private** reporting to lenders	**Public** reporting to investors	**Private**, project-specific reporting to lender
Flexibility of Use	High – money can be used anywhere in the business	High – general funding use	Low – funds must go to **pre-approved eligible projects**

How SLL work in practice?

Can be energy, GHG, water, diversity, health & safety, ….

- depends bank system (sector defined or / flexible)



Should be specific:

- Time bounded
- Per year covering the whole period
- Can be absolute or relative
- Ambitious enough (beyond BAU)
- Measurable

Annual reporting & third-party audit required to confirm reported results

Fee structure

- Basis points (bps) are used to measure changes in interest rates, loan margins, bond yields, and fees in a precise way
  - 1 basis point (bp) = 0.01%
  - So 100 bps = 1% - 25 bps = 0.25% - 15 bps = 0.15%, etc…
  - Fictive example

  Initial loan margin is 150 bps (1.50%) and SLL agreement to decrease by 5bps per target reached and increase by 5 bps per if none of KPI targets is reached

	Adjustments agreed	Margin evolution
0 KPI	+ 5 bps	1,55%
1 KPI	+ 2 bps	1,52%
2 KPI	- 2 bps	1,50%
3 KPI	- 5 bps	1,45%

SUSTAINABLY AT THE HEART OF YOUR LIFE.

Which KPI's selected for Ravago Group?

Ravago Group Sustainability Indicators

Recycled products volumes (absolute)

Scope 1&2 GHG Intensity change

Employee Engagement Score

Ravago Group SLL Indicators

Financial year of the Group	2020	2021	2022	2023	2024	2025	2026
Volume of Recycled Products STVs (Cumulative Growth in %)			Baseline	+4.4%	+16.2%	+26.8%	+35.2%
Manufacturing GHG Intensity Change		Baseline	99,7%	98.9%	94.7%	90.5%	89.8%
Employee engagement score (%) is above external sectorial benchmark score		>80%	>80%	>79%	>80%	TBD	TBD

Our learnings & key take aways

- GHG targets are (still & always) a challenge! Hard to escape scope 3 targets in the future
- Having sustainability strategy before engaging in SLL
- Costs not to be underestimated (external benchmark, audits, internal resources)

- ✓ Great instrument to drive sustainability internally
- ✓ Helps us to get prepared for CSRD
- ✓ Gives legitimacy to sustainability strategy
- ✓ Gives credibility (audited figures)

volution

From Prime to PCR

A converter's journey to full circularity

Lee Nurse

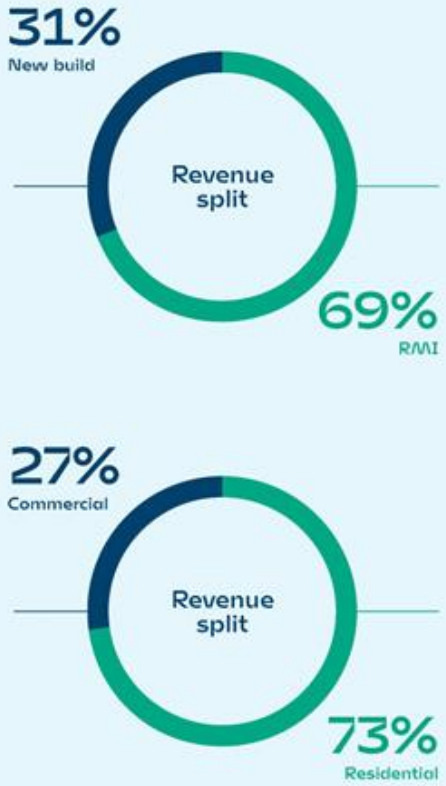
Healthy air sustainably

volution

Volution Group plc

Our journey with recycled plastic

Volution at a glance



UK

46.3%
of Group revenue

Revenue
£160.8m
Adjusted operating profit
£40.2m
Adjusted operating profit margin
25.0%

Continental Europe

38.7%
of Group revenue

Revenue
£134.4m
Adjusted operating profit
£32.1m
Adjusted operating profit margin
23.9%

Australasia

15.0%
of Group revenue

Revenue
£52.4m
Adjusted operating profit
£11.9m
Adjusted operating profit margin
22.7%

Our energy efficient indoor air quality solutions are part of the global green economy

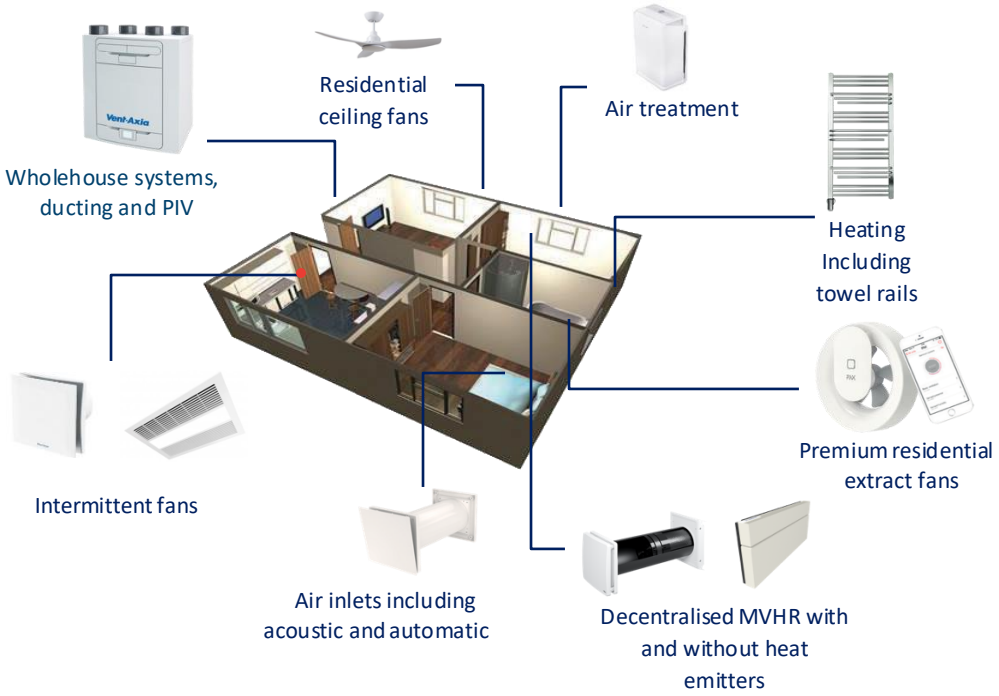
We are differentiated by our purpose. Our purpose is to provide healthy indoor air, sustainably. This commitment is integral to everything we do. It shapes our values, steers our strategy and informs our capital allocation.

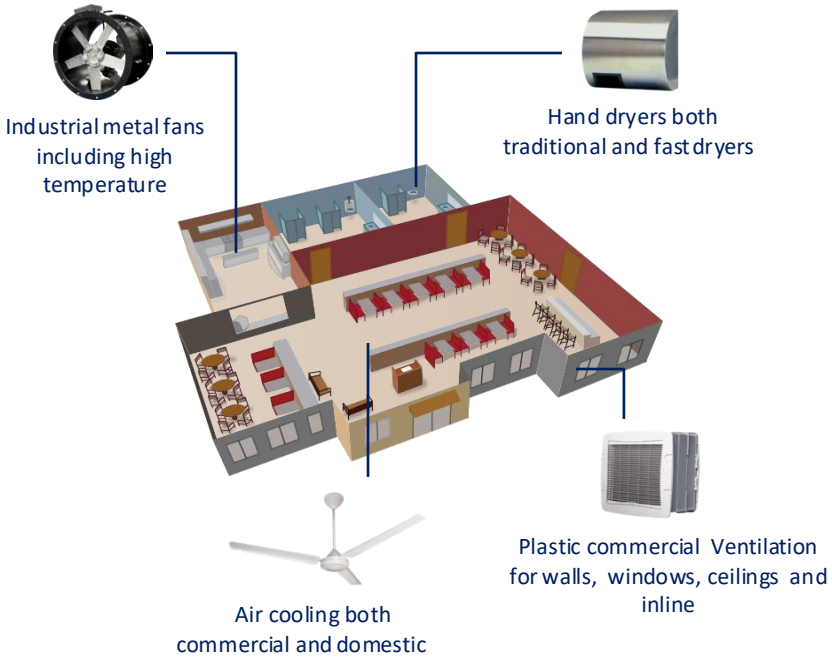
Products and Components

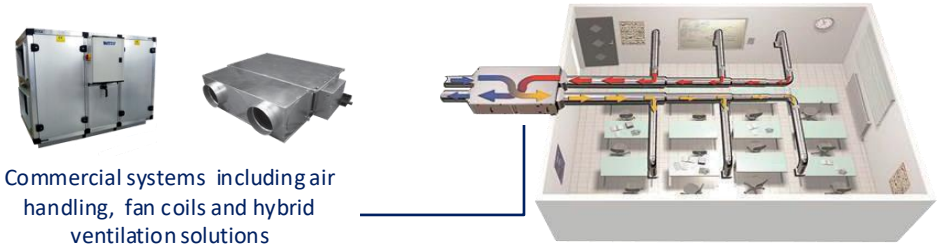
Ventilation Group primarily supplies heat recovery finished products for residential and commercial construction in the UK, Continental Europe and Australasia.

OEM heat cells for use in heat recovery products including plate and rotary and high efficiency motors for HVAC systems.

Key Product Categories







What is the scale of plastic use?

Circa 85% of what we sell we manufacture

We sell >3m fans a year across our group and extrude >2m meters of ducting a year

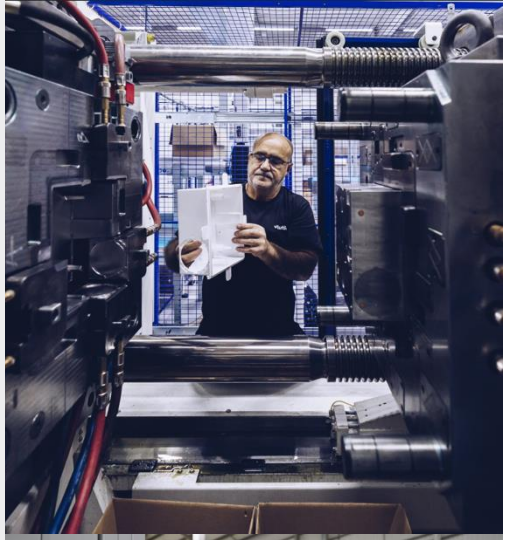
We have injection moulding and extrusion across 3 sites in the UK and Europe

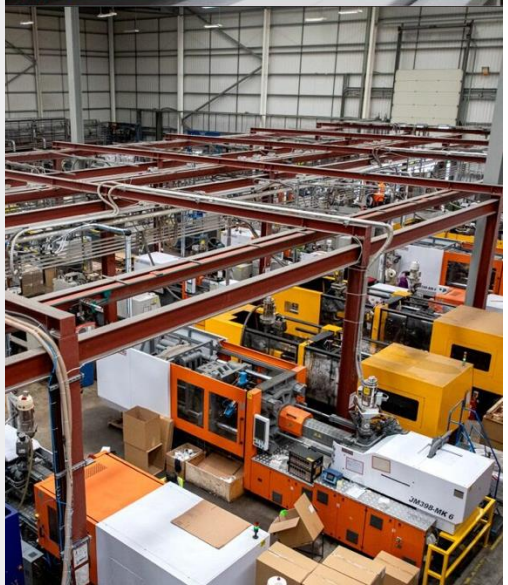
Circa 60 injection moulding machines from 25 tonne to 1200 tonne

5 extrusion lines for ducting

Total polymer usage is circa 4,000 tonnes a year

4 key polymers PVC, HIPS, ABS and PP





Key Uses for the different polymers

PVC = Extruded ducting

HIPS = Ducting components and Grilles

ABS = Fan facias and chassis

PP = Ducting plenums

hallenges to adoption of recycled plastic

1) Sourcing
Getting enough material for our needs and the continuity of supply

2) Processing
Learning how to manage variations between batches within our production facility

3) Quality and properties
Understanding the sensitivity of each component– This covers lots of areas including (but not limited to) colour and colour match between components, flow marks, imperfections, matt or gloss surfaces as well as mechanical properties of each component and the relevance of stresses.

4) Certification of our products
Lots of 3rd party certifiers assume virgin plastic with appropriate evidence of properties etc

5) Distribution Channels
Colour changes and the impact that has on listing in the distribution channels

6) Internal teams
There is a perceived association between recycled and quality, even though they are not the same thing. Those barriers needed to be broken down.

Quality Control

As part of the journey, we realised that we needed to be sure of the properties of the material that we were receiving.

To assist with that we set up our own lab. On each batch we perform the following tests:

- Tensile tests to ISO 527
- Charpy & IZOD impact tests to ISO 179 & ISO 180
- VICAT testing to ISO 306
- Heat deflection testing to ISO 75
- Glow wire testing to IEC 60695

We also leave samples on long term test for durability, performance and reliability.

Market acceptance

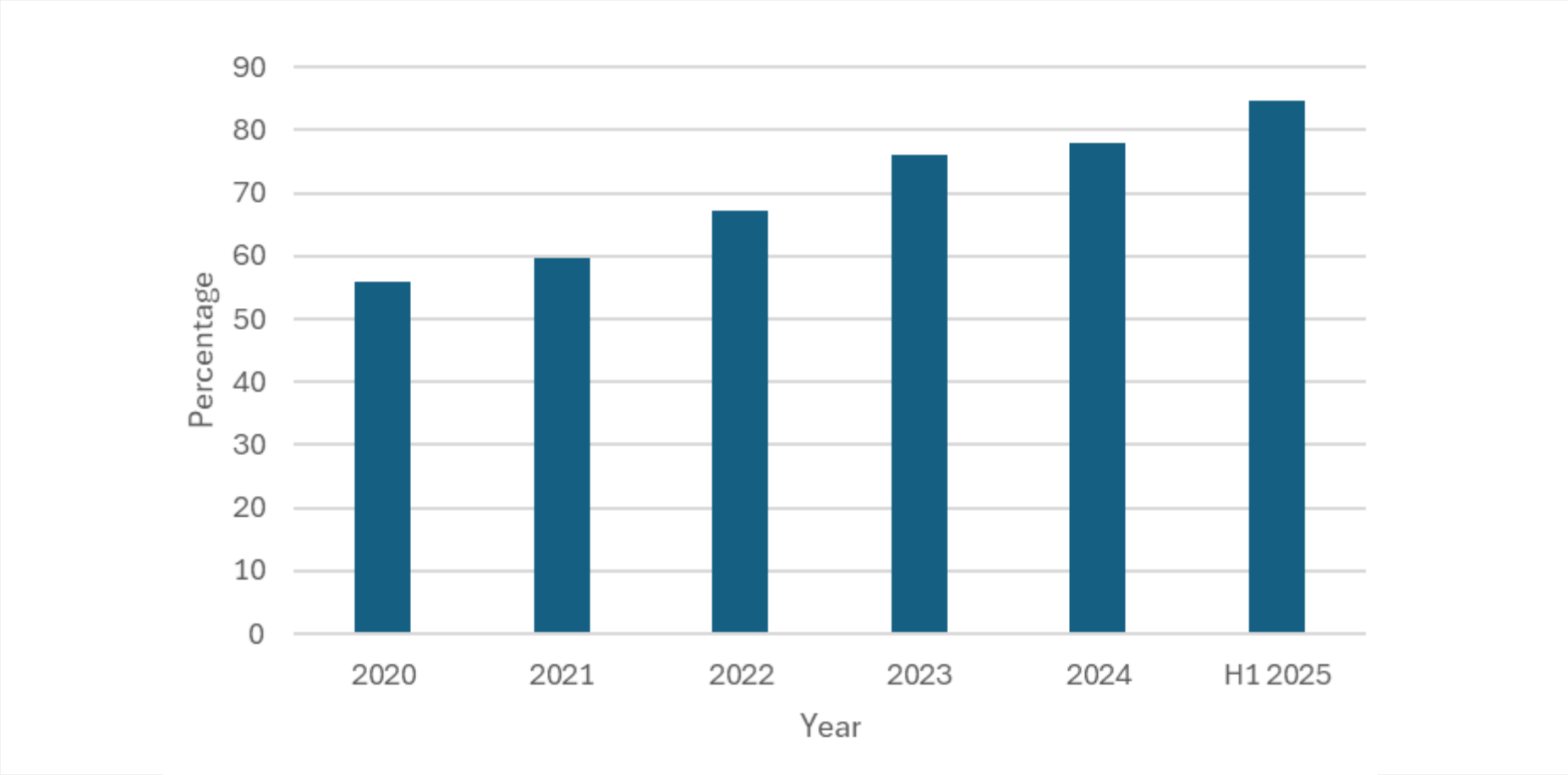
We sell most of our products through electrical distributors and retailers right across Europe as well as working with house builders, landlords and ventilation specifiers.

In some areas, recycled plastic has helped elevate ventilation. Listed companies have helped amplify by adding us into the external communications where it helps their own ESG journey.

We have had champions at the Director Level encouraging our teams to be brave and the sales teams have been carried along in the journey.

You don’t need many examples of positive feedback from customers before sales-people start to believe.

Our Progress



In 2020 we started this process in earnest. We had 56% of our overall usage from recycled sources already, but crucially nothing that was a visible part. Our target of 90% was always a challenge, but we are getting close…


Welcome
to Volution Group's largest
domestic ventilation production facility
Targeting 90% of our plastics
to be from recycled content by 2025
volution
Healthy air, sustainably.

Recycling from the Retail Frontline

Building a circular electronics model

Dave Ware

Spirit of Partnership

+ 5 years

Since 2016

Every year we recycle

Every year we recycle

+1.25 million large appliances

Every year we recycle

+1.25 million large appliances

50k reuse

Every year we recycle

+1.25 million large appliances

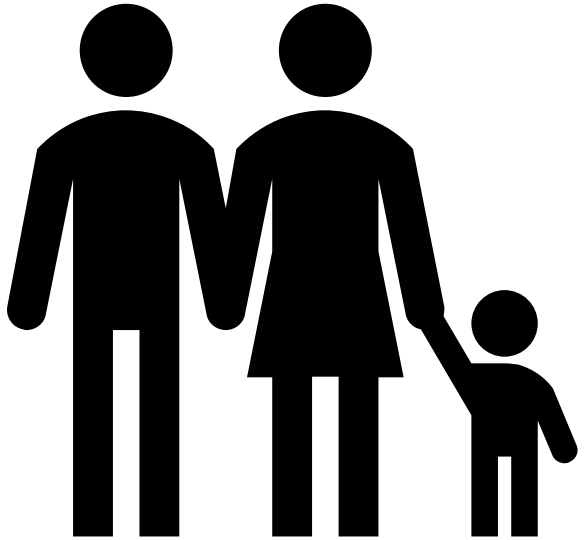
50k reuse

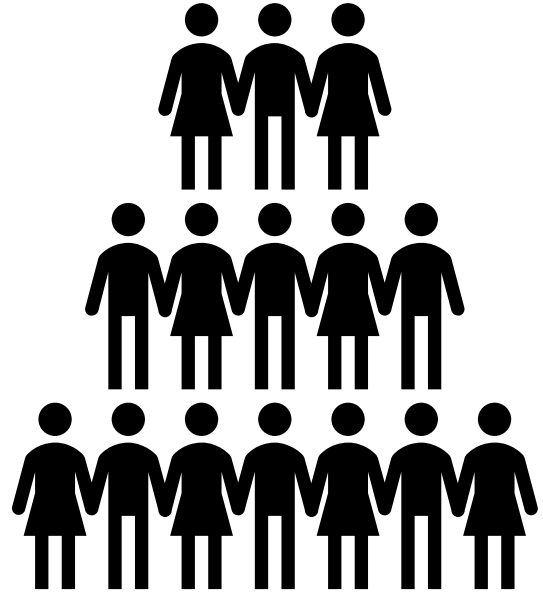
4,000 tonnes packaging

Why invest in recycling?

Why invest in recycling?

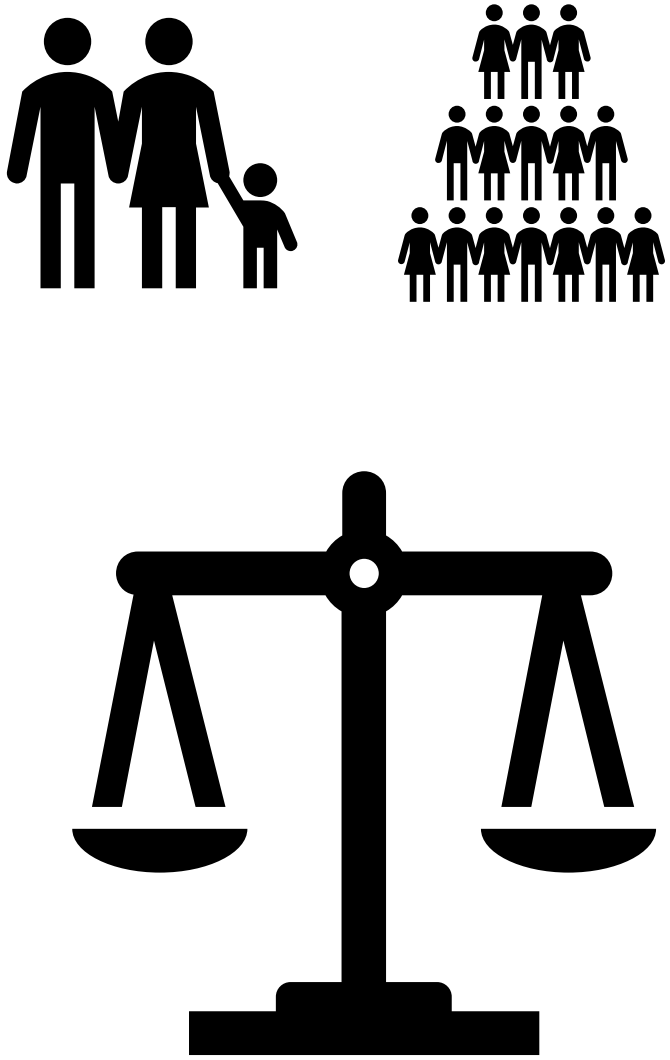
Customer direction





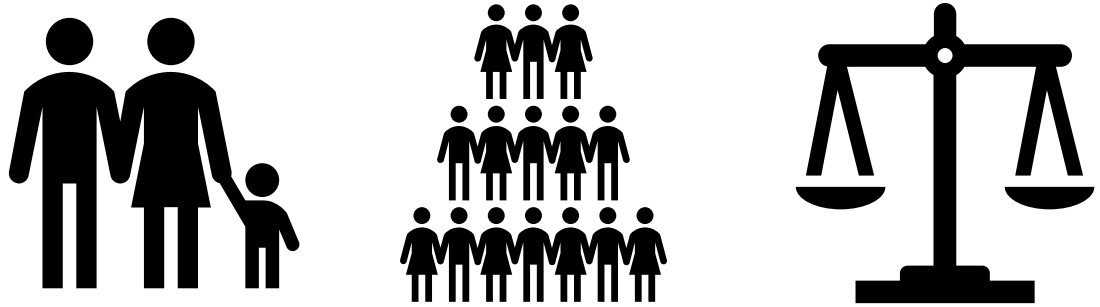
Why invest in recycling?

Legislation



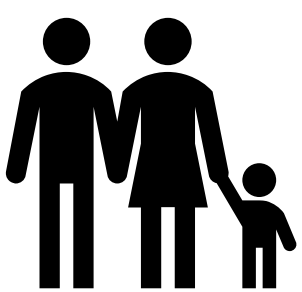
Why invest in recycling?

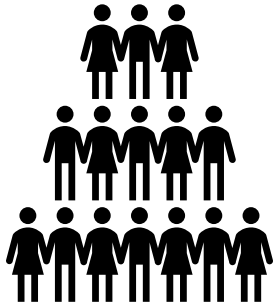
ESG

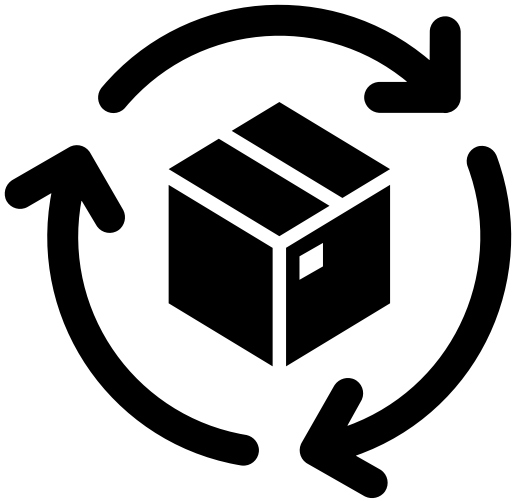


Why invest in recycling?

Vertical integration







Why invest in recycling?

Doing the right thing

Plastics Recycling

Plastics Recycling

11,000 tonnes
(60% from AO fridge recycling plant)

Plastics Recycling

5,000 tonnes of white/light grey HIPS
700 tonnes of mixed colour PP


EREMA
REMA®
TVEplus® RegrindPro®
ecoSAVE
BluPort

Quality Assured

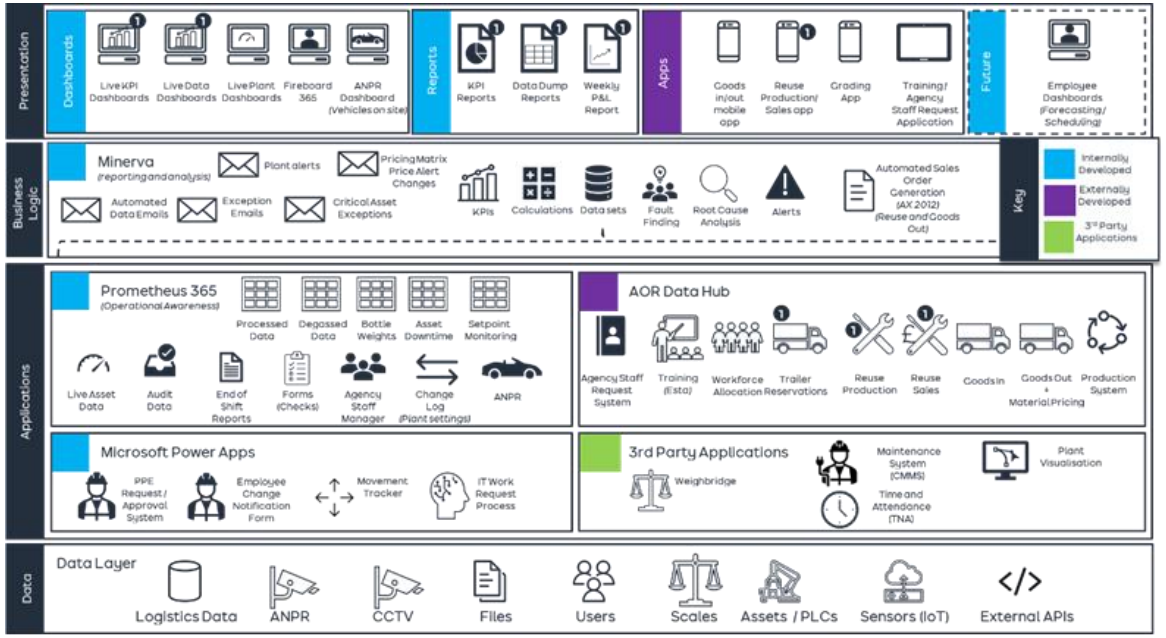
RecyClass RECYCLING PROCESS EN 15343

Registered to ISO 9001:2015
ISO 14001:2015 & ISO 45001:2018

WEEELABEX
CONFORMITY & VERIFICATION

Consistency & Quality

Process Controls & Tech

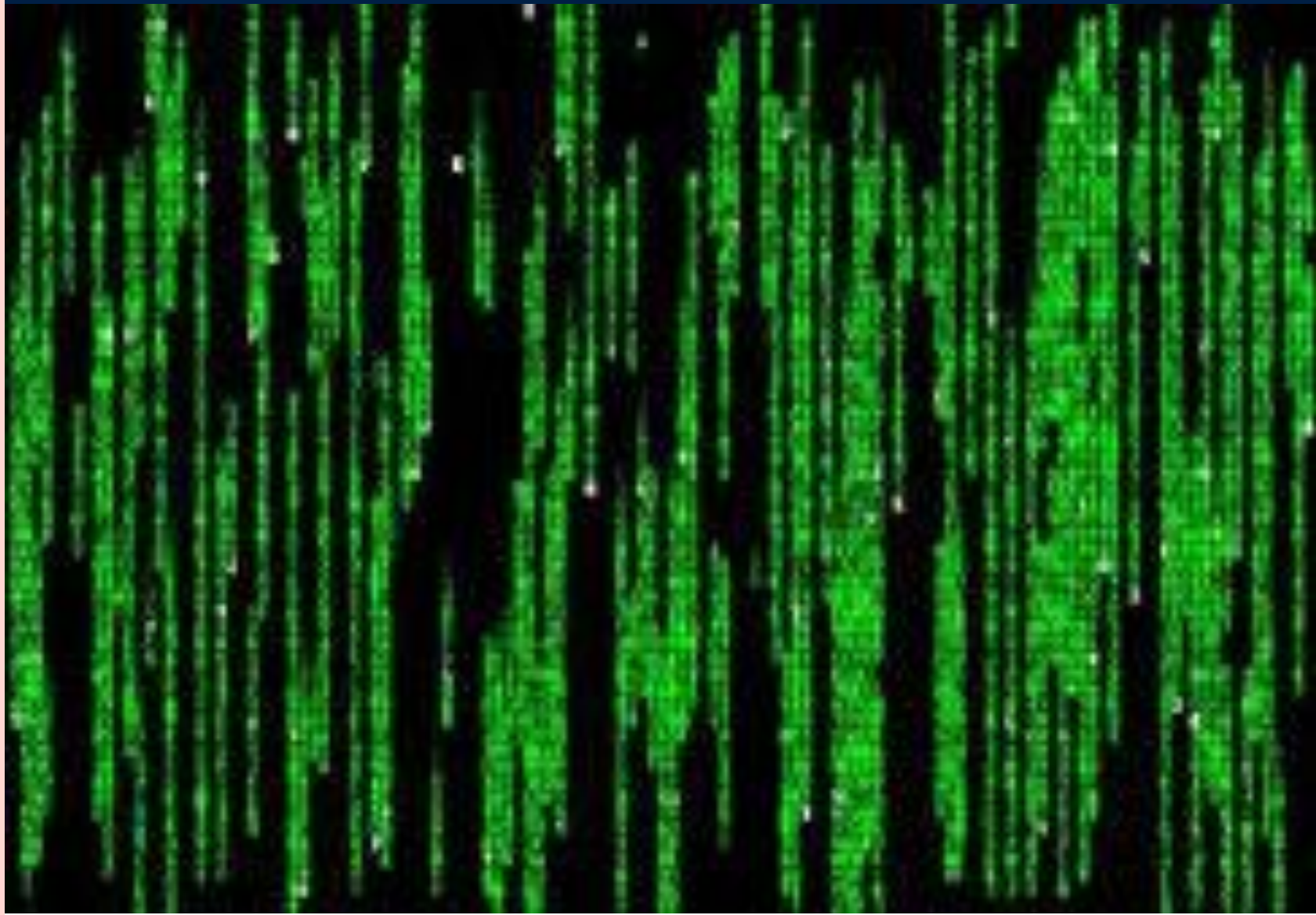


Use with confidence

Why we are different

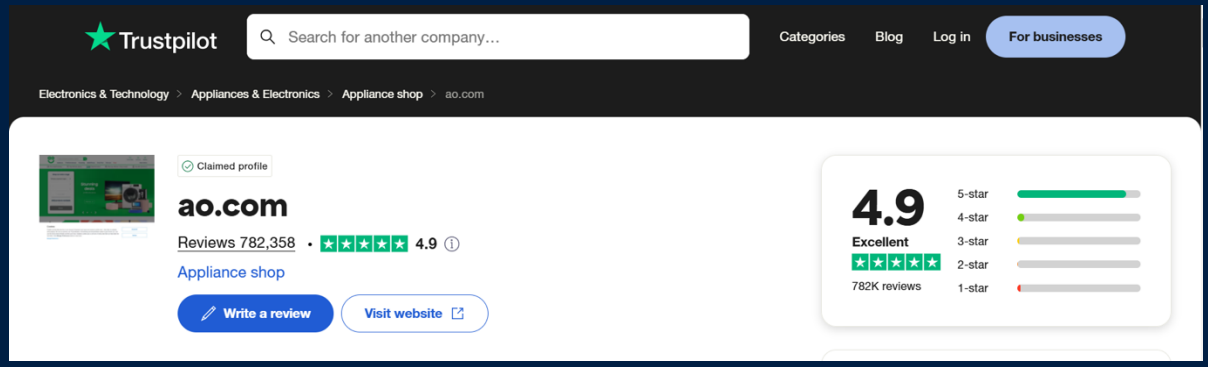
Long term view

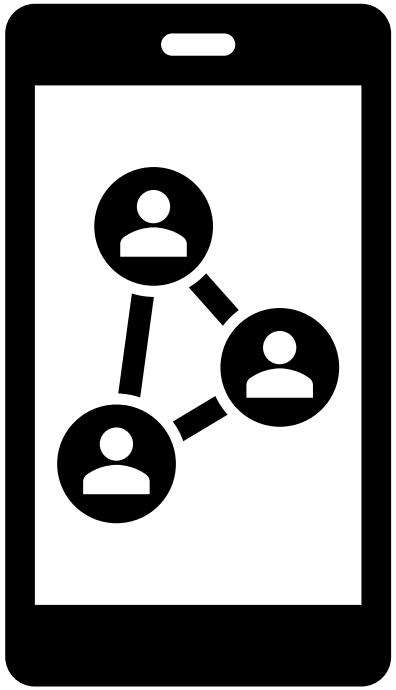
Why we are different



Why we are different

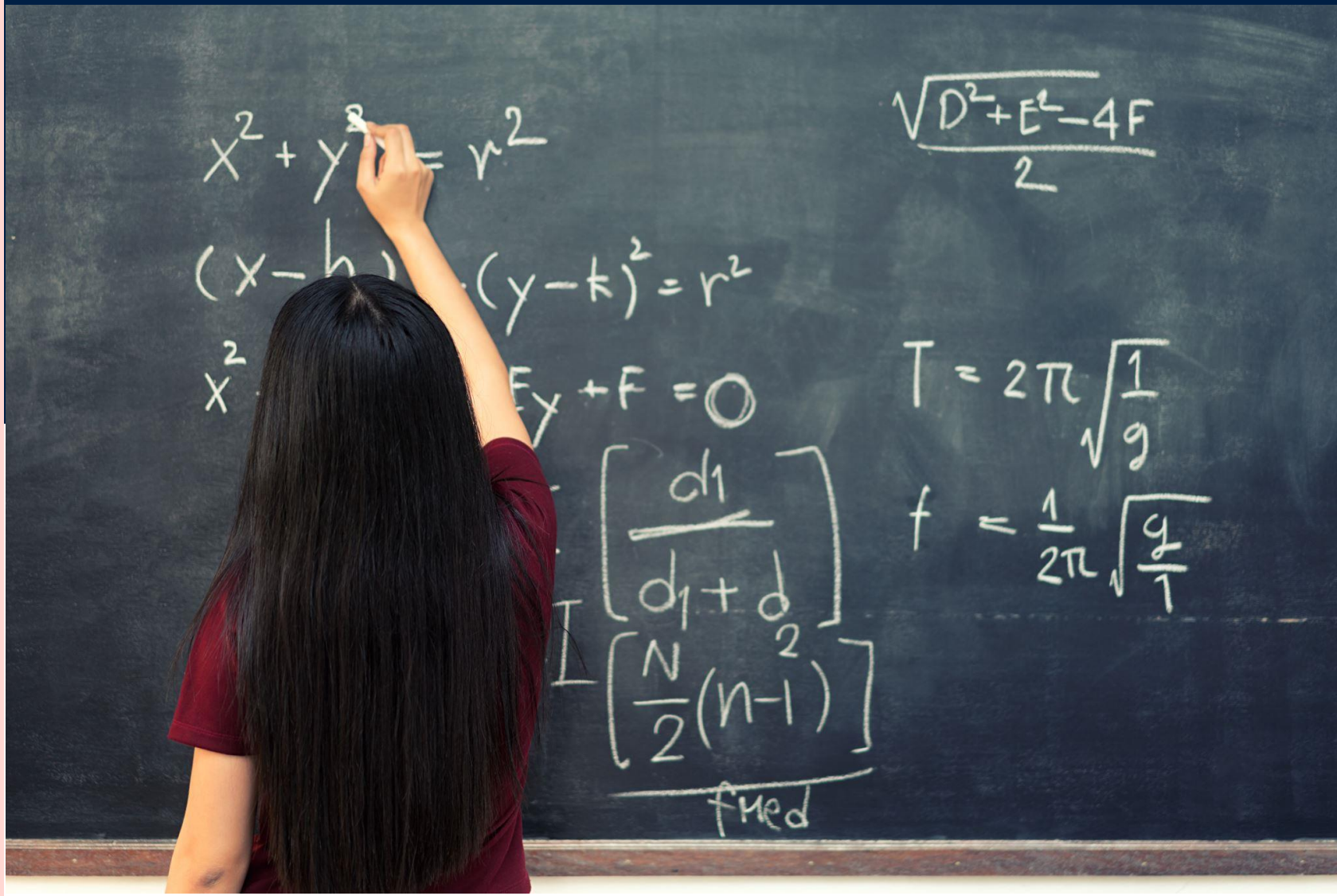
Reach of Voice





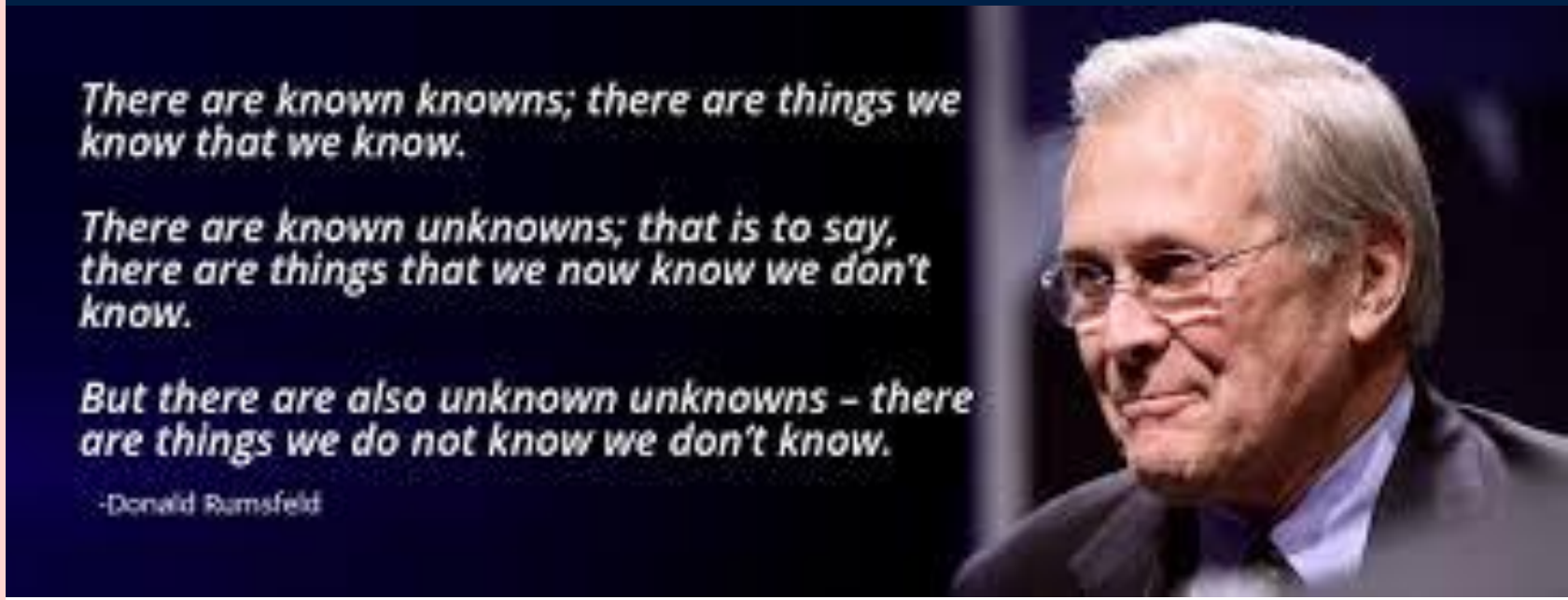
Continued Learning

Why we are different



Accepting limitations

Why we are different



Working in partnership

Why we are different

Transparency & trust

Why we are different

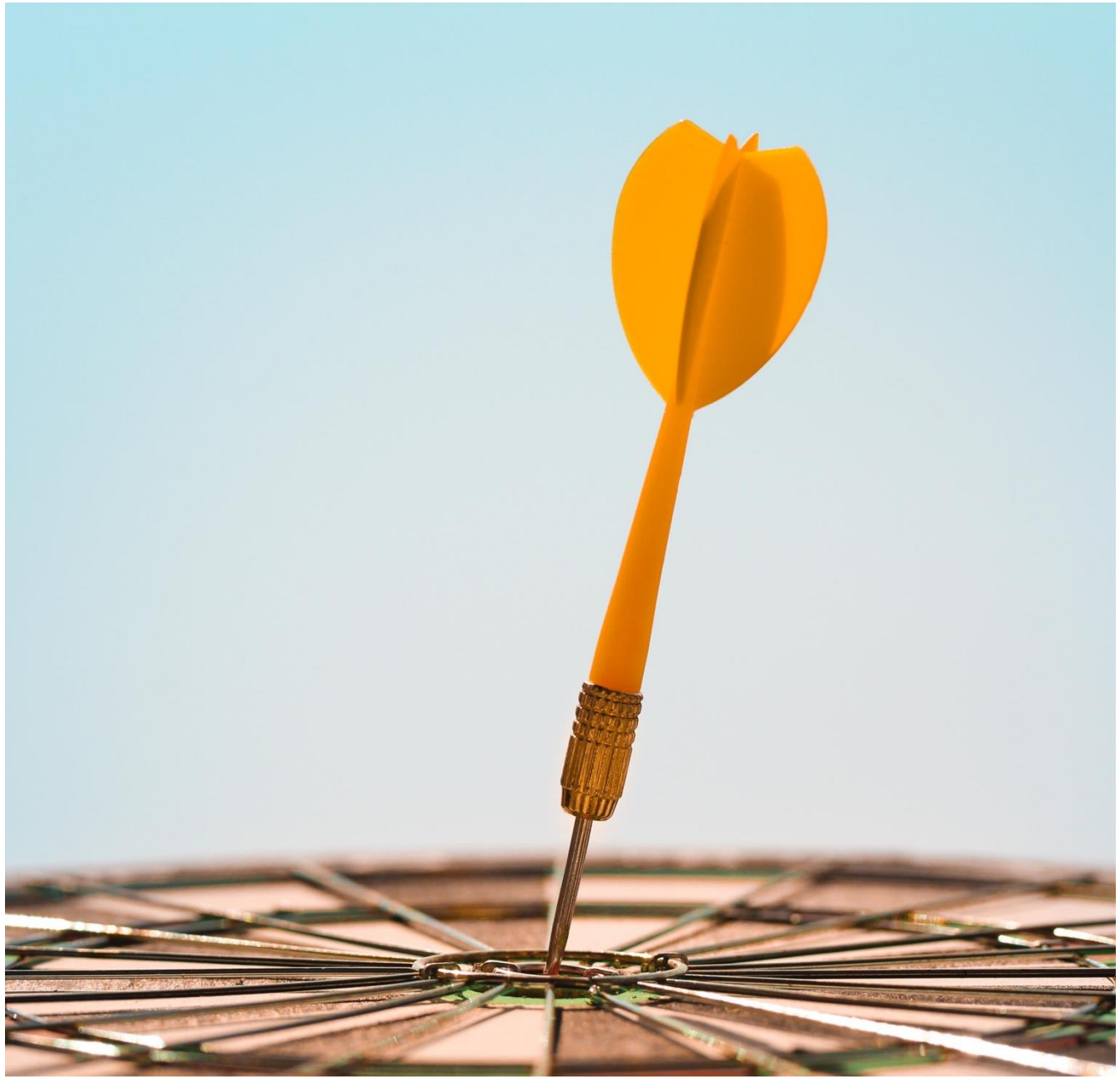
Problem Solving

The results?


ACCELERATING
ELECTRIFICATION TO MEET
NET ZERO
#ACCELERATING
eama


RECYCLED PRODUCT
OF THE YEAR
SPONSORED BY
wrap
Awards for
EXCELLENCE
IN RECYCLING AND WASTE MANAGEMENT

The Future



BASF

The Chemical Company

BASF's Sustainability Toolbox

Solutions for Circularity

Michael Prinz

BASF – We create chemistry

- Our chemistry is used in almost all industries
- We combine economic success with environmental protection and societal responsibility
- Sales 2024: €65.3 billion
- EBITDA before special items 2024: €7.9 billion
- Employees (as of December 31, 2024): 111,822
- 235 production sites including 6 Verbund sites
- Over 74,000 customers from various sectors in almost every country in the world

Our products reach almost all industries & applications

Core businesses

Chemicals

Petrochemicals

Intermediates

Materials

Performance Materials

Monomers

Industrial Solutions

Dispersions & Resins

Performance Chemicals

Nutrition & Care

Care Chemicals

Nutrition & Health

Standalone businesses

Surface Technologies

Environmental Catalyst and Metal Solutions

Battery Materials

Coatings

Agricultural Solutions

Agricultural Solutions

BASF
We create chemistry

BASF Ludwigshafen

BASF
We create chemistry

“Our ambition:
to be the preferred chemical company to enable our customers’ green transformation.

BASF’s key customer industries are facing tremendous challenges in achieving their transformation targets. We deliver the chemical products that support our customers on this journey.”

Dr. Markus Kamieth, CEO of BASF

While enabling our customers' green transformation, we keep fully committed to our climate protection targets

2030

Scope 1 and Scope 2

25%

CO_2 emission reduction (compared with 2018)[1]

Specific Scope 3.1

15%

CO_2 emission reduction (compared with 2022)[2]

Sustainable-Future Solutions (sales share)[3]

>50%

products that offer sustainability benefits in terms of resource efficiency, climate change and energy, circularity, others[4]

Loop Solutions sales

€10bn

products that **close the loop** by being based wholly or partially on renewable or recycled feedstocks or enabling recyclability and/or biodegradability or **extend the loop** by increasing durability of materials or prolonging their functional life.

2050

Scope 1, 2 and 3.1

Net Zero

CO_2 emissions[1]

[1] Scope 1 and Scope 2 (excluding sale of energy to third parties); greenhouse gas emissions according to Greenhouse Gas Protocol, converted into CO_2 equivalents (CO_2e)

[2] Corresponds to a reduction from 1.64 to 1.39 kilograms of CO_2 equivalents per kilogram of raw material bought; Scope 3.1, raw materials excluding battery materials, excluding services, technical goods and greenhouse gas emissions from BASF trading business. In 2024 we adjusted the baseline in line with the TfS guideline due to the availability of further primary data.

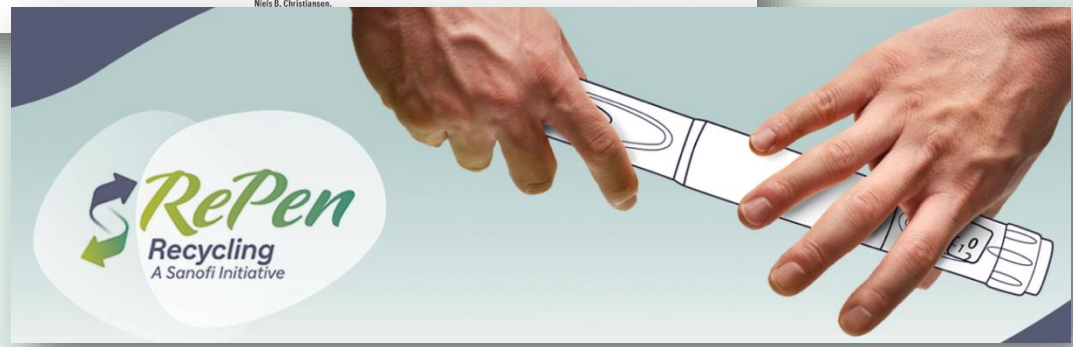
[3] TripleS: Sustainable Solution Steering methodology for steering the product portfolio based on sustainability criteria; not included: platinum group metals within ECMS, strategically non-relevant businesses such as IT services, licenses, etc.

[4] "Others" comprises health and safety, pollution reduction, biodiversity, water protection and zero hunger.

The green transformation is global driver

Regulation clearly targets ***circularity***

Brands strive for a ***Green Image***



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The chemical industry as key player in the green transformation

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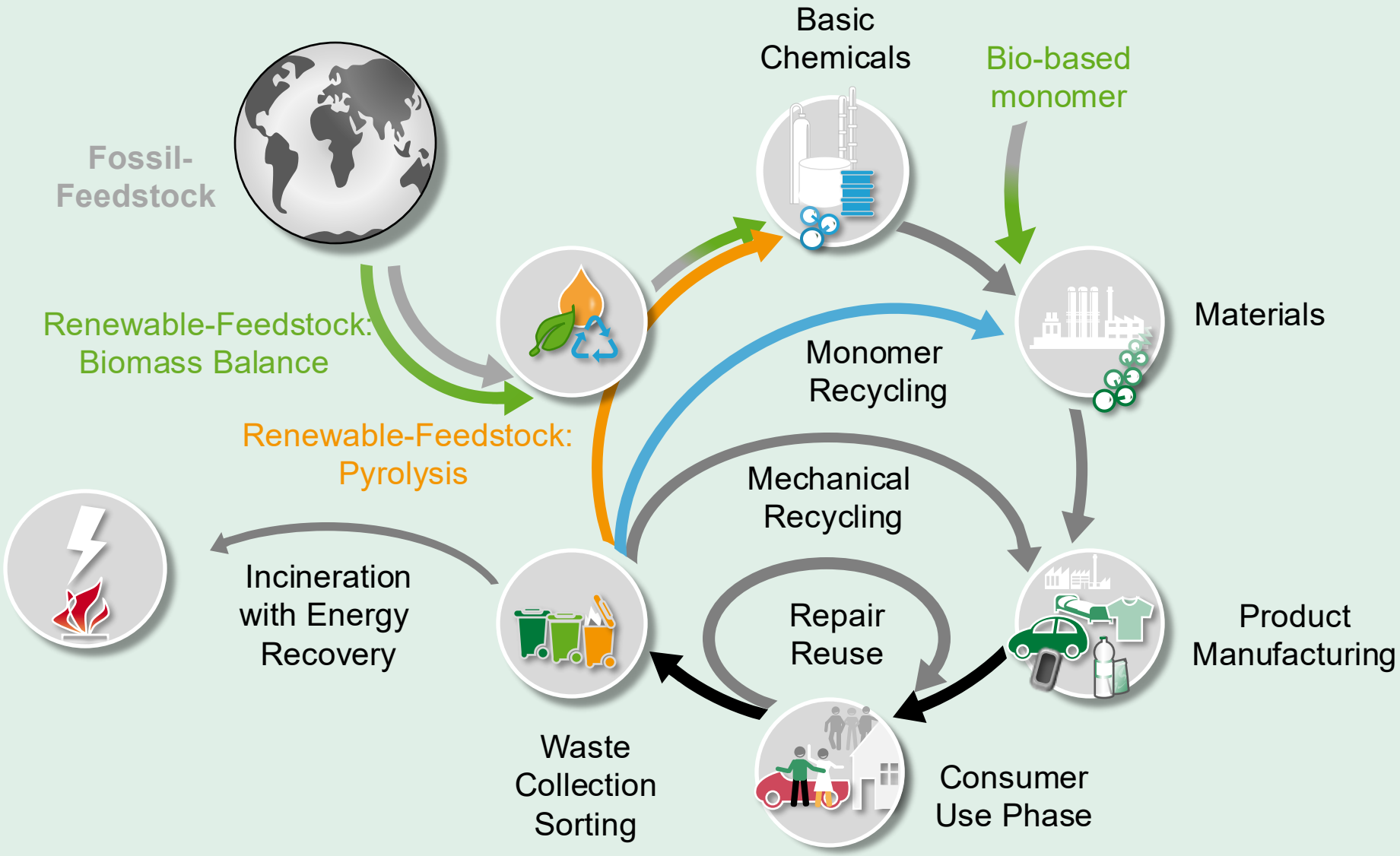
Closing the loop with circular economy: We have several options



Ultramid® & Ultradur® RC grades

BASF We create chemistry
loopamid

E.g. Ultramid® S Balance

ChemCycling® grades

Biomass Balance grades

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Our customers produce intrinsically sustainable products

Durable

Cost-efficient

Based on fossil resources

CO_{2e} emissions

Strong

Reliable

Safe

Lightweight

Chemical products are crucial in our daily life

Their production traditionally requires fossil resources and causes emissions

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Let's talk about our Sustainability Toolbox

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Our Sustainability Toolbox summarizes various solutions and will be further extended

The chemical industry has many tools → **Have a look!**

Mechanical Recycling

Green Energy Manufacturing

Mass Balance

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We support you with our Engineering Plastics toolbox

BASF standard (fossil feedstock)	Mechanical recycling	Green Energy Manufacturing	Mass Balance: Biomass Balance & ChemCycled®
	Reduce product carbon footprint		Reduce fossil resources (reduced product carbon footprint*)
	Recycled content	Sustainable drop-in solution (& attributed recycled content)	
	Segregated production (post-consumer & industrial waste)	Green electricity and steam in all plants (via mass balance)	Mass balance attribution of certified circular feedstock at the beginning of the Verbund (e.g. biogas or pyrolysis oil)
Ultradur®			
Ultramid® A			
Ultramid® B			
Ultramid® C			
Ultramid® S			

Suffix: RC1 or RC2

Suffix: rPCF

Suffix: : BMB or CCYD

DIN ISO 14021

*Product Carbon Footprint including biogenic uptake or upstream system expansion

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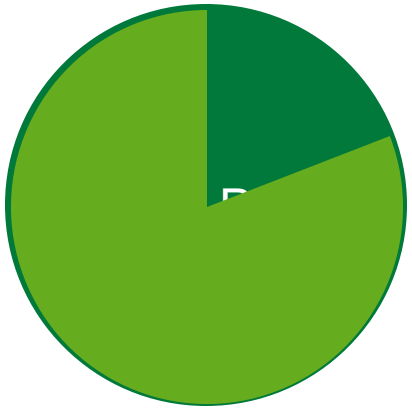
Product Carbon Footprint reduction and circularity potential

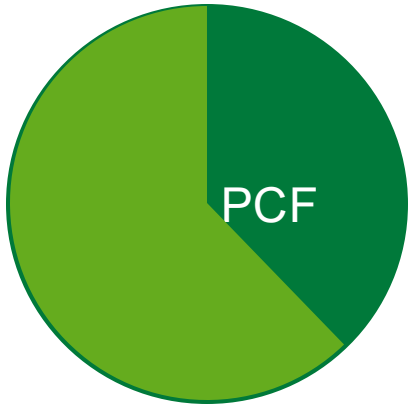
Mechanical Recycling

50% RC

Green Energy Manufacturing

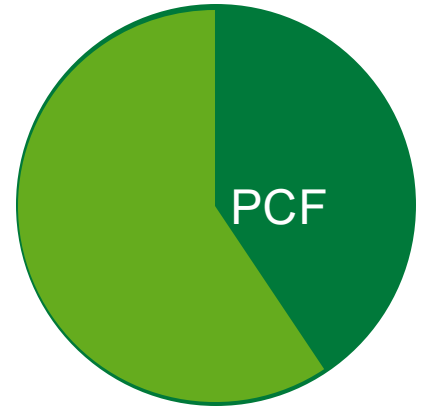


Biomass Balance*



100% attributed

ChemCycling®**



100% attributed

Disclaimer:
*including biogenic uptake
**including upstream system expansion
Abbreviations:
PCF: Product Carbon Footprint
RC: Recycled Content

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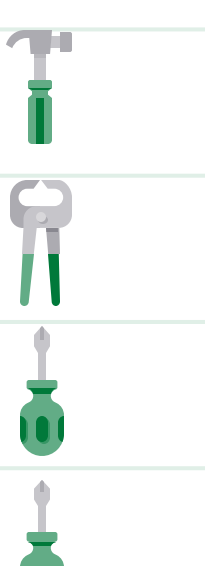
Sustainability Toolbox: Ultramid B product example

Product & Sustainability Attributes	PCF [kg CO_{2e}/kg]	Circularity
Ultramid® B3EG6 UN	3.4	
Mechanical Recycling (30%)	-1.0	30% recycled content
Green Energy Manufacturing	-0.6	
Biomass Balance	-1.6*	Up to 100% attributed biobased*** content
ChemCycling®	-1.5*	Up to 100% attributed recycling content



Disclaimer:
All shown data represent "BASF Environmental Evaluation Data" and therefore fall under the signed Agreement. Shown PCF data for products based on fossil raw materials are equivalent with already submitted data with given constraints regarding liability and comparability. *) PCF data marked with * are estimated values based on qualified estimation procedures. Such estimation allows to derive a first indication forecast for the particular products.
The values are not accurate, and BASF will not grant any liability for these values, nor will BASF guarantee commercial availability of such products with given PCF

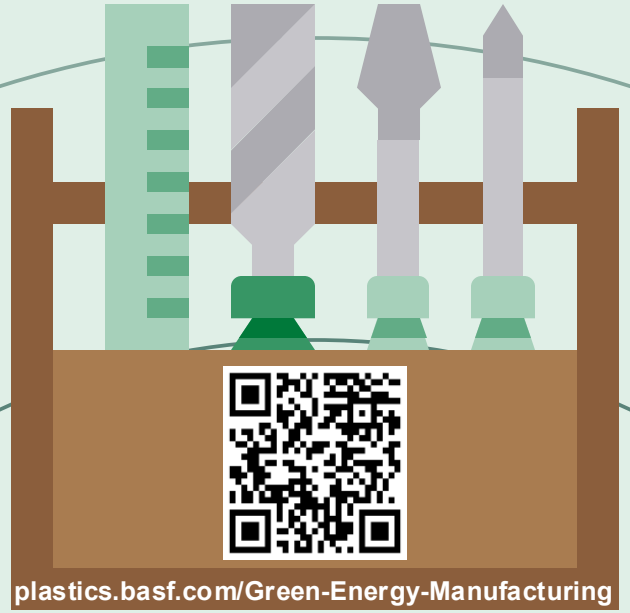
Abbreviations:
PCF: Product Carbon Footprint
*including biogenic uptake
**including upstream system expansion
***Waste based biofeedstock

Our Toolbox is constantly evolving…stay tuned!

Best-in-class raw materials

Additional recycled product offerings

Further green energy carriers (e.g. green hydrogen)



plastics.basf.com/Green-Energy-Manufacturing

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Regulation in the UK

What you need to know

Andrew Dixon

1. Who Are Eunomia?
2. Policy Objectives
3. Selected Regulatory Trends
4. How Eunomia Can Support

1

Who are Eunomia

Introducing Eunomia

A leading global environmental consultancy that combines real world consulting experience with an active role in policy, to provide pragmatic, science-led solutions for people and the planet.

What we do

Joining the dots between **policy, strategy and real-world implementation** for better environmental outcomes.

.

Where we work

A certified B-Corp business with 150+ employees across 5 offices, spanning three continents.

Who we work with

Clients across the public, private and NGO sectors.

Clients along the entire value chain.

For more information and our latest impact report visit www.eunomia.eco

eunomia

2

Policy Objectives

Quick Poll – Hands Up

What is primarily motivating businesses to make sustainable product decisions?

- Consumer perception
- Regulations
- Other

Policy Objectives

Problem: Reliance on consumer preference and unharmonized regulatory landscape leads to poor environmental outcomes

Solution: Harmonised legislation provides clear direction to manufacturers, the waste management sector and consumers while reducing regulatory burden

Implication: Major shift in Responsibility = Major Implications for supply chains

3

Selected Regulatory Trends

Introducing PPWR

Feb 2025
Entered into force

Recycling targets
65% of packaging is recycled.

Recycling targets 25-70% depending on material.

Compostable packaging
Mandatory use of compostable packaging for certain products e.g. tea bags, fruit & veg sticky labels.

Non-mandatorily compostable items must allow material recycling.

EPR
Mandatory EPR fee modulation for recyclability.

Recycled content targets for plastic
10-35% depending on polymer and use.

Recycling targets
70% of packaging is recycled. Recycling targets 30-85% depending on material.

Reuse targets
10-100% depending on packaging type and use.

Recycled content targets
25-65% depending on material.

Reuse targets
25-70% depending on packaging type.

2025 2026 2027 2028 2029 2030 2035 2040

Substances of concern
PFAS limit values and minimisation of substances of concern.

EPR
Producer EPR registers established in every MS.

Design for Recyclability
Calculation methods expected

Labels
Harmonised material labelling.

DRS
Mandatory DRS set up with 90% collection target for bottles & cans

Item bans
XPS food & beverage containers; Plastic packing peanuts; Plastic luggage wrap; Plastic multipack rings

Minimisation & void space
Minimum necessary packaging. Empty space ratio in grouped, transport and e-commerce packaging <50%

Item bans
HORECA single use plastic food and beverage containers, sachets and toiletries; very lightweight plastic bags; plastic multipack and plastic fruit and veg packaging.

Waste reduction targets
Increasing 5% 2030, 10% 2035 and 15% 2040.

Bans based on recyclability scores
2030: <70% recyclable
2035: <70% recyclable, <55% recycled
2040: <80% recyclable, <(55+x)% recycled .

Recyclability Criteria

Product

Supply chain obligated to provide product information to **Producer**

Assessment Methodology

- Component composition
- Additives and colourants
- Barriers and coatings
- Components seperability

Rating

Product gets recyclability rating eg:

- UK EPR 
- A-F for PPWR

The Stakes

- **Bans** from products being placed on market
- Higher **EPR fees**

Supply Chain Obligations

Minimum: Understand obligations and have technical documentation available

Optimum: Proactive engagement with customers to provide compliant alternatives

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Recycled Content

Feedstock

RC origin often dictated eg:
PCR
Vehicle to Vehicle

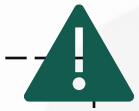
Chain of Custody

Supply chain will have to report chain of custody compliance

Recycled Content Targets

Vary by **sector**, **material** and **application** and increase over time
PPWR:
2030: 10-35%
2040: 25-65%
ELV: 25%

The Stakes



- **Bans** from products being placed on market
- Higher **EPR** fees

Supply Chain Obligations

Minimum: Understand obligations and have chain of custody strategy in place

Optimum: Proactive engagement with customers to provide compliant materials with chain of custody evidenced

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Green Claims Restrictions

The UK has new regulation in force to prevent greenwashing with Europe following close behind.

United Kingdom

What?
Digital Markets, Competition and Consumers Act 2024
What is in scope?
Mis-leading, false, unsubstantiated claims
Is it in force already?
Yes
Fines
Up to 10% of companies global turnover

European Union

What?
Green Claims Directive
What is in scope?
Explicit claims on environmental impacts and performance made on a voluntary basis.
Individual states can transpose it into national law with differences to the EU legislation
Is it in force already?
No – expected 2025, in force ~2027

Supply Chain Obligations

Environmental claims must be specific and substantiated by clear evidence and therefore will require supporting documentation from supply chain actors

4

How Eunomia can Help

How Eunomia Can Help

The Transformation

- Voluntary sustainability
- Unverified claims
- Lack of harmony with waste management

→

- Regulatory framework
- Mandated compliance
- Harmonised strategy

Eunomia can help you turn regulatory risk into competitive advantage

The Challenge

- Understanding obligations
- Assessing and mitigating risk
- Navigating complexity

The Opportunity

- Proactive Customer Engagement
- Reach previously unmotivated customers
- Provide impactful solutions

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LyondellBasell

Circular and low carbon solutions for your business

Solutions for Circularity

Andrea Delforno

LYB – Sustainability Report 2024 Highlights

At a glance sustainability performance

0.127

Total Recordable Incident Rate (TRIR), representing industry-leading performance, marking our second-best year for TRIR

70

Manufacturing sites achieved GoalZERO[1]

100%

allocation of Green Bond funds to eligible projects

72

Manufacturing sites were injury-free

Laid the foundation for our first commercial-scale chemical recycling plant using our *MoReTec* technology

Produced and marketed more than

200,000

metric tons of recycled and renewable-based polymers[2]

Volumes of our recycled and renewable-based polymers have increased since 2023

65%

1,820 MW of renewable energy capacity secured under power purchase agreements, which will enable us to meet our goal to procure at least 50% of our electricity from renewable sources by 2030[3]

Safely completed the shutdown of refining operations at our Houston Refinery in the first quarter of 2025, marking our exit from the refining business, which will reduce our annual scope 3 emissions by

~40MMtCO_2e

1. We classify incidents on a scale from 0 to 5, with Level 5 having the highest impact. Our GoalZERO program relates to Level 2+ incidents, which generally means at minimum, an impact resulted in reporting or record keeping under an applicable regulatory program.
2. Production and marketing includes: (i) joint venture production marketed by LYB plus our pro rata share of the remaining production produced and marketed by the joint venture, and (ii) production via third-party tolling arrangements.
3. Based on 2020 procured levels.
4. Identified items include adjustments for lower of cost or market (LCM), gain on sale of business, asset write-downs in excess of $10 million in aggregate for the period and refinery exit costs.

At a glance financial performance

Net income
$1.4B

Net income excluding identified items[4]
$2.1B

EBITDA
$3.5B

EBITDA excluding identified items[4]
$4.3B

Diluted EPS
$4.15

Diluted EPS excluding identified items[4]
$6.40

LYB circular and low carbon solutions

Business-led sustainability

Circulen portfolio offers multiple pathways to achieve virgin plastic and PCF reduction goals

circulen recover By LyondellBasell

Recycled polymers using plastic waste converted through mechanical recycling

- Direct inclusion of post-consumer recycled content up to 100%
- The shortest path from plastic waste to recycled polymer
- PCF reduction compared to virgin polymers

circulen revive By LyondellBasell

Recycled polymers sourced from plastic waste converted through chemical recycling

- Chemical recycling complements mechanical recycling by diverting hard-to-recycle plastics from the waste stream
- Up to 100%* attributed circular content on an ISCC PLUS-certified mass balance basis
- Retains regulatory compliance of virgin resins

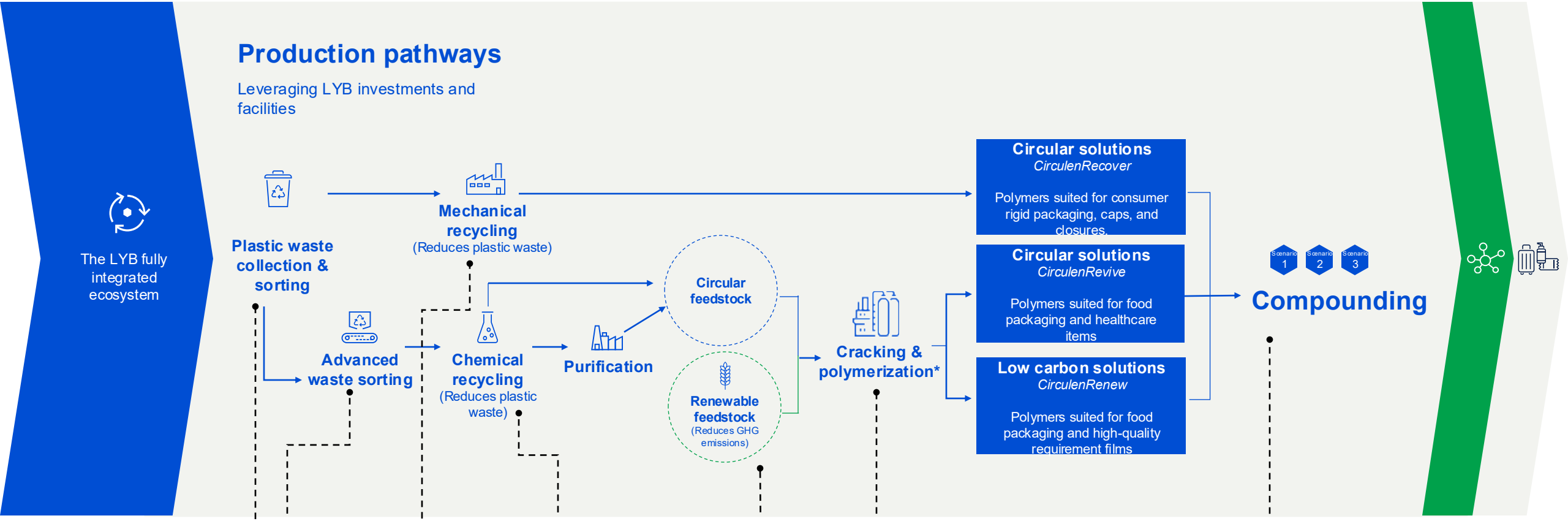
circulen renew By LyondellBasell

Polymers sourced from bio-circular feedstock

- Replacing fossil-based feedstocks with bio-circular feedstocks derived from bio-mass waste and residues
- Up to 100%* attributed bio-circular content on an ISCC PLUS-certified mass balance basis
- Retains regulatory compliance of virgin resins
- Substantially lower PCF compared to virgin polymers

*PP and PE grades can be attributed at up to 100%; Catalloy grades can be attributed up to 95%

The LYB integrated ecosystem is designed to bring global scale and continuous innovation



Joint Ventures:
Source One (EU)

Joint Ventures:
Source One Plastics (EU)
Cyclyx (US)

Joint Ventures:
Rodepa (EU) – Oct-23

Acquisitions:
LYB Merseburg Solvent-based (APK) – Feb-23

LYB Geleen & Blandain (QCP & Tivaco -EU) – Apr-23

Existing LYB channel:
Third-party pyrolysis oil offtakes (U.S., EU)

LYB assets and proprietary technology:
Semi-industrial pilot plant running in Ferrara (EU) – Feb-23

***MoReTec*-1 50 ktpa (EU) FID – 2024 start of Construction**

***MoReTec*-2 100 ktpa (US) started engineering (subject to final investment decision)**

Existing LYB channel:
Third-party renewable offtakes (U.S., EU)

LYB assets and proprietary technology:
LYB crackers (Cologne) and polymer sites (Houston)

LYB assets:
APS sites (EU)

LYB acquisition:
Mepol (EU) – Mar-23

*Mixed with traditional feedstocks; alternative feedstocks attributed to *Circulen*Revive and *Circulen*Renew using an ISCC Plus Certified mass balance approach.

MoReTec: a differential chemical recycling technology

Construction of the first commercial facility in Germany: 50kt single train

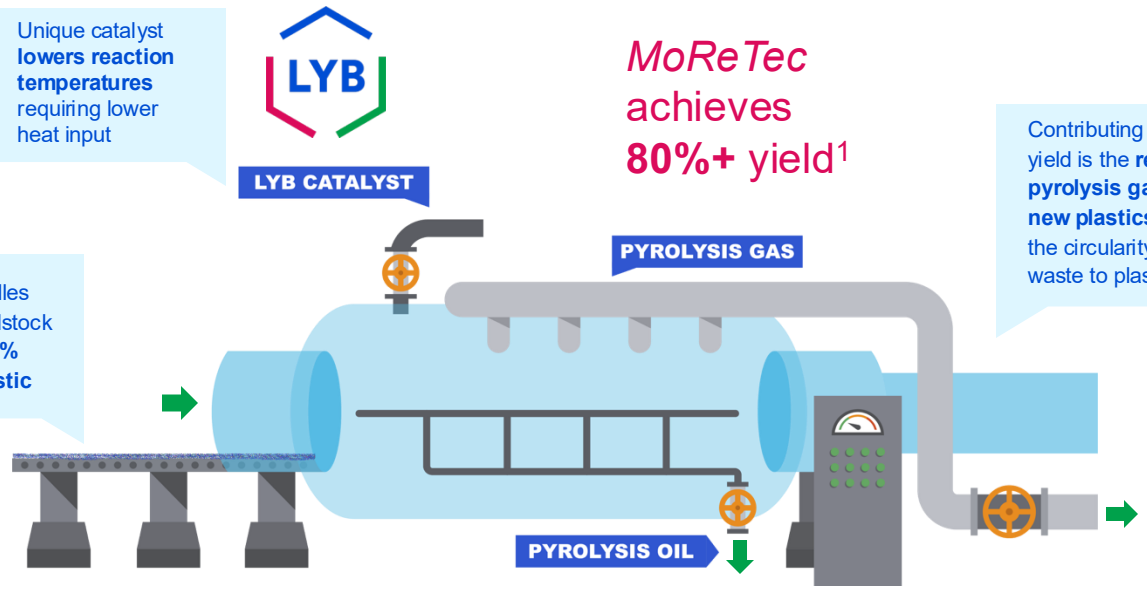
Post-consumer waste journey

Mechanical recycling recovers single polymer plastics

Chemical recycling complements mechanical methods by processing a broader range of plastics, including difficult-to-recycle multi-polymer types

MoReTec handles pre-sorted feedstock with at least **85% polyolefin plastic**

Unique catalyst **lowers reaction temperatures** requiring lower heat input

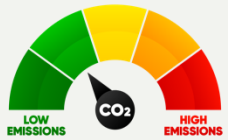


MoReTec achieves **80%+** yield[1]

Contributing to the high yield is the **recovery of pyrolysis gas to make new plastics**, maximizing the circularity of plastic waste to plastics.

MoReTec facility will process the plastic packaging waste equivalent generated by 1,2 million German citizens annually

Unique process design allows for electrical heating, enabling the process to be **powered by renewable energy.**



The *MoReTec* process is estimated to have at least a **50% lower carbon footprint** than the process for fossil-based feedstocks.[2]

MoReTec's **innovative design enables commercial scaling** and supports the LYB goal to produce and market at least **2 million metric tons/year of recycled and renewable-based polymers** by 2030.[3]

LYB is developing post-treatment solutions to enable higher volumes of chemical recycled feedstock to be processed into plastics via steam crackers

1. Yield depending on the quality of the waste plastic feedstock. We define yield as the percentage by weight of the waste plastic fed to the process that is converted into liquid and gaseous products (pyrolysis oil and pyrolysis gas) that can be used as feedstock to produce new polyolefins.
2. Feedstocks produced via the MoReTec process (pyrolysis oil and gas) displace fossil-based feedstocks in the olefins cracking process; the stated carbon footprint reduction is based on a comparison of Life Cycle Assessment (LCA) results for (1) pyrolysis oil and gas produced by the MoReTec technology, and (2) fossil-based naphtha feedstock. LCA for pyrolysis oil and gas based on MoReTec pilot plant data. LCA for fossil-based naphtha includes carbon emissions associated with the production of fossil-based naphtha feedstock, plus incineration of the equivalent amount of mixed plastic waste required to produce pyrolisis oil and gas via the MoReTec process.
3. Production and marketing includes: (i) joint venture production marketed by LYB plus our pro rata share of the remaining production produced and marketed by the joint venture, and (ii) production via third-party tolling arrangements.

Solutions for a better tomorrow

Automotive Sustainability

Future materials, strategy & supply chains

Nat Spencer

01 CONTENTS

02 NET ZERO & ELV

"Aligned to our Reimagine strategy, we aim to truly embed a sustainable mindset into the heart of JLR, driving workstreams and partnerships to enable the transformation of our business as we target carbon net zero across our supply chain, products, and operations by 2039."

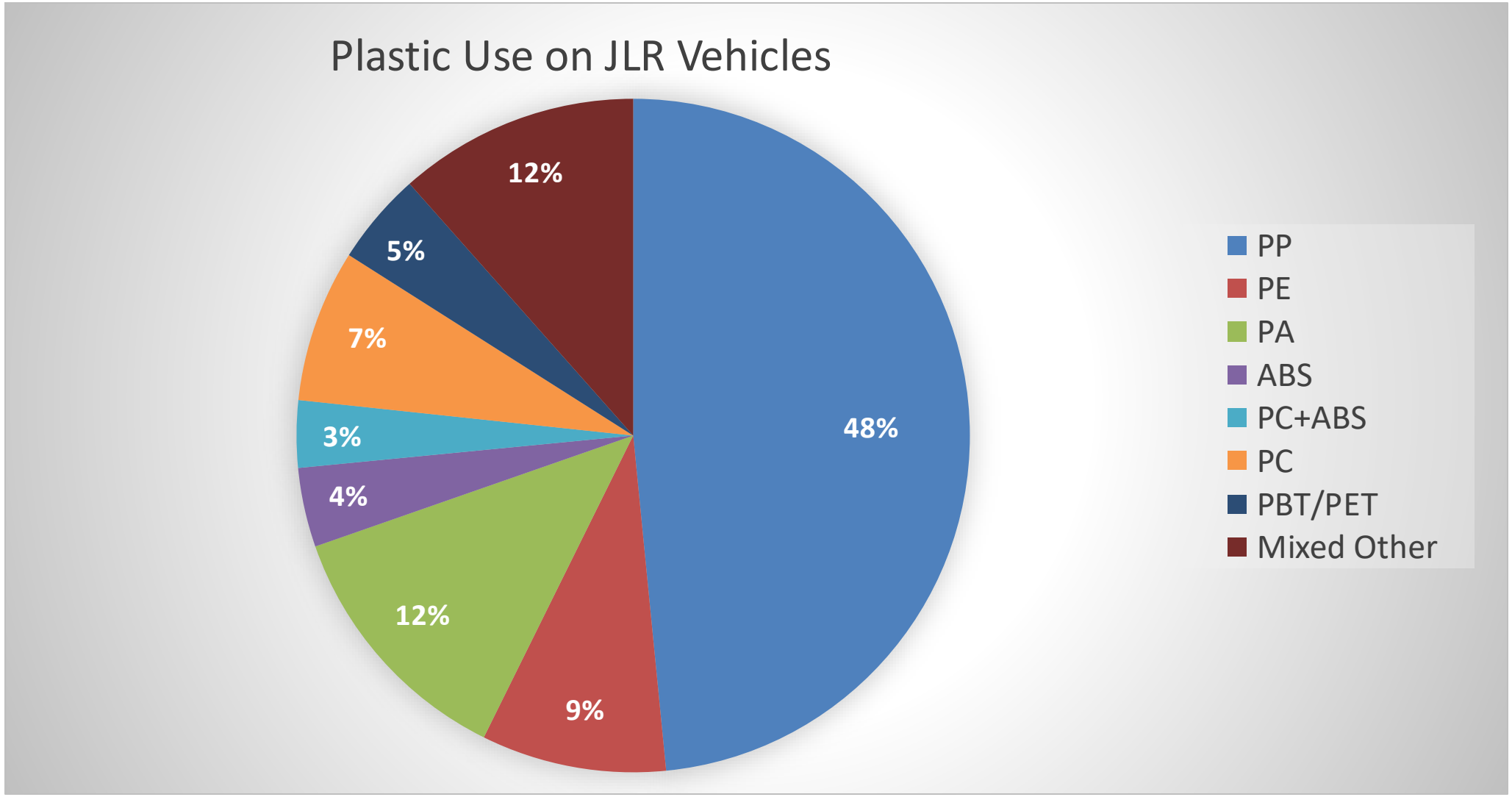
Andrea Debbane, JLR Sustainability Director

2025
Electric first business - £15bn transformation

2030
Halve carbon equivalent emissions in the full value chain

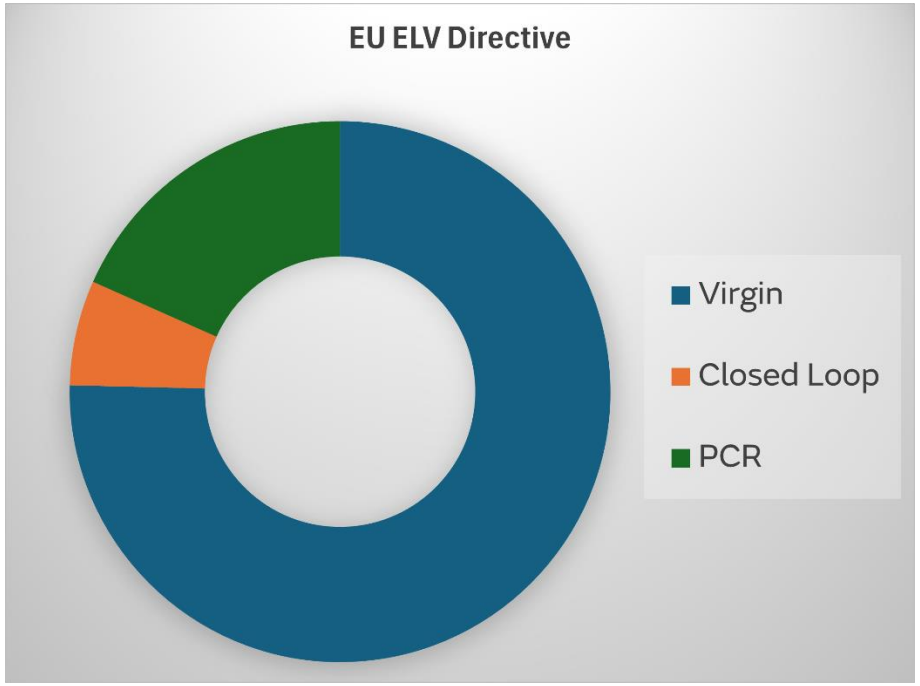
2039
Carbon Net Zero emissions across the full value chain

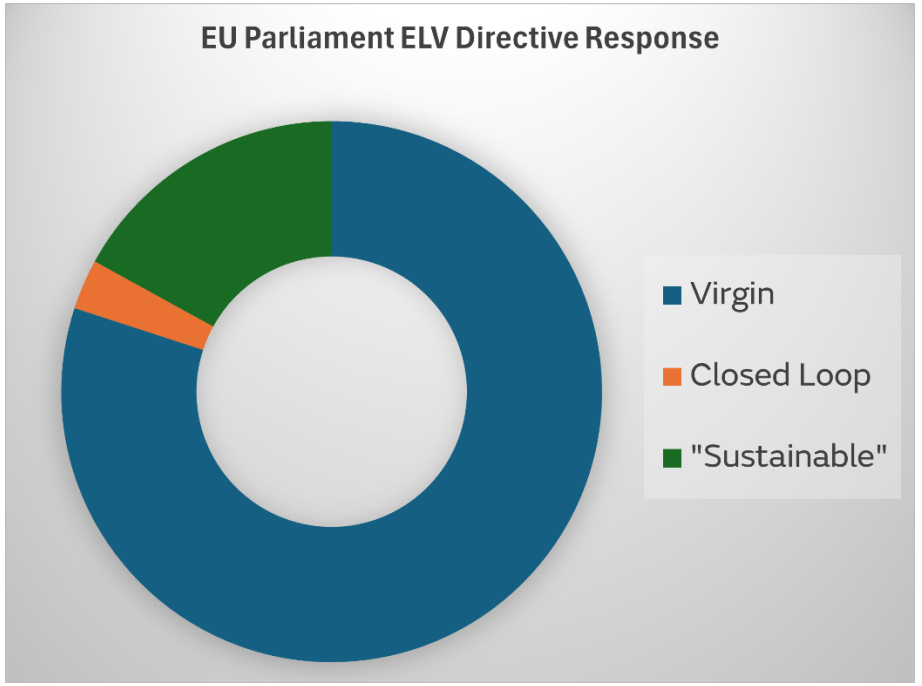
02 NET ZERO & ELV



02 NET ZERO & ELV

Sustainability will be the biggest driver in the development of Automotive plastics





JLR to focus on increasing the recycled content within the top 6 polymers
PP, PA6, PA66, ABS, PC, PET

Chemically recycled grades must have a lower carbon footprint than virgin

02 NET ZERO & ELV

02 NET ZERO & ELV

Share the Message!!

A-Surface PCR PP in Light Colours

Bills of Design and RFQs PIR/PCR Priority

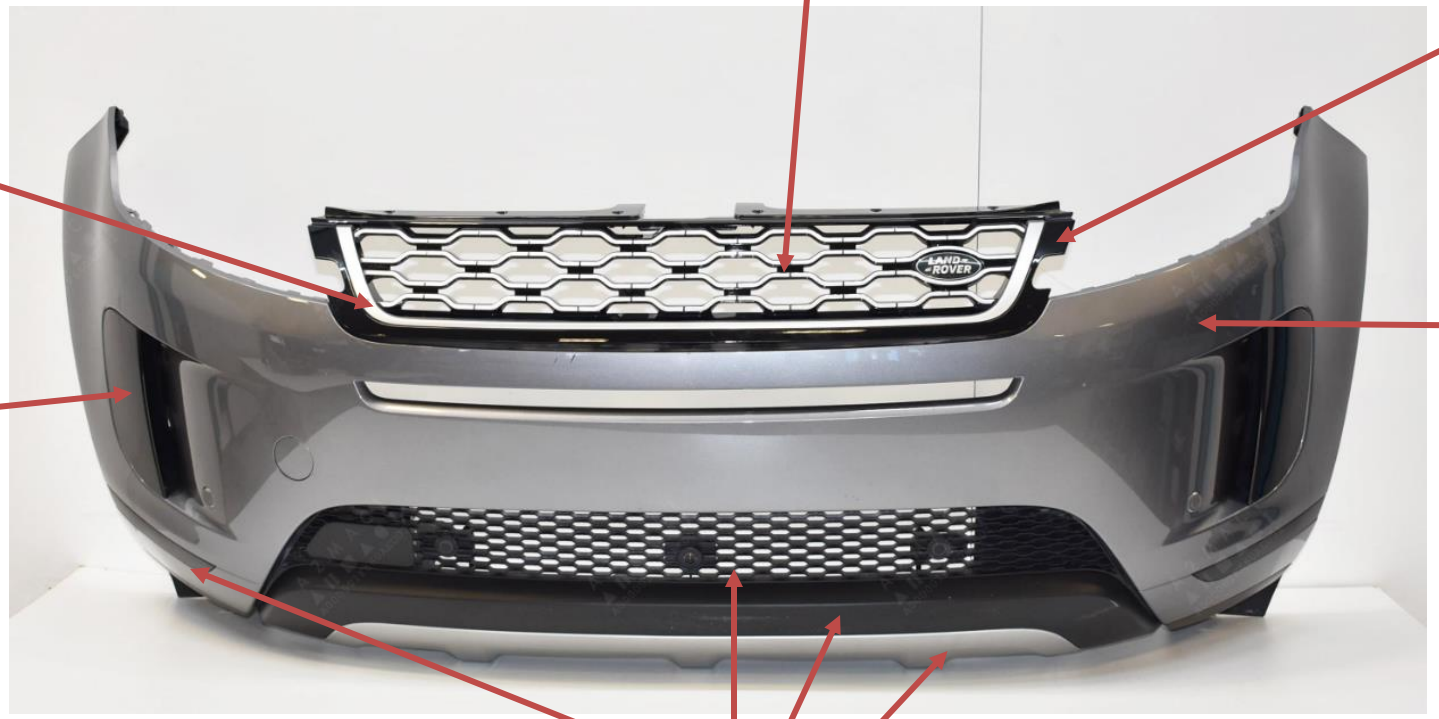
Automotive Closed Loop A-Surface PP

Internal Database of Approved PCR Grades

Exterior Paintable PIR PC+ABS

03 THE FUTURE OF SUSTAINABLE AUTOMOTIVE MANUFACTURE

03 THE FUTURE OF SUSTAINABLE AUTOMOTIVE MANUFACTURE

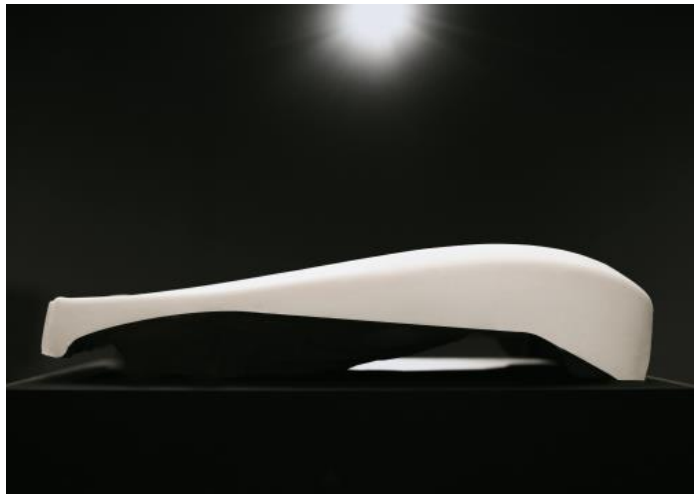


121 fastening points (clips, screws, bolts & welds)

03 THE FUTURE OF SUSTAINABLE AUTOMOTIVE MANUFACTURE

Dismantling Stage	Avg Time Taken (mm:ss)	Exceptions / Comments
Removal from Car	3:00 – 5:00	Discovery Sport (8:00) – Attached washer bottle leak caused a delay
Secondary Dismantling	10:00	

04 INNOVATION IN AUTOMOTIVE POLYMERS



JLR Circularity Lab and Seating Team are developing a circular seat concept aimed at halving the CO_2e footprint per seat

Circularity Lab worked with Dow and Adient to create a PU seat foam with 20% closed loop recycled polyol

Demo seat to be produced with all plastics replaced with grades containing a minimum 20% of PCR content

JLR Materials Engineering and Circularity Lab working with 10 polymer suppliers and 4 Tier 1 suppliers on End-of-Life vehicle recycling

05 OEM & SUPPLY CHAIN PARTNERSHIPS

Material Suppliers	• Aim for recycled grades that are virgin-like for a-surface and safety critical parts • Control batch variation and share data • How to achieve balance of design and sustainability – dark colours only?
Design and ELV	• Start with recycled mindset – how do I design with lower properties or more variation? • Design for disassembly (mono materials, reduce welding and adhesives) • Replace painted & wrapped parts with a-surface moulded plastics
Moulders	• Optimise factory energy efficiency, fix leaks, green energy, optimise start-up times • Upgrade moulding machines to automatically compensate for viscosity variation
ELV Recyclers	• Remove more parts and separate by material family • Recover higher percentage of material from ASR

05 OEM & SUPPLY CHAIN PARTNERSHIPS

External Regulations
EU ELV Directive
China, USA ???

Customers
Environmentally
Conscious

Internal Targets
Net Zero
Social Responsibility

JLR (and other OEMs)

Material Suppliers

Tier 1s and Moulders

ELV Recyclers

OCEANWORKS®

SEA PLASTIC DIFFERENTLY

From Ocean to Opportunity

Making recycled content work for your brand

Patrick Todd

jointly with

ULTRA POLYMERS

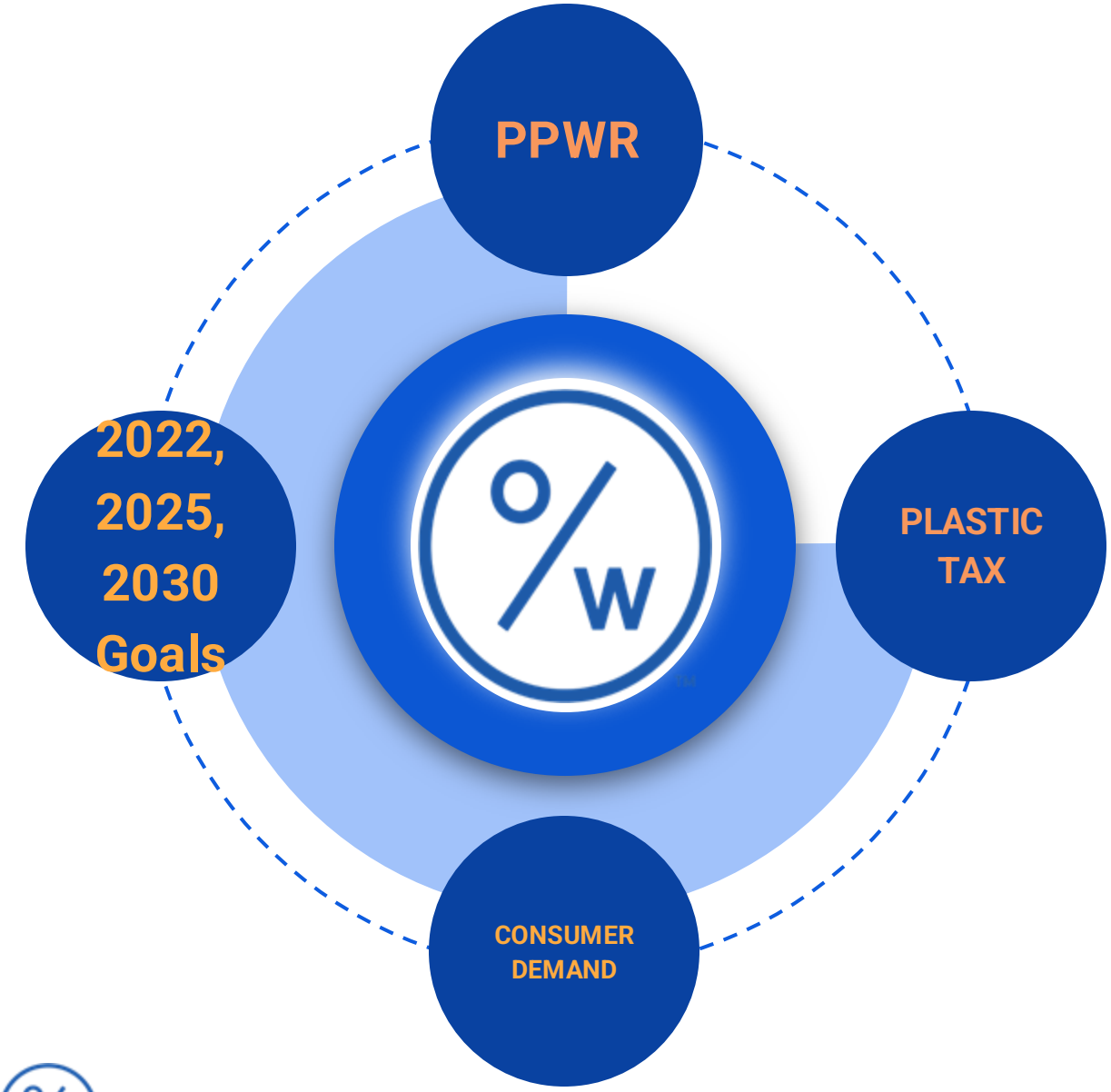
a Spirit of Partnership

OCEANWORKS


WHY?
SHOULD YOU CARE


CAUTION !!!
AKU KUDU KERJA KERAS
ORA DITANGGUNG BPJS
S 9589 NF

WHY?



9%

WHO?

IS OCEANWORKS

WHO

VANESSA COLEMAN
CO-FOUNDER & CEO

PATRICK TODD
VP OF SALES

MARTIN PAVLIK
DIRECTOR OF SALES, EUROPE

JEFFREY SUDIKOFF
BOD Chairman, Riverhorse tments

JAIME WESTON
BOD & Marketing Advisor

ROB IANELLI
BOD & Co-founder

PETER HARTZ
BOD & Operations Advisor

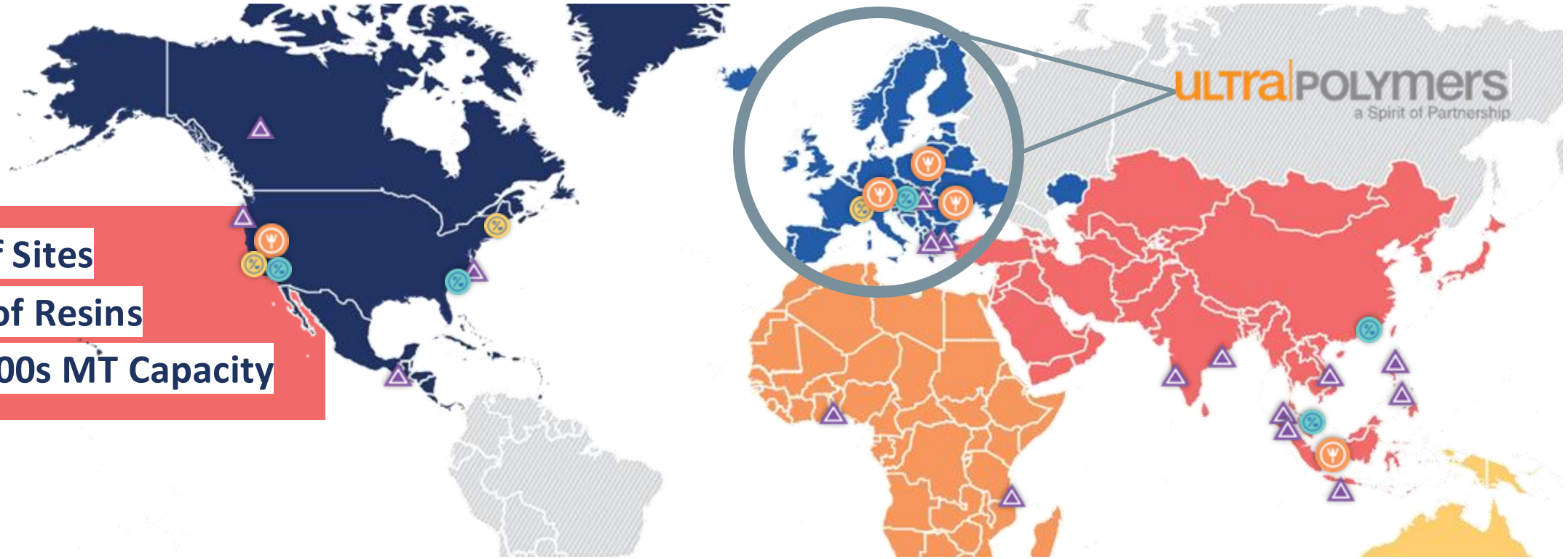
NEAL OAKTER
BOD Observer BASF

KEN MORSE
Advisory Board Chair

CHRISTOPHE LACROIX
rd

RONALD BECKER
ory Board (Technical)

GLOBAL REACH



10s of Sites

100s of Resins

100,000s MT Capacity

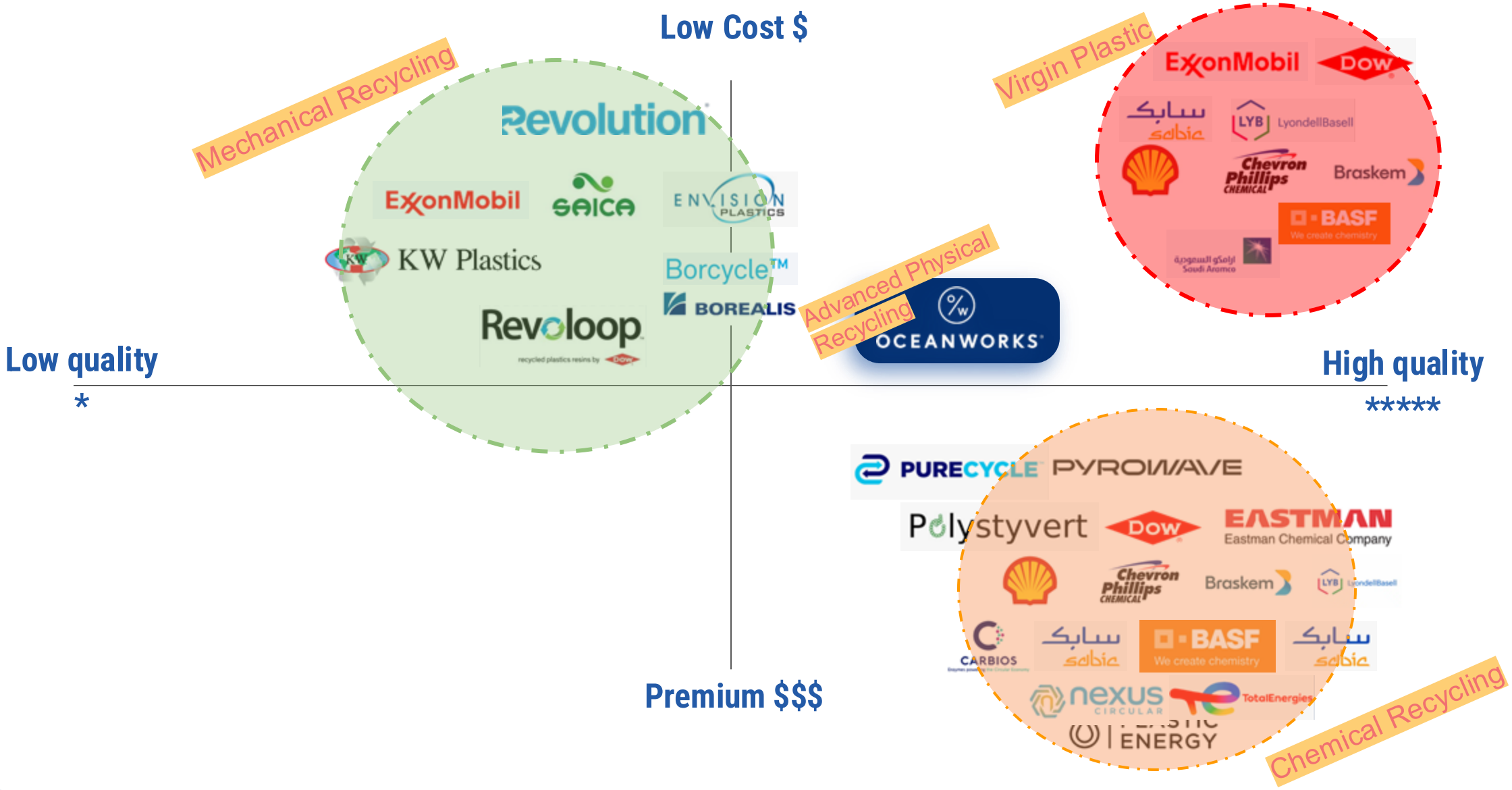
FEEDSTOCK RECLAMATION SITES

FUTURE PRODUCTION ASSET (TRIDENT)

DISTRIBUTION CENTER

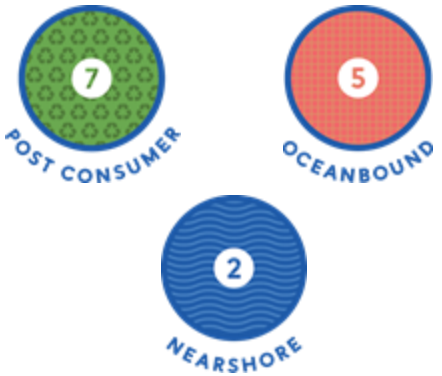
OCEANWORKS OFFICE

WHO




WHAT?
ARE WE OFFERING

WHAT: THE BROADEST PORTFOLIO OF PERFORMANCE PCR MATERIALS
FOR YOUR TODAY'S AND FUTURE'S NEEDS



WHAT: ENHANCE EFFECTIVENESS & PROVIDE CLEAR DATA TO INCREASE YOUR CUSTOMER'S SUCCESS
WITH OCEANWORKS BEST-IN-CLASS DIGITAL TOOLS

DIGITAL TOOLS

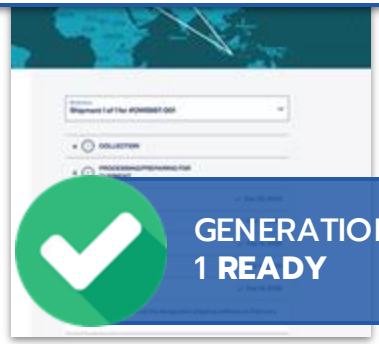
CO2 Footprint GtG Calculator

- ROBUST, VALIDATED MODEL
- SITE & TRANSPORT SPECIFIC

GENERATION 2 **READY**

Customer Portal

- DIGITAL TRACEABILITY
- BLOCKCHAIN ARCHITECTURE



GENERATION 1 **READY**

Plastic Leakage Offsets

- OFFSETS EMBEDDED IN RESINS
- HOLISTIC IMPACT SOLUTION

UNDER **DEVELOPMENT**

OCEANWORKS

Ocean-Bound & Closed-Loop Post-Consumer Recycled Polyethylene

Polymer	Product Code	Feedstock	Color	Properties	Film & Sheet Extrusion	Blow Molding	Profile Extrusion	Compounding
HDPE	OR.211621	Ocean-bound PCR	Natural	MFI≈0.3	☑	☑	☑	☑
HDPE	OR.201125	Ocean-bound PCR	Natural	MFI≈0.2	☑	☑	☑	
HDPE	PCR.247021	Closed-loop PCR	Natural	MFI≈0.3	☑	☑	☑	☑
LLDPE	PCR.222641	Closed-loop PCR	Natural	MFI≈2.2	☑			☑
LL/LDPE	PCR.222643	Closed-loop PCR	Natural	MFI≈1.1	☑			☑
LL/LDPE	PCR.223846	Closed-loop PCR	Natural	MFI≈0.8	☑	☑	☑	
LDPE	PCR.222644(.02)	Closed-loop PCR	Natural	MFI≈0.5	☑	☑	☑	
LDPE	PCR.247041	Closed-loop PCR	Natural	MFI≈0.5-1.5	☑	☑	☑	☑

PCR.223846

PCR.222644

PCR.222641

PCR.222643

OR.211621

PCR.247021

OR.201125

SEA PLASTIC DIFFERENTLY.

OCEANWORKS®

Ocean-Bound Post-Consumer Recycled Polypropylene

Polymer	Product Code	Feedstock	Color	Properties	Food Contact	Film & Sheet Extrusion	Injection Molding	Fiber Extrusion	Compounding
hPP	OR.201151	Ocean-bound PCR	Natural	MFI≈5	☒	☑		☑	
hPP	OR.211651	Ocean-bound PCR	Natural	MFI≈10	FDA COMPLIANT		☑	☑	☑
hPP	OR.190656	Ocean-bound PCR	Natural	MFI≈12.5	☒		☑		☑

OCEANWORKS® GUARANTEED

OR.201151

OR.211651

OR.190656

OCEANWORKS

Closed-Loop Post-Consumer Recycled Polypropylene

Polymer	Product Code	Feedstock	Color	Properties	Film & Sheet Extrusion	Injection Molding	Fiber Extrusion	Compounding
hPP	PCR.236451	Closed-loop PCR	Black	MFI≈4	☑		☑	
hPP	PCR.236452	Closed-loop PCR	Light Grey	MFI≈6.5	☑	☑	☑	☑
hPP	PCR.246453	Closed-loop PCR	Black	MFI≈6.5	☑	☑	☑	☑
hPP	PCR.246454	Closed-loop PCR	Black	MFI≈13.5		☑		☑
hPP	PCR.246455	Closed-loop PCR	Light Grey	MFI≈4	☑		☑	

PCR.236451

PCR.236452

PCR.246453

PCR.246454

PCR.246455

SEA PLASTIC DIFFERENTLY.

OCEANWORKS

Nearshore Post-Consumer Recycled Polyamide

PA6 NETTING // BLACK

OR.201271

PA6 NETTING // NATURAL

OR.211279

PA6 NETTING // BLACK*

OR.231276*

PA6 CLOTHING // MIXED(BLACK)

PCR.231274

SEA PLASTIC DIFFERENTLY.

OCEANWORKS

Ocean-Bound Post-Consumer Recycled Polyethylene Terephthalate

Polymer	Product Code	Feedstock	Color	Intrinsic Viscosity	Food Contact	Film & Sheet Extrusion	Injection Molding	Blow Molding	Fiber Extrusion
rPET	OR.201611	Ocean-bound PCR	Colorless/Clear/ Crystallized	IV≈0.80	FDA COMPLIANT	☑	☑	☑	☑
rPET	OR.201612	Ocean-bound PCR	Colorless/Clear/ Non-Crystallized	IV≈0.66	FDA COMPLIANT	☑	☑		☑

OCEANWORKS GUARANTEED

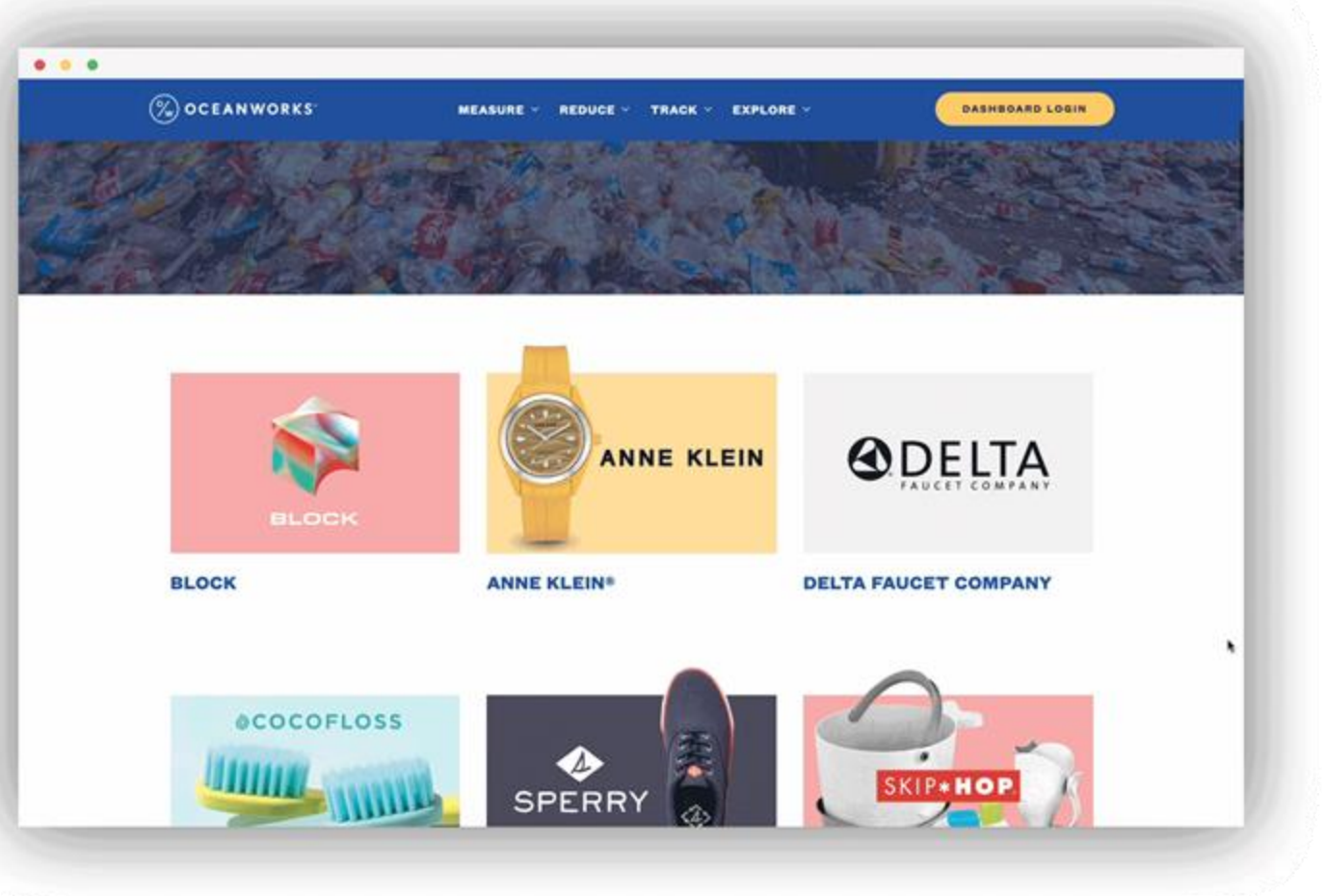
OR.201611

OR.201612

rPET

A PARTNER IN YOUR CUSTOMERS' SUSTAINABILITY JOURNEY

Oceanworks® can work directly with your customers to help effectively and transparently tell their plastic action story. The result will beneficial to both our planet and your bottom line.



OCEANWORKS®

LET'S WORK TOGETHER TO

#SEAPLASTICDIFFERENTLY

OCEANWORKS.CO

INEOS Styrolution

Advancing Styrenics

How EFSA approval is possible on mechanically recycled PS

Frank Eisentraeger

INEOS Styrolution

Polystyrene – a circularity champion

Frank Eisenträger

Polystyrene and dairy packaging:

An excellent combination!

Recyclable

- Can be recycled via mechanical recycling, depolymerisation, dissolution, gasification, pyrolysis
- Meets food-contact regulations after being recycled

Faster to process

- 20% to 30% faster processing speed, particularly with form-fill-seal (FFS) machines
- Doesn't need to be pre-dried
- Can be rapidly moulded into its final shape

Easier to process

- Large processing window due to its amorphous structure – less chance of waste compared to other polymers
- Can withstand several processing cycles while maintaining mechanical properties

Ideal choice for multi-pack yoghurt pots

- Portionability – PS is the only packaging material that can be snapped off easily into smaller units

Excellent properties

- Less PS needed to obtain same degree of strength and stiffness compared to other polymers

Great footprint reductions

- Low scope 2 in FFS processing due to amorphous polymer
- Depo advantage over pyrolysis
- Strong footprint reduction agenda for virgin

Yogurt cup with 30% mrPS

Now in your (German) supermarket

- PS is recyclable back to direct food contact
- MR-PS is a drop in solution
- White labels are front runners
  - Prepare for PPWR
  - Move towards SBTi targets
- Parties involved in this project: Müller, INEOS Styrolution, Lidl and more
- According 2022/1616 “Novel Technology”

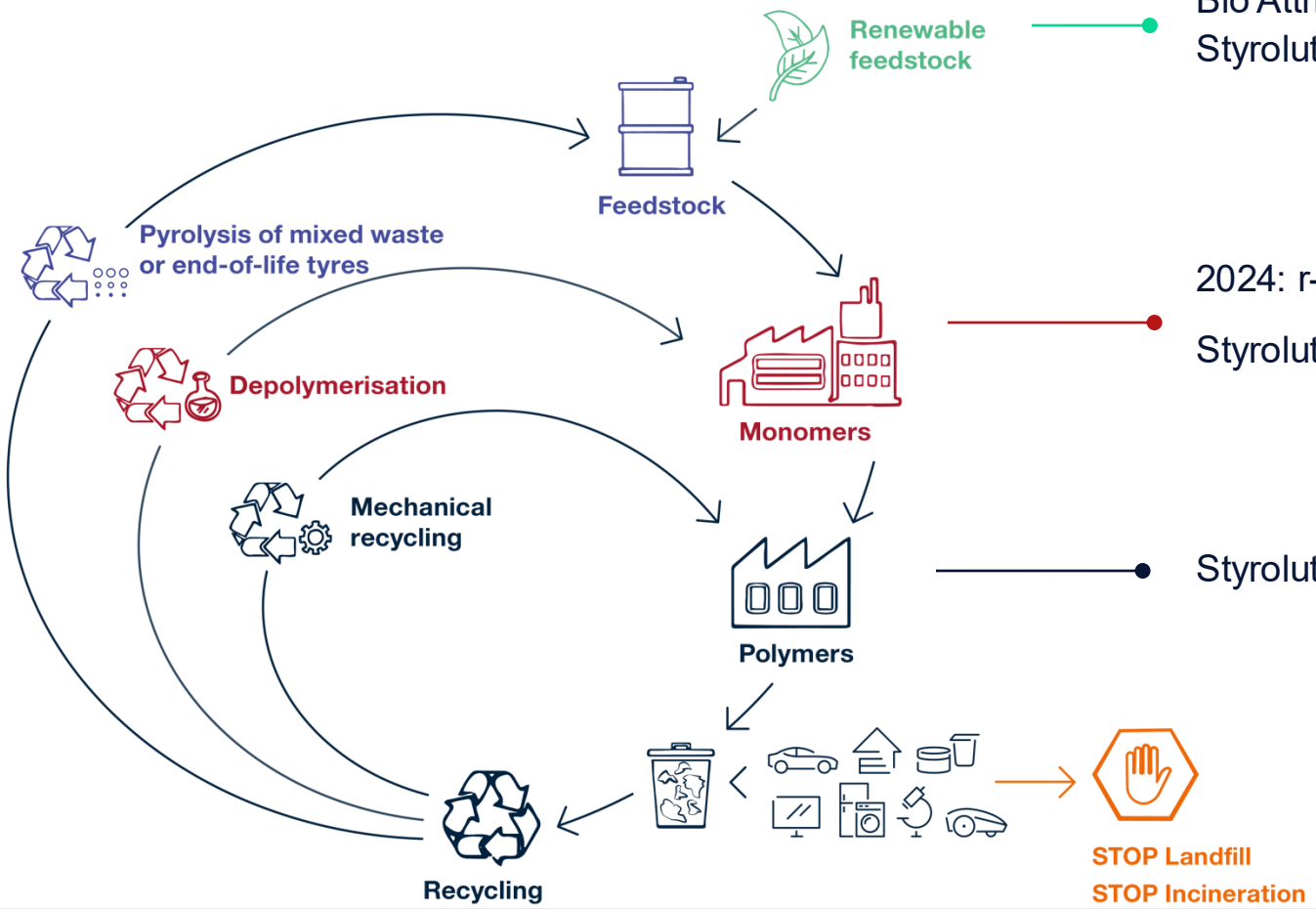
INEOS | Styrolution

PRSE Award – finalist

INEOS | Styrolution

Recycling technologies and bio feedstock

Pathways to circularity for styrenics



Bio Attribution:
Styrolution PS ECO BC

2024: r-SM from depolymerisation of PS

Styrolution PS ECO CC

Styrolution PS ECO MR

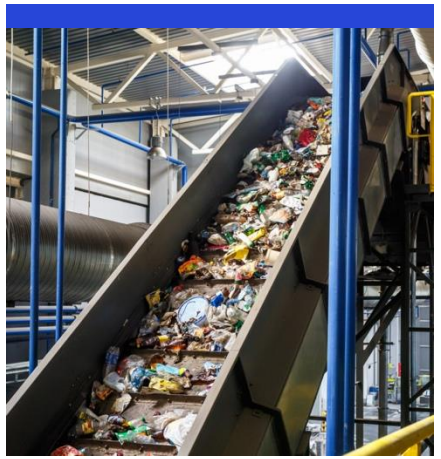
INEOS | Styrolution

Mechanical recycling of polystyrene

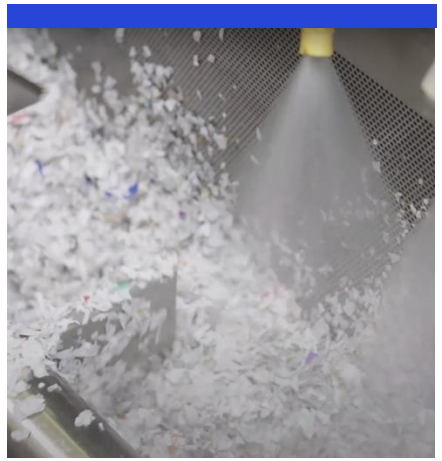
Leading to 99.9% polystyrene purity

Bales of polystyrene

Sorting by food/ non-food/ by colour

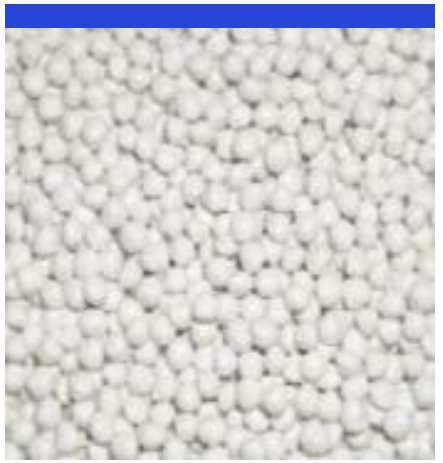


Hot washing



Flake sorting

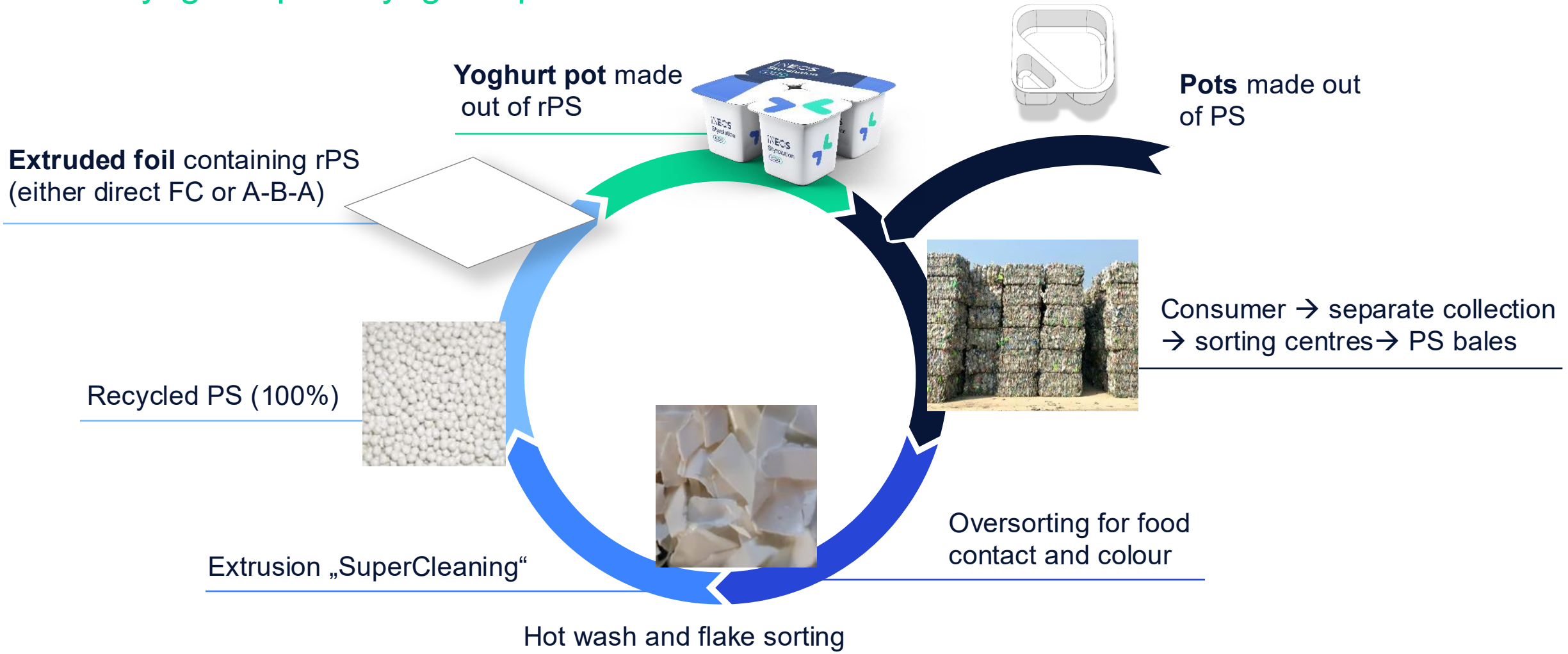
Super cleaning & melt filtration



The result: Recycled polystyrene suitable for use in food-contact applications

Perfect cylcle

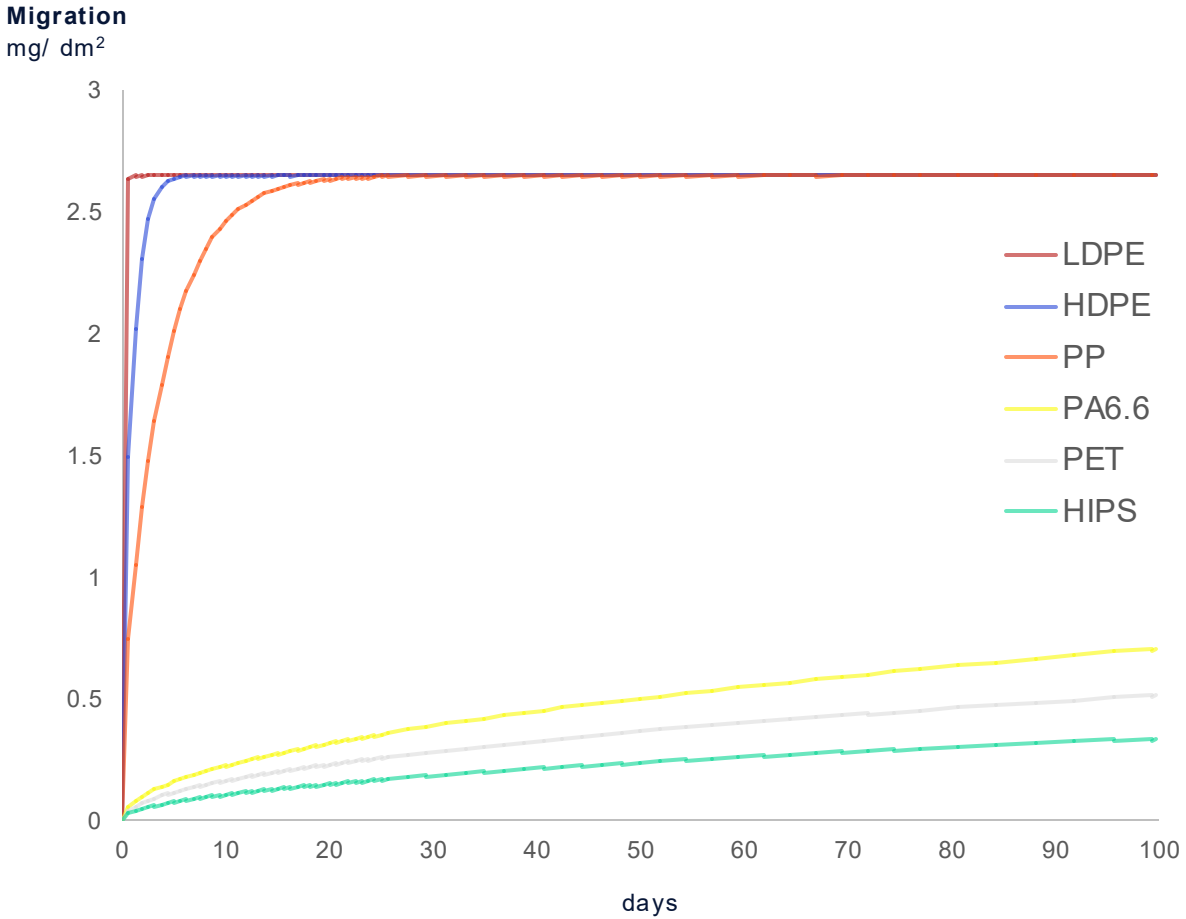
From yoghurt pot to yoghurt pot



INEOS | Styrolution

The power of PS waste: Low contaminations

Low diffusion polymer – even more than PET



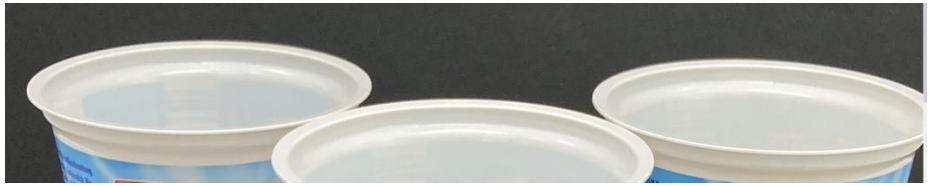
- **Polystyrene is a low diffusion polymer – even more than PET**
- Due to its properties, it takes up little contamination in the waste stream and when recycled doesn't diffuse out contamination
- This makes it **safe** and **perfect for mechanical recycling,** even in highly demanding food packaging applications
- **Refrigerated applications** with short best before dates are an **additional safety**!

Kinetic modelling, diffusion coefficients from Ap model (calculated for a molecule 250 g/mol, $c_{P,0}$=1000 mg/kg, 40 °C, 300 µm film thickness). Source: A Störmer Fraunhofer IVV 7/2/23

INEOS | Styrolution

Project impressions

rPS tested in various formats



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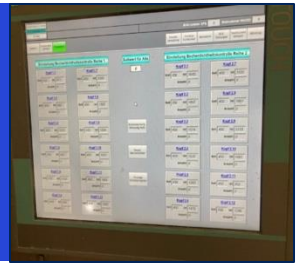
Intensive testing

Colour

Migration

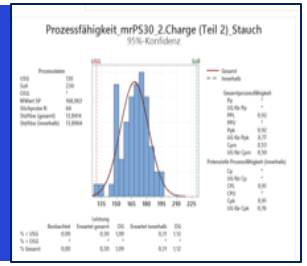
Print quality

Processing parameters



Smell/ taste

Packaging test



Transport test

Regulatory
Update

- InSTY has **passed** Local Authority **Audits** for MR – the register of “novel technologies” will show status **“Active”**

- We completed 2 years (**4 reports**) of monitoring our mechanical recycling. >very many lots have been analyzed in detail.
- **EFSA opinion** has been requested by INSTY (and SCS) immediately with 4th report in **April 25**
  - No postponement expected (large set of data available)
  - EFSA is well into the matter, as they worked on the dossiers already in 2021/22 and had nearly finished when 2022/1616 kicked in and wiped it off the table
  - **Positive EFSA opinion expected** late 2025/early 2026.

Closing the loop

here PS recycling happens

- First depolymerisation plant in Europe
- Capacity 26 kt
- Excellent footprint (compared to e.g. pyrolysis)

- First rSM delivery expected early June
- French dairies close the loop
- Larger press release expected around start up and at the opening ceremony in september

Depolymerisation process

Rather up- than downcycling

Petri dish made of recycled polystyrene

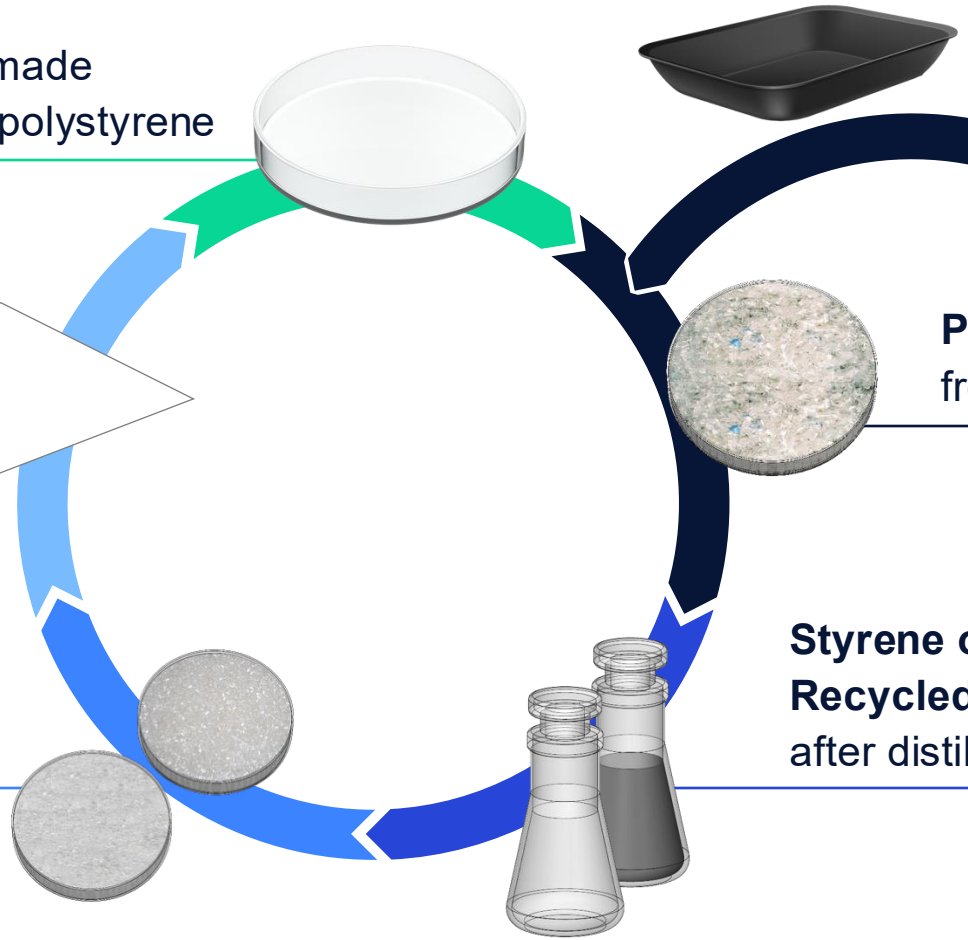
XPS tray made of conventional polystyrene

Extruded sheet made of recycled polystyrene

Polystyrene flakes sorted from household waste

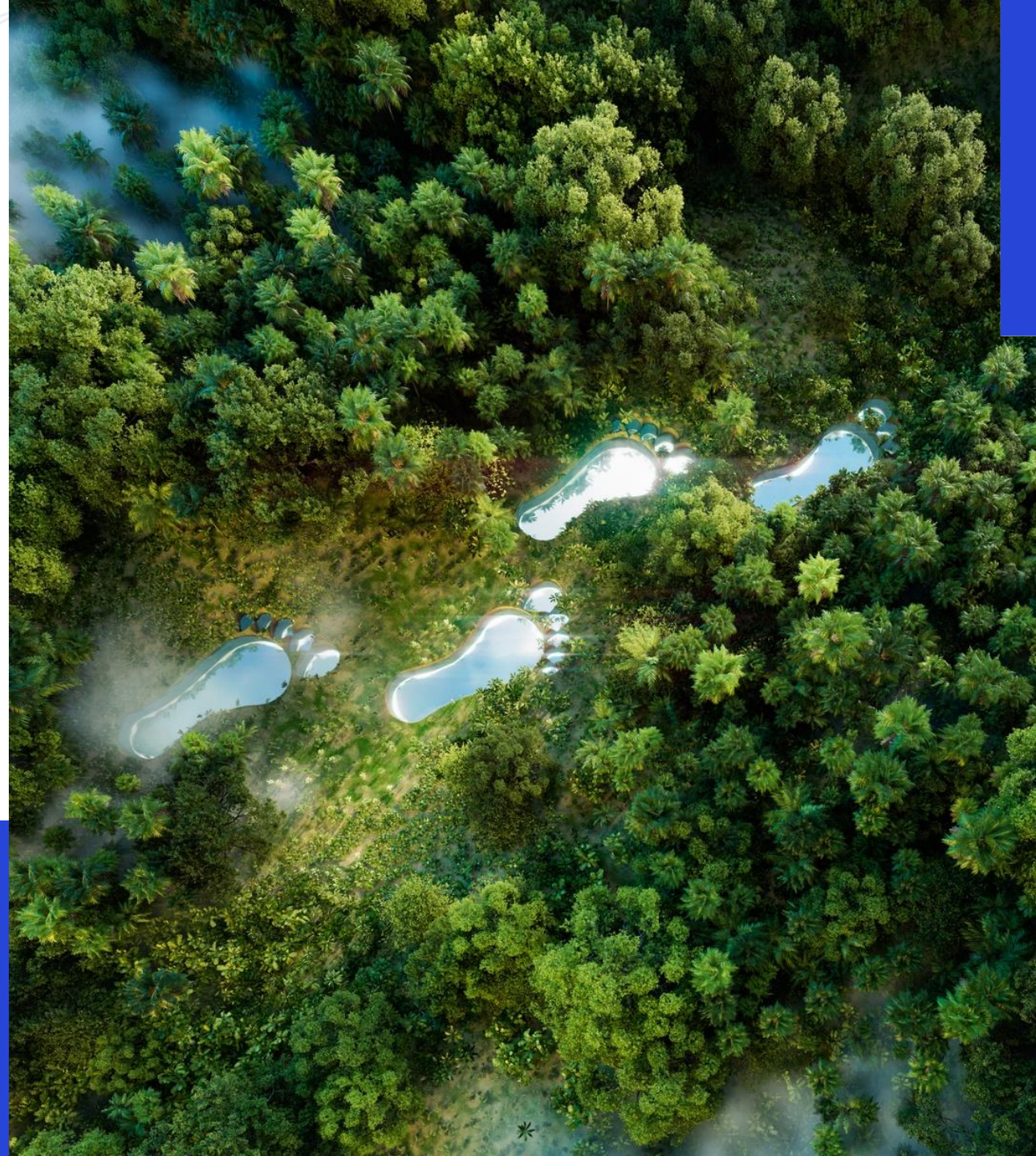
Recycled polystyrene (rGPPS from recycled styrene monomer)

Styrene oil after depolymerisation
Recycled styrene monomer after distillation



INEOS
Styrolution

Footprint



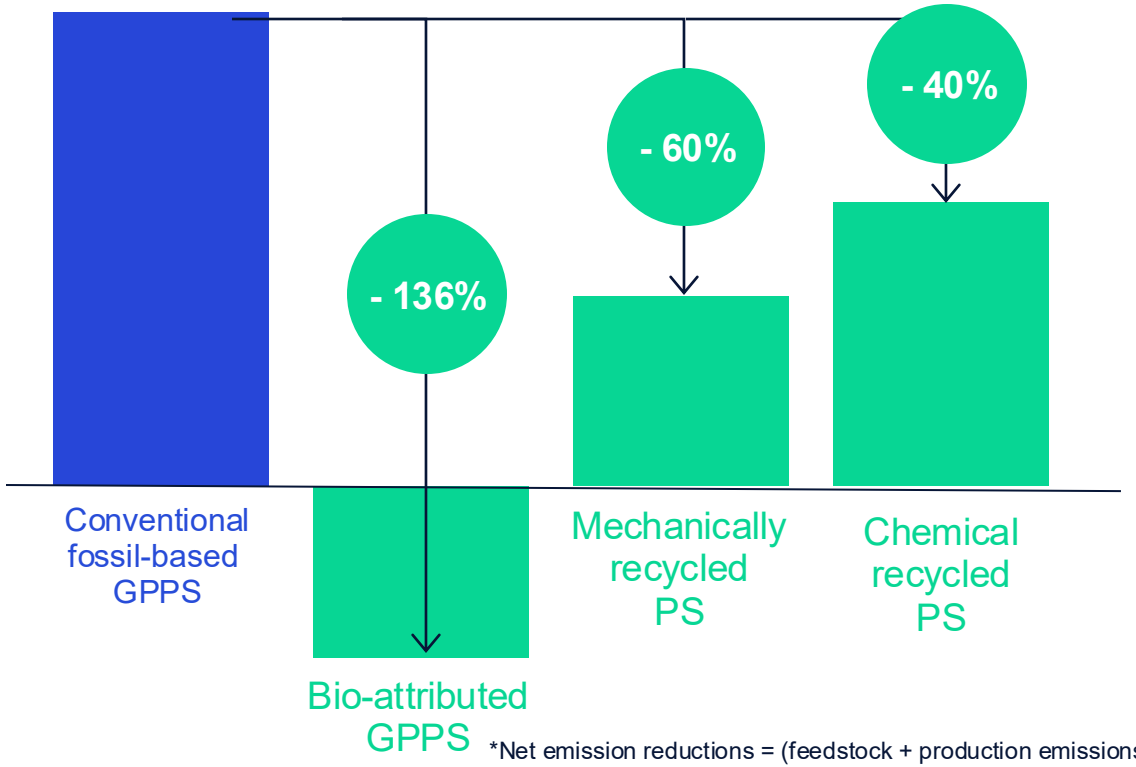
Source: LinkedIn ESG Professionals Group

INEOS | Styrolution

PS Eco solutions

Footprint overview

Cradle-to-gate CO_2-eq/ AU[1] material produced
Emissions from fossil-based material/ bio-attributed material



INEOS Styrolution eco

*Net emission reductions = (feedstock + production emissions) Savings correspond to the emissions of fossil feedstock avoided via attribution
[1]AU – Arbitrary Units; CO_2-equivalent based on an arbitrary mass of production
Data based on 100% bio-attributed styrene; values and methodology 3rd party assessed. | Conventional value based upon Plastics Europe Eco-profile of polystyrene

PS: at the forefront of circular food packaging solutions

Mechanical recycling

- Enables perfect closed circle: from yoghurt pot to yoghurt pot
- Today 70% recycling quota, but rather downcycling to flower pots

Depolymerisation

- Can preferably use foamed feedstocks (EPS, XPS)
- Enables recycling of Styrene monomer back into all kind of Styrenics
- Great footprint

Chemical Recycling Pyrolysis

- PS does not disturb pyrolysis
- Not sorting it out is a loss for the above mentioned recycling technologies
- Can handle mixed plastics waste

rPS is a perfect circular material, but it needs an industry widespread adoption

PS is no longer a dying horse

It’s a circular packaging champion.

INEOS | Styrolution

INEOS STYROLUTION

PS: I love you!

Polystyrene. Made for recycling – with a bright future in the circular economy.

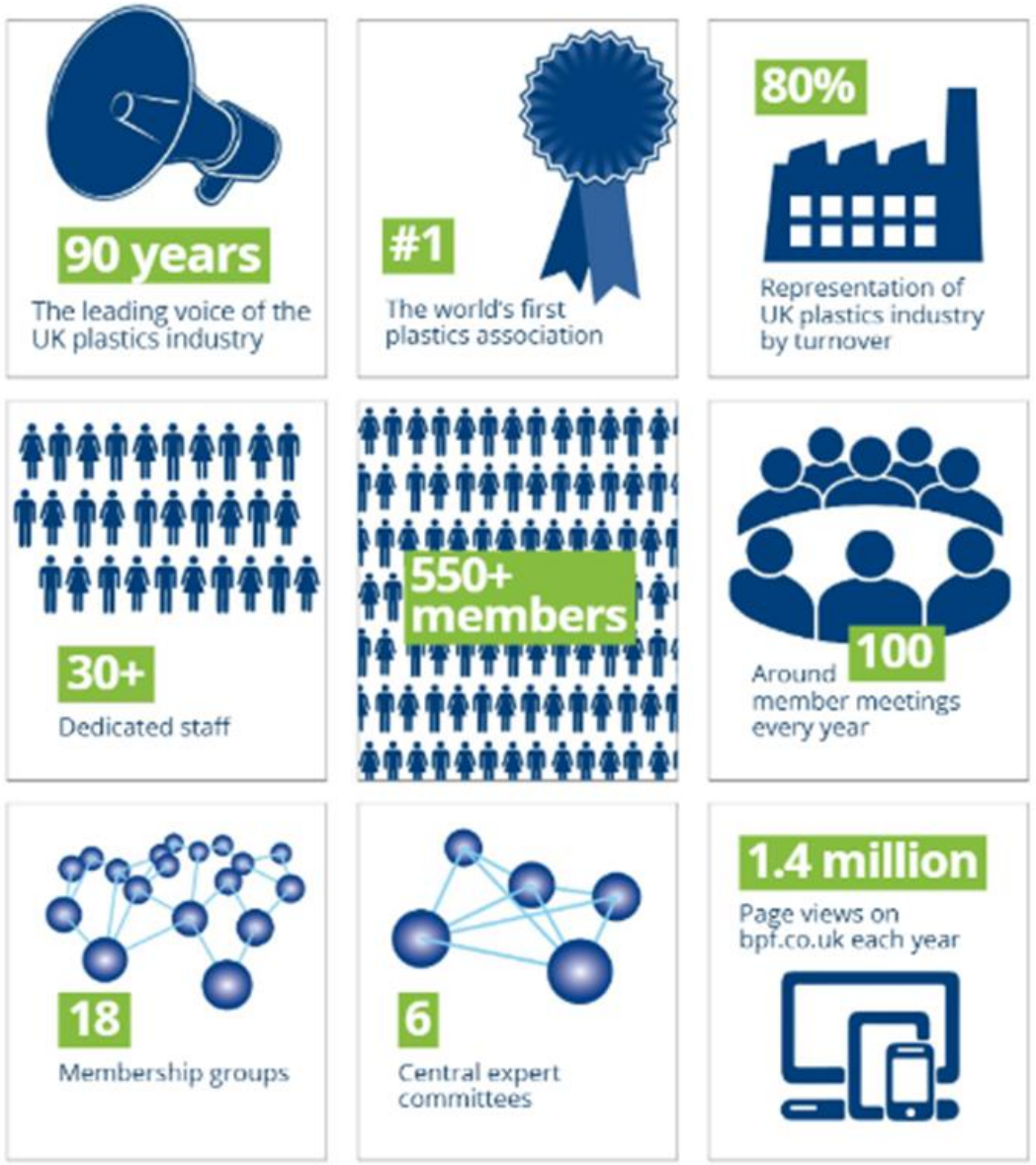
Styrolution-ECO.com

Upcoming regulations update

Where regulation meets reality

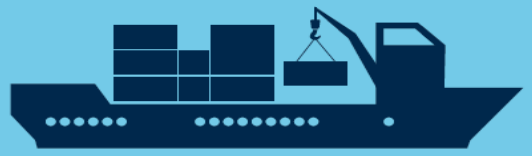
Lara Steinhobel

About the BPF



£10.5 bn

Value of exports



3.5m Tonnes of plastics consumed

5,700

Companies in the plastics industry

Plastics are one of the UK's

Top 10 exports

£32.8 bn*

Plastics industry turnover

1.7 m

Tonnes of material produced

160,000

People employed

2.5×

Increase in recycling since 2006

Top 3 largest manufacturing sectors

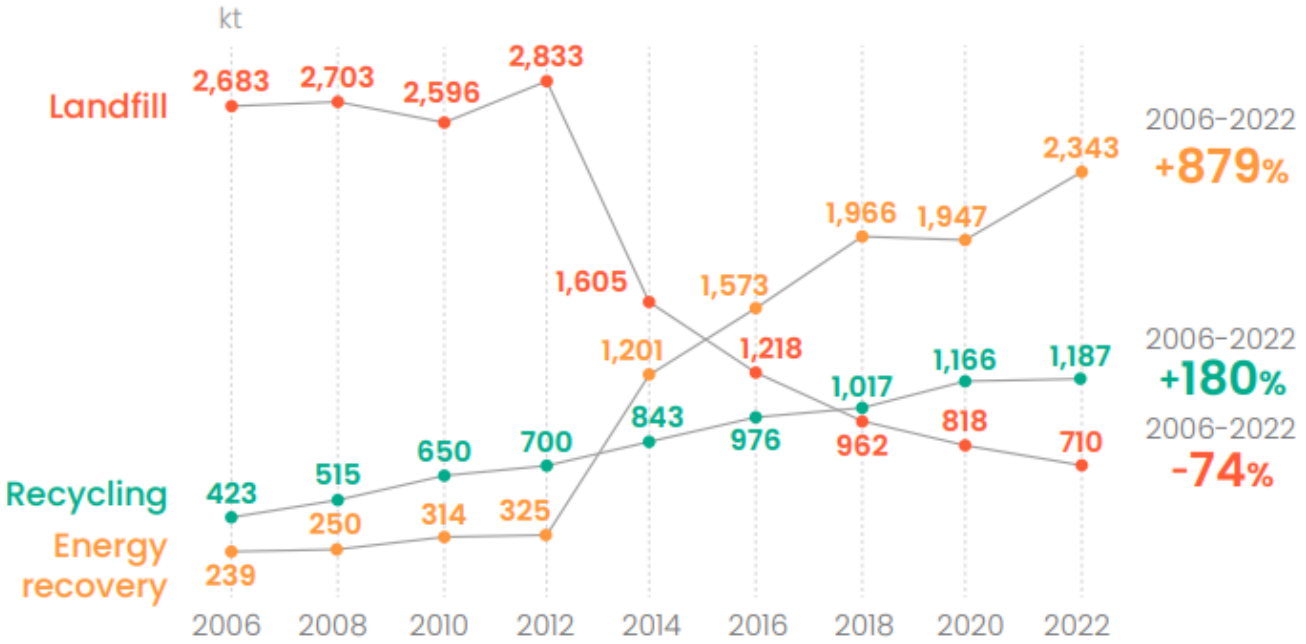
in the UK
(by employment)

BPF British Plastics Federation

Recycling and waste management

Post-consumer plastics waste treatment evolution

2006-2022, in kt



Source: PlasticsEurope Circular Economy for Plastics Data for 2022

BPF Recycling Roadmap – 2nd Edition

Includes:

Where we are now data across the industry

- Placed on the market
- Recycling
- Capacity
- Environmental Impact

Forecast for 2030 and 2035.

16 Key changes needed to achieve the forecast.

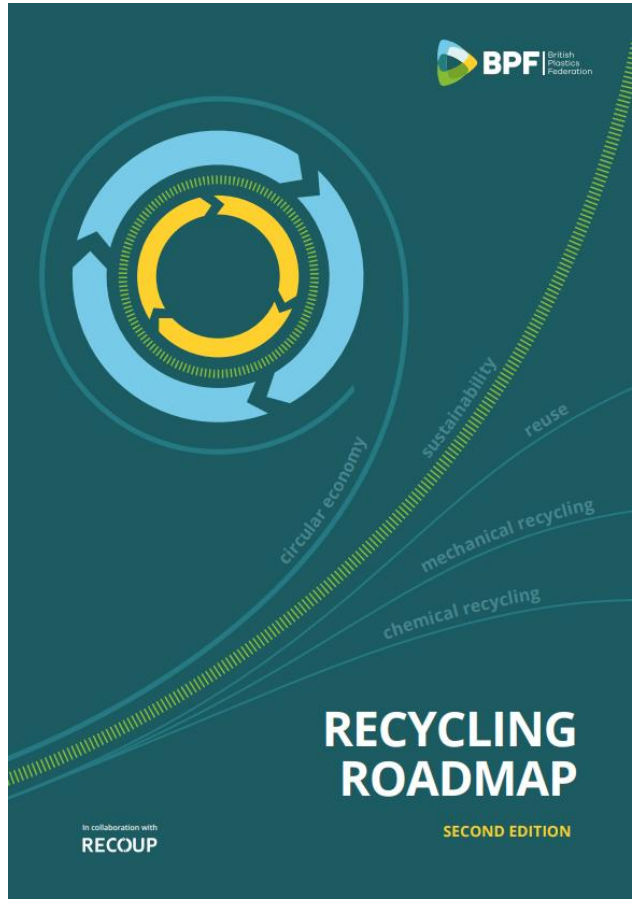


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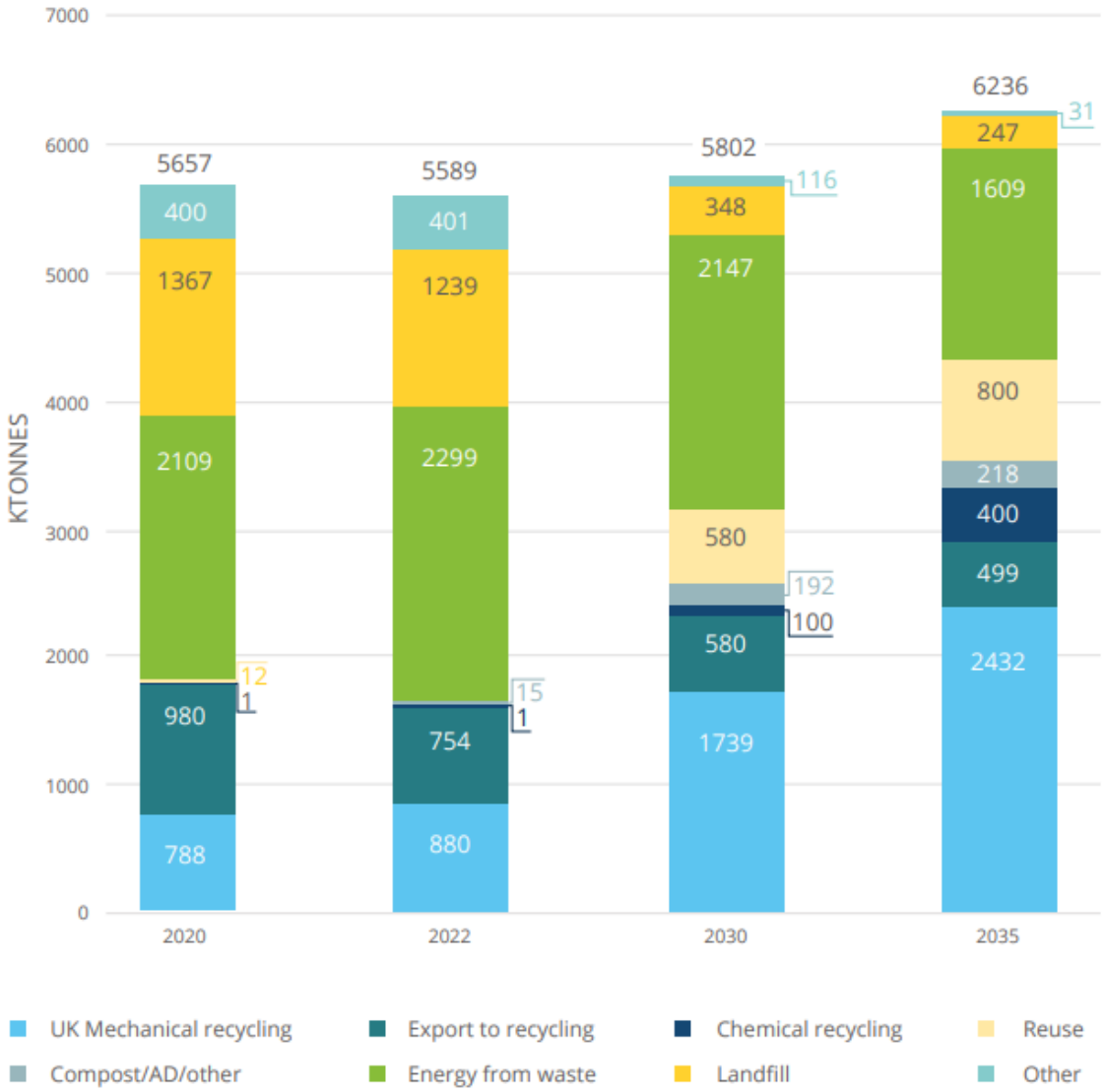
FIGURE 9: Plastic waste flows



The forecast

BPF British Plastics Federation

Key changes

Increasing investment

Optimising legislation and existing systems

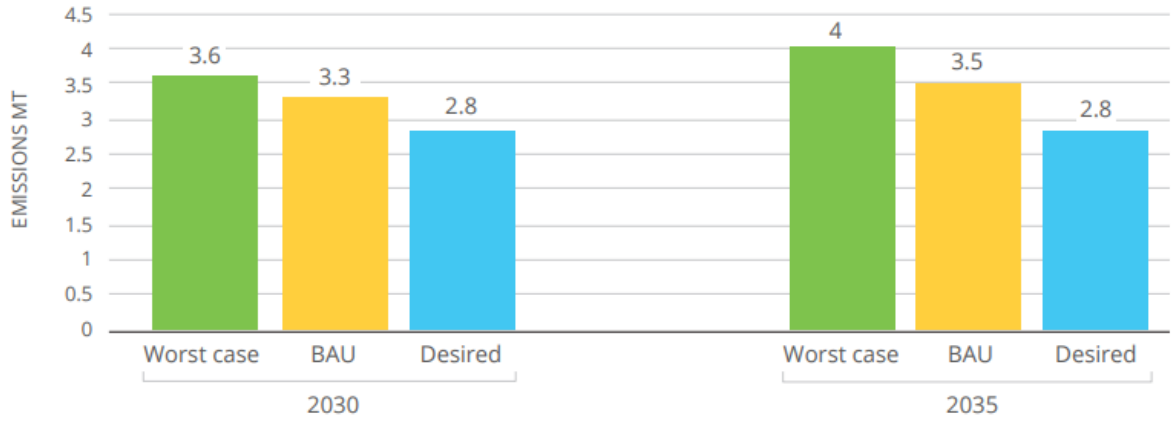
Improving communication and collection systems

BPF British Plastics Federation

Environmental Impact

Environmental impact[65]

FIGURE 15: CO_2 emissions associated with each scenario (see Annex 1)



Without the key changes (worse case scenario see annex 1) emission would be **1MT CO2e higher** (4MT).

Actual savings would be higher when the emissions savings from replacing virgin plastic are taken into account. In the 2035 forecast it could save an additional **6MT** of CO_2.

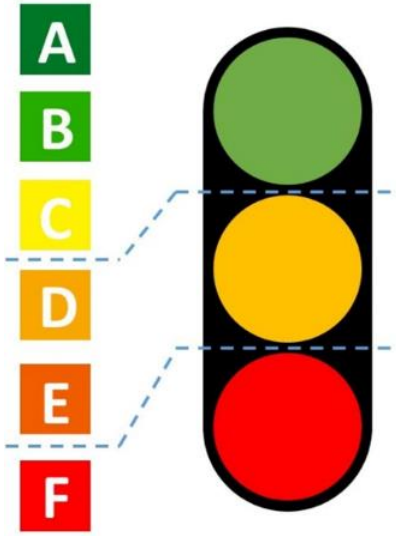
Recycling around 20 Mt of plastics will **save about 50 million tons** of resources from depletion worldwide.[66]

BPF British Plastics Federation

Ecodesign

PACKSCORE

The Sustainable Design Tool



START PACKSCORE...

BPF British Plastics Federation

		COMPATIBLE for recycling for most applications	MAY BE SUITABLE for recycling for some applications	NOT SUITABLE for recycling
BODY	**COLOUR**	Clear / Light-blue / light tints	Dark blue / dark green / brown / strong tints	Opaque / solid colours Carbon Black
	BARRIER / COATINGS	Clear plasma coating	External coating / PA - 3 layers	EVOH / PA monolayer blends
	ADDITIVES		UV stabilisers / AA blockers	Nanocomposites
CLOSURE	**CAPS**	PP HDPE LDPE - Europe only		Steel / Aluminium / Silicone (density >= 1g/cm3)
	SEALS	PE / PP	Silicone (density < 1g/cm3)	PVC / Aluminium / Silicone (density > = 1g/cm3)
DECORATION	**DIRECT PRINTING**	None / Embossed / laser printing (minimal)	Minimal direct printing e.g. production or expiry date	Steel / Aluminium / Silicone (density >= 1g/cm3)
	LABELS	HDPE / LDPE / PP /OPP less than 60% coverage on face	Paper over 60% coverage on face	PET / PVC / Metallised
	SLEEVES (INCL. TAMPER RESISTANT)	PE / PP / OPP / EPS (density <1g / cm3) Foamed PET / Foamed PET-G		PET PVC / Full body sleeves PS (density > 1g/cm3 / PET-G)
	ADHESIVE	Removable Water releasable in 60–80°C		Not removable in water
	INK	EuPIA good manufacturing practices (for non food applications)		Inks that bleed and dye-wash solution
OTHER	**TRIGGER SPRAYS**	PP / HDPE / LDPE		Glass components Metal springs / ball bearings

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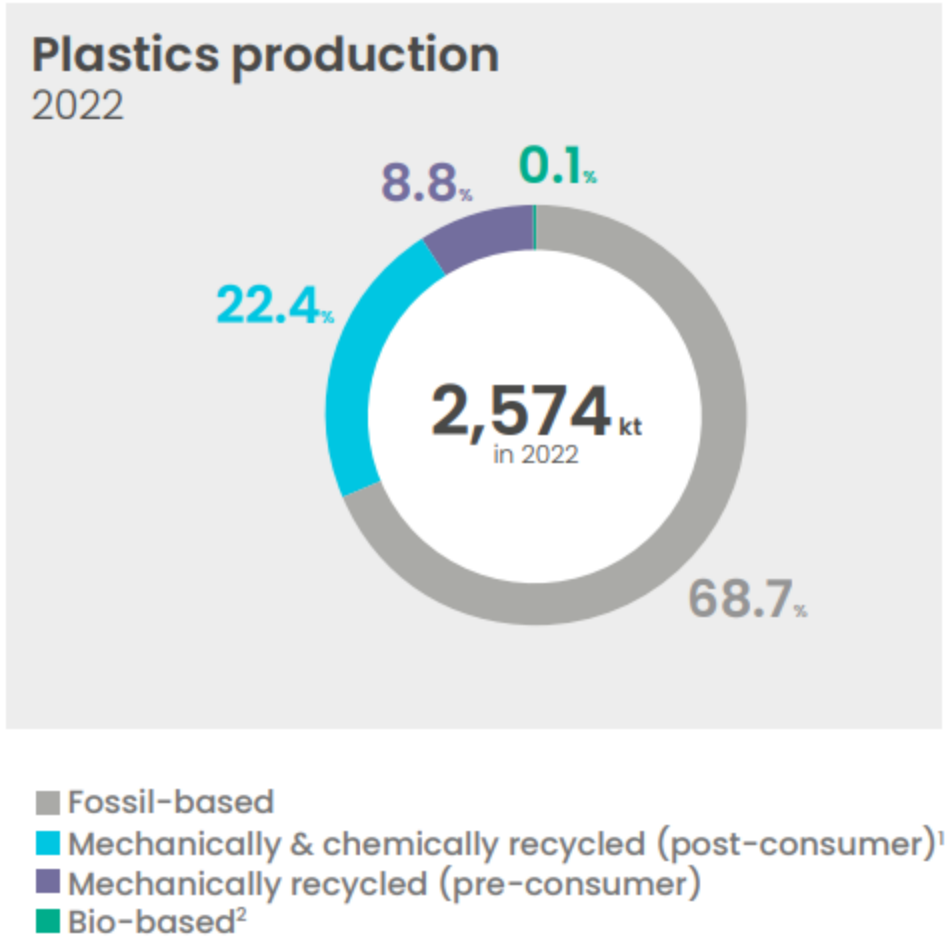
Circular Plastics



Source: PlasticsEurope Circular Economy for Plastics Data for 2022

Targets from Plastics Europe

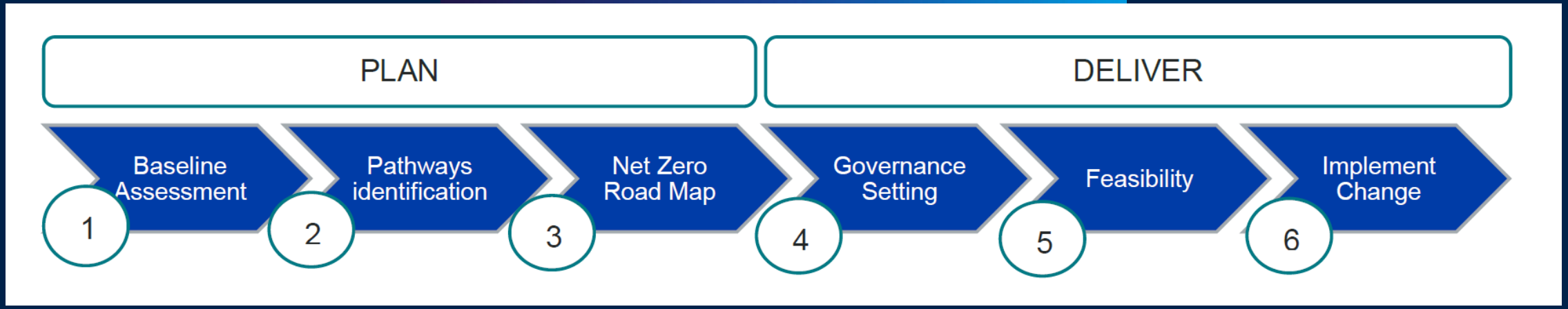
25% Circular Plastics by 2030
65% Circular Plastics by 2050

BPF British Plastics Federation

Net Zero and Decarbonisation

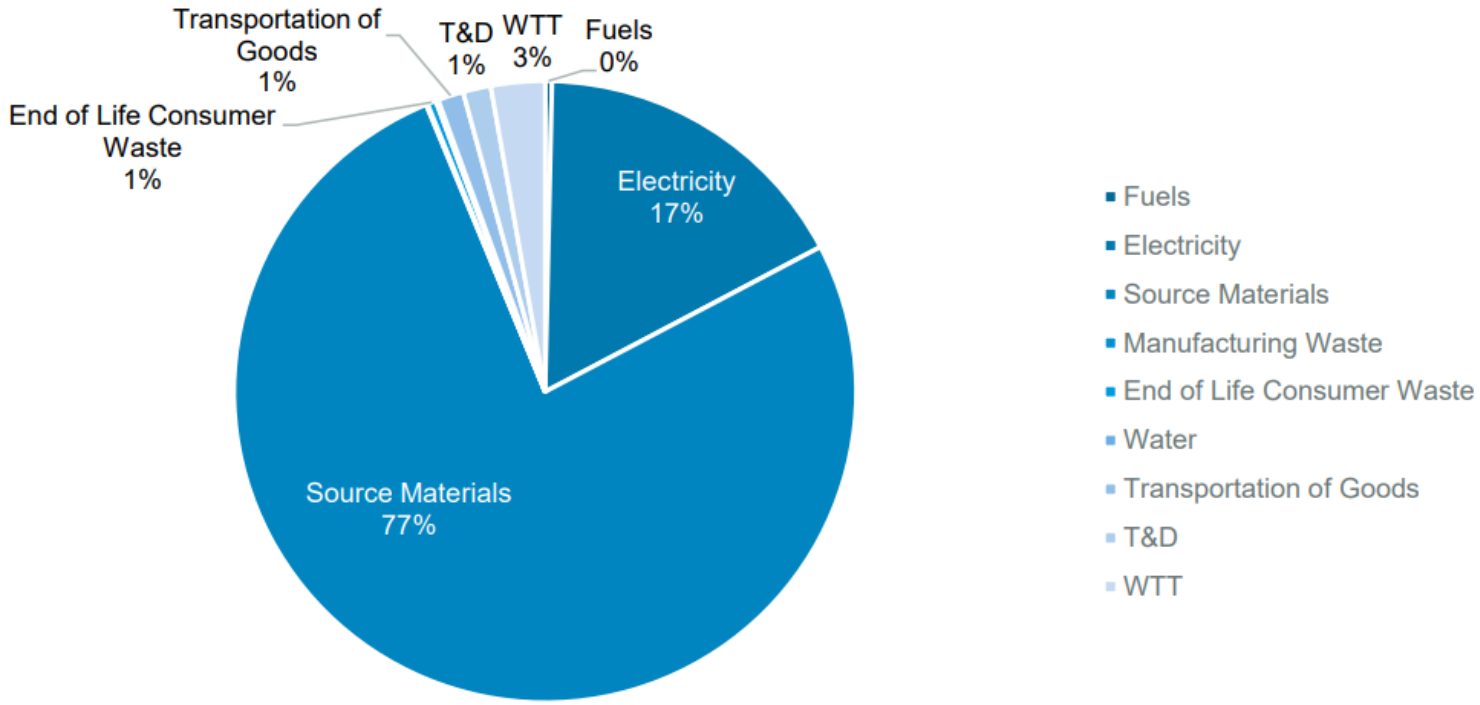
BPF launched a Net Zero Strategy Report at the end of 2023.

It is a Member-only document available online at the Net Zero Hub

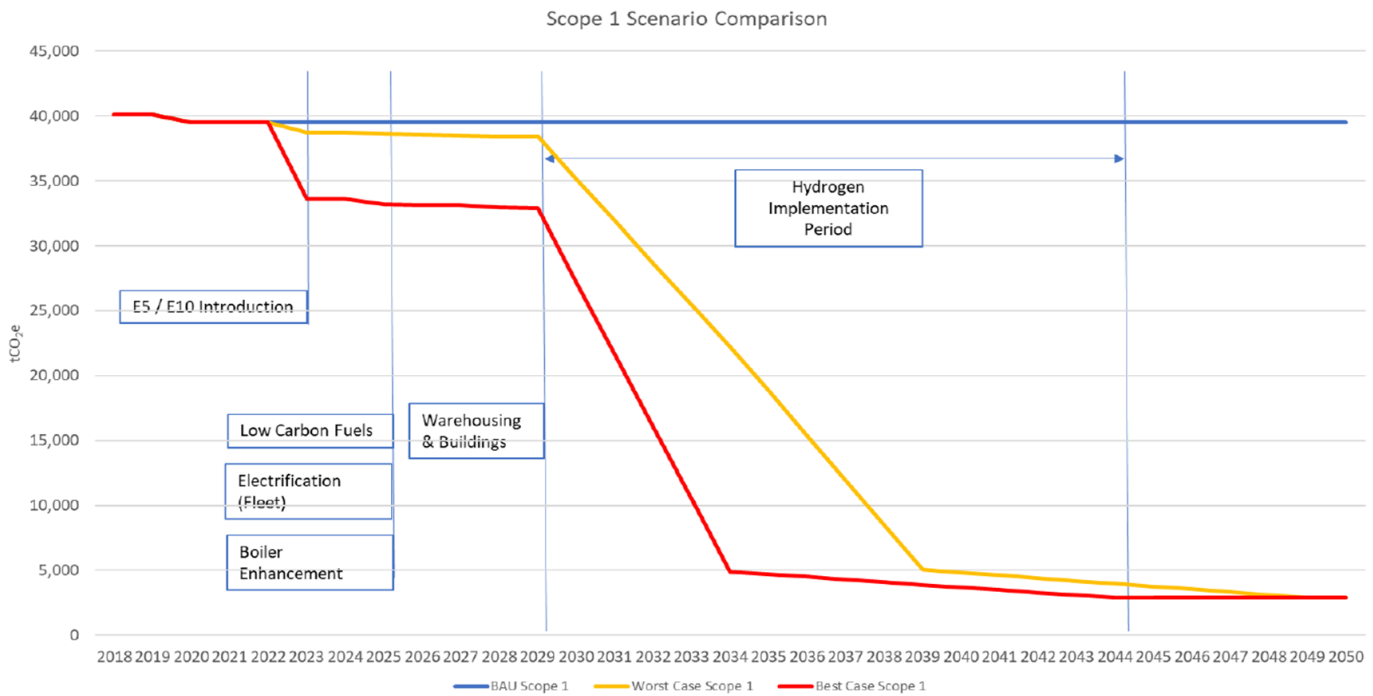


Baseline 2018

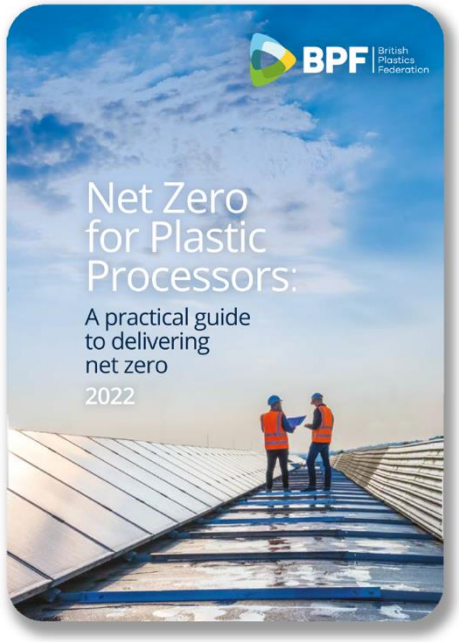
Figure 4-1 Emissions by source A & B (BPF, 2018).



Scope 1 Emissions - Decarbonisation Pathway Scenarios

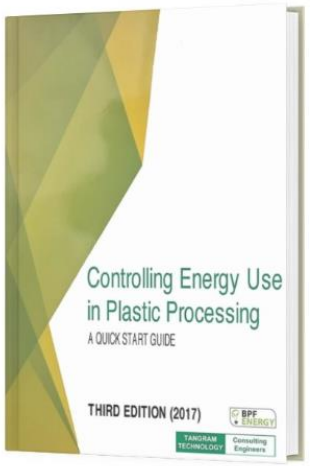


Action	Owner	Target Archetypes	Timescale	Estimated Benefits	Barriers	Enablers	Target Emissions
Energy Management System (EMS, or EnMS)	Individual businesses	**Primary Targets:** Plastic producers, converters, recyclers, and equipment suppliers. **Secondary Targets:** all others archetypes	0.5 – 1 year	See individual actions below	Resistance to change, lack of awareness, and lack of data and resources	Policy, CAPEX & OPEX savings	Scope 1 & 2



Lots of Net Zero resources on the BPF Net Zero Hub!

www.bpf.co.uk/netzero



Eco Design

BPF British Plastics Federation

Step by Step Guide to Net Zero

Achieving net-zero carbon emissions is one of the most pressing challenges of our time. With climate change threatening ecosystems, economies, and communities worldwide, transitioning to net-zero has become critical for preserving our planet for future generations. But as important as it is, we know that many companies are confused about best practise, or even where to start! That's why we've created a 10-step guide to help you reach net-zero.

- Step 1: Set Your Boundaries
- Step 2: Identify your scope 1, 2 and 3 emissions
- Step 3: Collect data on scope 1, 2 and 3
- Step 4: Calculate your carbon footprint
- Step 5: Net zero methodology
- Step 6: Set targets
- Step 7: Develop your decarbonisation plan
- Step 8: Publish your plan and implement it!
- Step 9: Review your progress against your targets
- Step 10: Achieve your net zero target!

www.bpf.co.uk/netzero

BPF British Plastics Federation

A BPF NOTE ON 'THINGS TO THINK ABOUT'

BEST AVAILABLE TECHNIQUE

Quick Guide

Purchasing Equipment

When purchasing equipment for your site, the following questions may help:

Key Questions

1) What do you need to buy?

2) How much does it cost?

3) What is the payback time?

4) What are the implications on your Net Zero journey?

It is important to think about the energy efficiency of equipment purchased. Smaller products usually use less electricity than bigger ones of the same type, and it is necessary to have an understanding of how much energy the various options use so that you can make an informed choice.

It is also important to calculate your payback period, as energy saved in the long run should encourage the purchasing of energy-efficient equipment. Also ask if the equipment you purchase will affect the efficiencies of other machinery on site. How and when you use the equipment is also key, and is outlined in the 'energy efficiency' section.

BPF British Plastics Federation

Operation Clean Sweep

What is OCS?

OCS is an international voluntary agreement from the plastics industry to prevent plastic pellet, flake and powder loss into the environment.

By signing up to OCS, you are making a commitment to adhere to best practice and implement systems to prevent plastic pellet loss.

Total of ~340 Companies Signed up to OCS

Over 2/3 of UK Polymer Handled by Converters are Signed up to OCS

Major Brand Retailers:

- Coca-Cola European Partners
- Iceland
- Sainsburys

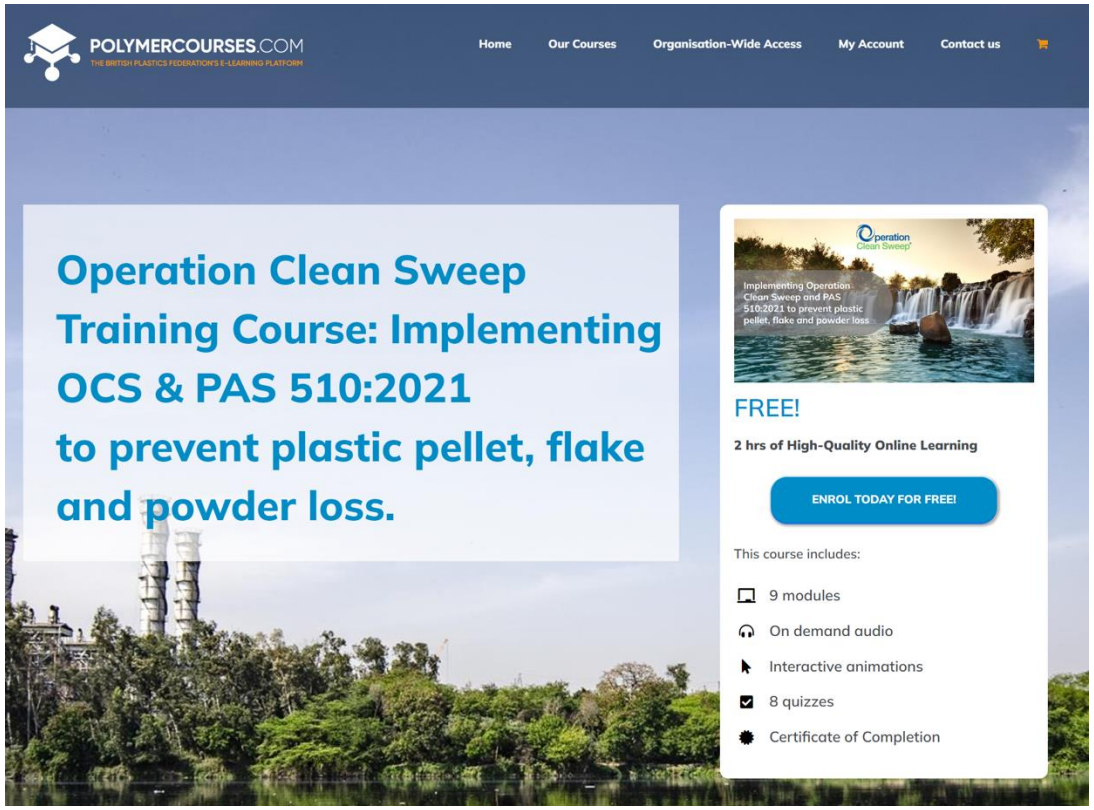
99.9% of Material Produced in the UK are Signed up to OCS

BPF British Plastics Federation

OCS training

- Aimed towards:
- OCS signatories
- Any company that handles plastic pellet, flake or powder

- 2-hour online training course
- 9 modules
- Audio – voiceover
- Interactive animations and 8 quizzes
- CPD accredited by IOM3
- COMPLETELY FREE FOR ALL



Course content is based upon the OCS manual, PAS 510:2021 and Guidance.

BPF British Plastics Federation

UN Global Treaty on Plastic Pollution

A Global Treaty on Plastic Pollution

- In March 2022, at the resumed fifth session of the UN Environment Assembly (UNEA-5.2), a historic resolution was adopted to develop an international legally binding instrument on plastic pollution, including in the marine environment.

- The resolution (5/14) requested the Executive Director of the UN Environment Programme (UNEP) to convene an Intergovernmental Negotiating Committee (INC) to develop "the instrument," which is to be based on a comprehensive approach that addresses the full life cycle of plastic, including its production, design, and disposal.

End Plastic Pollution: Looking forward

BPF involvement

- The BPF attended the 4th and 5th session of the Intergovernmental Negotiation Committee on the Global Treaty on Plastic Pollution as an observer. They will also be attending 5.2.

- Part of OPRL and Defra's dialogues

- Regular meetings with Defra and DBT

- Position statement

Where are we now?

- A final agreement could not be reached!. Divergence from Member States particularly on Articles on Supply, Chemicals of Concern and Plastic Products, and Finance
- It was determined that the INC process will be continued at INC 5.2, a resumed session of this meeting
- The latest non-paper will serve as a basis for negotiations going forward, but it should be assumed that all language in this document is in brackets (not yet agreed on)

Efficient Moulding Machinery

Cutting emissions through technology

Carl Reeve

Smart Manufacturing for a sustainable future

Carl Reeve – MD Haitian UK

British Plastics Industry – who we are and what we do

- 5,700 Companies
- 180,000 Employees
- £26 Billion Turnover
- 1,500 Injection Moulding Companies
- Sectors Supplied: Automotive, Aerospace, Packaging, Medical, Defence, construction.
- Approximately 14,000 machines in operation

Average Machine data

- Average machine is 250 Ton (clamp force)
- Manufacturesd in 2007
- Average age of machine is 18 years. Oldest in Europe.
- Fixed or variable hydraulic pump
- 300 gram shot weight (in PP)
- Running a 30 second cycle
- 80 hours per week

The Times they are a changing

Best Laid Plans..

CO2 Calculations

➡ Average 250 ton machine (Haitian vs. Actual 'average' machine)

Calculation CO2 - Haitian Machine (250 ton clamp force EUROMAP 10)							Calculation CO2 - Competitor		
Shot weight	300	gr		Country CO2 / kwh			Shot weight	300	gr
consumption	0.25	kwh /kg					consumption	1.6	kwh /kg
Cycle time	30	s		0.00027			Cycle time	30	s
Power	9	kwh		UK			Power	58	kwh
Nb hours /year	4500	h		0.2	£/kwh		Nb hours /year	4500	h
Power /year	40,500	kwh					Power /year	259,200	kwh
Energy cost	8,100	£					Energy cost	51,840	£
Material / year	162	tons					Material / year	162	tons
CO2 / year	2.734	tons					CO2 / year	111.974	tons

Haitian Servo Technology

Generation I

Total energy
50%↓

2006

Generation II

Total performance
5%↑

2012

Generation III

Total performance
20%↑

2018

Generation V

Total energy
20-40%↓

2023

Electrical Charging

MA models	Energy consumption V-generation	Energy consumption III-generation	comparative
1600	0.3	0.369	-23 %
2500	0.248	0.318	-28 %
5300	0.254	0.31	-30.1%

Electric charging as standard feature for IU130-IU8400

20%+

Machine energy consumption reduction

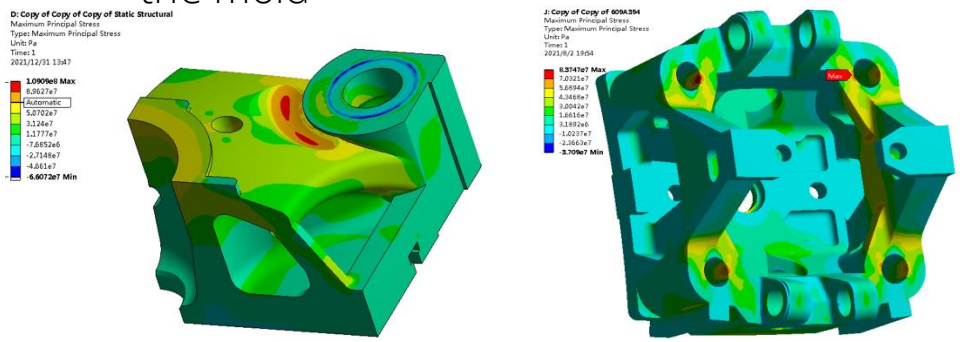
Energy-saving Heating Device

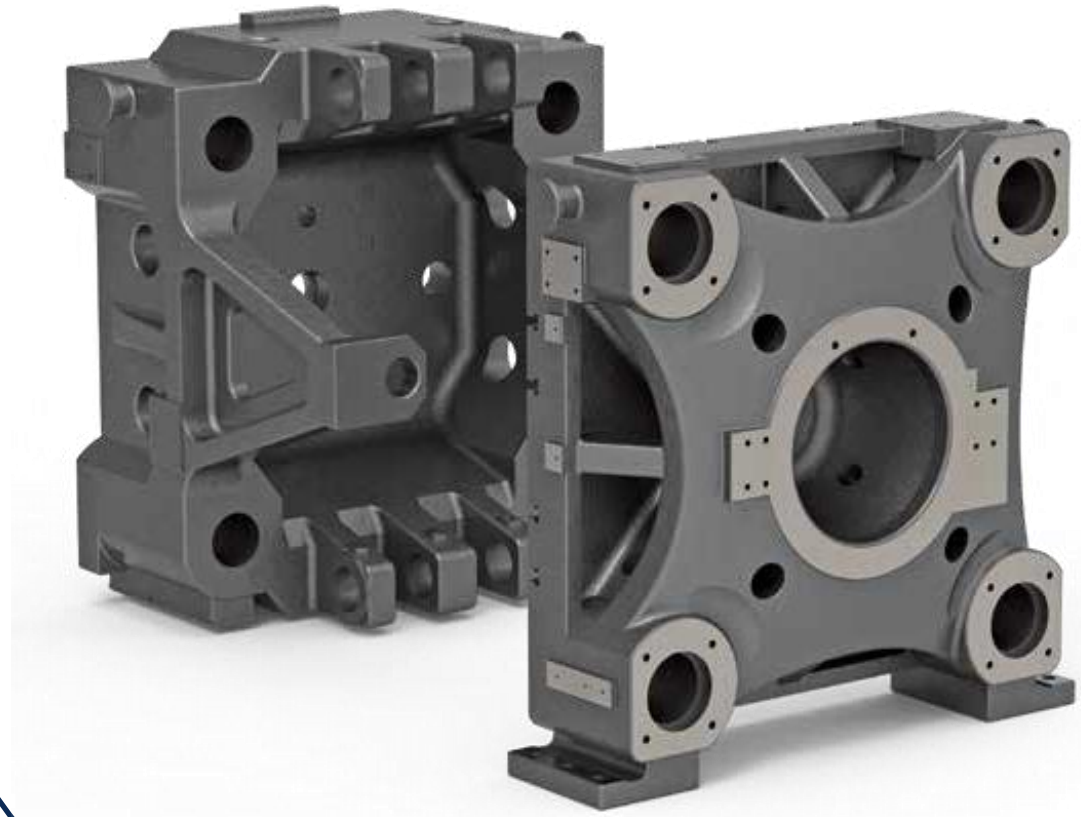
- Overall better energy saving results
- Optimal insulation
- Easy and quick to dismantle
- Feeding leakage prevention

Type	New	Old
Heating Energy (kW)	**3.14**	3.55
Saving	12 %	-
Description	Housing on top, left and right sides to save energy	-

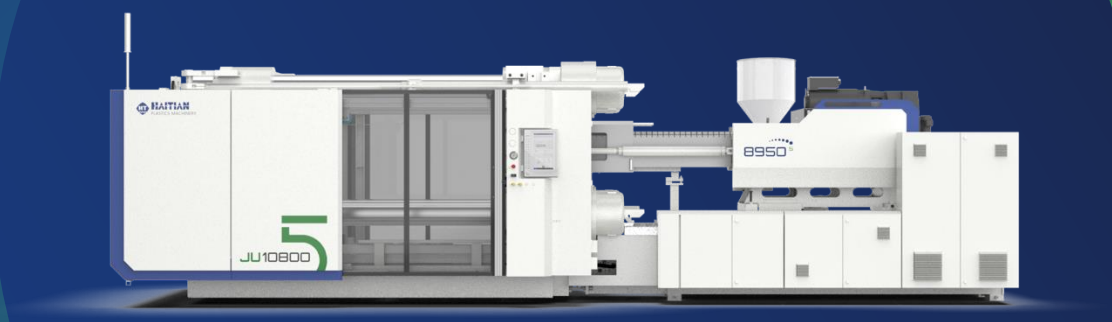
High-rigid Platen Structure

- Centralized Pressure Platen
- High rigidity against deformation
- Even pressure distribution across the surface
- Excellent moving platen support to protect the mold





HT·XTEND



HT·CLAMP

HT·INJECT

HT·CHARGE

HT·DIAGNOSE

HT·ENERGY

HT·LUBRICATE

Smart Machine Technology
as a
Standard

Costs Involved – What's your payback time?

Financial Inputs

Agreement Type	Hire Purchase
Net Price / Invoice Price / Vatable items	£65,000.00
VAT Qualifying Deal?	Yes
VAT	£13,000.00
Non-vatables	£0.00
Deposit (please include the VAT amount of £13,000.00)	£26,000.00
Number of advance payments	0
Number of subsequent payments	36
Term (In Months) - term must be 12-60 months	36
Net rate	8.00%

Deal Summary

Net Price		£65,000.00
VAT	@ 20%	£13,000.00
Non vatables		£0.00
Total Cost		£78,000.00
Deposit		£26,000.00
Amount Financed		£52,000.00
Monthly repayments		£1,629.49
Flat Rate		4.27%

WOULD YOU RUN YOUR BUSINESS

with a 20-year old computer?

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- carl.reeve@haitian.co.uk
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Questions, Panel Discussion & Closing Remarks

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