

CHEMISTRY THAT MATTERS™



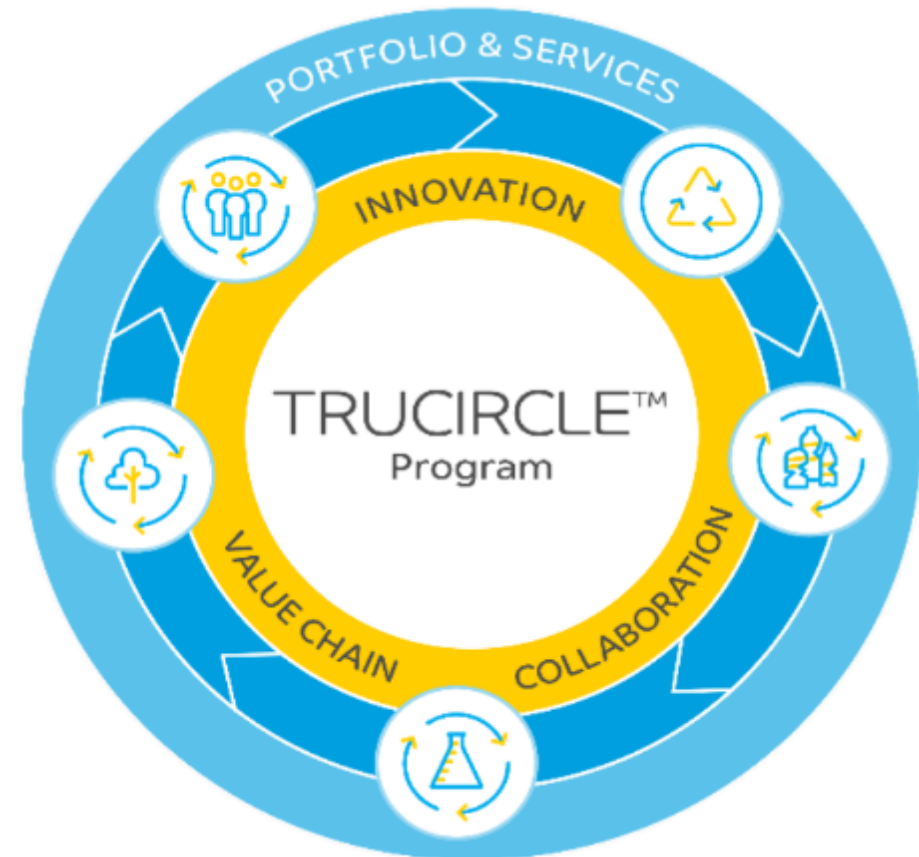
# SABIC'S TRUCIRCLE™ PROGRAM

EXTERNAL COMMUNICATION DECK  
JANUARY, 2023



## JOIN OUR FUTURE

SABIC's circular commitment	4 – 7
Introduction	8 – 10
Challenges & SABIC commitment to sustainability	11 – 18
Complementary TRUCIRCLE™ pillars	
Design for Recyclability	20 – 24
Design for Re-Use	25 – 26
Mechanically recycled products	27 – 33
Mass balance concept	34 – 43
LCA	44 – 46
Certified circular polymers	47 – 58
Ocean bound plastics	59 – 63
Certified renewable polymers	64 – 74
Closed loop initiatives	75 – 78
TRUCIRCLE™ service elements	79 – 82
SABIC's carbon neutrality strategy	83 – 87
Value chain collaboration	88 – 91
References (movies, PR's, awards, ESG ratings)	Part 2



# SABIC'S CIRCULAR COMMITMENT

# SABIC'S CIRCULAR COMMITMENT ANNOUNCED AT DAVOS

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## Increasing Demand for Recycled Plastics

The global market for recycled plastics is anticipated to increase by 56% over the next five years



## Committing to Circular Plastics

To meet these growing demands, we are committing to processing at least one million metric tons of TRUCIRCLE™ products annually by the year 2030



## Reducing Carbon Emissions

Our innovative TRUCIRCLE™ portfolio includes bio-based feedstock sourced from plant material, enabling us to reduce CO2 emissions by as much as 60%



COMMITTS TO ACCELERATING ACIRCULAR ECONOMY

SABIC CEO (A)

Abdulrahman Al-Fageeh

# SABIC 2023 ANNOUNCEMENT AT DAVOS

## 2018

SABIC DEMONSTRATES COMMITMENT TO SUSTAINABLE DEVELOPMENT WITH ICONIC ICEHOUSE™

SABIC first in the industry to commit to scale up high-quality recycling processes for chemical recycling of mixed plastic waste to the original polymer.



## 2019

SABIC AND CUSTOMERS LAUNCH CERTIFIED CIRCULAR POLYMERS FROM MIXED PLASTIC WASTE

SABIC launches Market Foundation stage in collaboration with customers Unilever, Vinventions and Walki Group and supplier Plastic Energy



## 2020

SABIC REVEALS PLANS FOR TRUCIRCLE™ SOLUTIONS TO CLOSE THE PLASTICS LOOP

SABIC reveals progress on TRUCIRCLE™ circular journey with new collaborations highlighting construction of first commercial advanced recycling plant



## 2022

SABIC REAFFIRMS COMMITMENT TO CARBON NEUTRALITY AT WORLD ECONOMIC FORUM IN DAVOS

SABIC highlights 2030/2050 Carbon Neutrality commitment and 4 R's of Circular Carbon Economy including TRUCIRCLE™ contributions



## 2023

SABIC AFFIRMS COMMITMENT TO ACCELERATING CIRCULARITY WITH A TARGET TO PROCESS **ONE MILLION METRIC TONS OF TRUCIRCLE™ SOLUTIONS BY 2030**

- SABIC's reaffirmed its commitment to accelerating the circular carbon economy by unveiling its target to process **one million metric tons of TRUCIRCLE™ solutions by 2030**
- Target includes SABIC's first commercial advanced recycling unit in Geleen, The Netherlands which is in the final stages of construction with commercial delivery of first circular polymers is expected in Q2 2023
- As next step on the roadmap to meet this 2030 target, SABIC has also announced that it is **exploring a new world-scale commercial advanced recycling investment**
- SABIC's roadmap to meet this new 2030 target also includes **bio-based feedstock** and **mechanically recycled materials**

# SOCIAL MEDIA & PRESS RELEASE

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**COMMITTS TO  
ACCELERATING  
ACIRCULAR ECONOMY**  
SABIC CEO (A)  
**Abdulrahman Al-Fageeh**

**Increasing Demand for Recycled Plastics**

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**SABIC REAFFIRMS COMMITMENT TO THE CIRCULAR CARBON ECONOMY WITH A TARGET OF ONE MILLION METRIC TONS OF TRUCIRCLE™ SOLUTIONS BY 2030**

SABIC has reaffirmed commitment to accelerating the circular carbon economy by unveiling a target of one million metric tons of TRUCIRCLE™ solutions by 2030.

Target includes production from SABIC's first commercial advanced recycling unit in Geleen, The Netherlands which is in the final stages of construction with commercial delivery of first circular polymers is expected in 2023.

As next step on the roadmap to meet this 2030 target, SABIC has also announced that it is exploring a new world-scale commercial advanced recycling investment.



**“At SABIC, we are committed to helping provide our customers with more sustainable solutions, and our target of one million metric tons of TRUCIRCLE™ solutions by 2030 intends to help usher in the new circular economy”**

Abdulrahman Al-Fageeh, SABIC CEO (A)

PRESS RELEASE  
Riyadh, January 19 2023
www.sabic.com



Classification: General Business Use


**PRESS RELEASE**

Riyadh, Saudi Arabia, January 19, 2023

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- Target includes production from SABIC's first commercial advanced recycling unit in Geleen, The Netherlands which is in the final stages of construction with commercial delivery of first circular polymers is expected in 2023.
- As next step on the roadmap to meet this 2030 target, SABIC has also announced that it is exploring a new world-scale commercial advanced recycling investment.

SABIC, a global leader in the chemicals industry, has reaffirmed its commitment to accelerating the circular carbon economy during the World Economic Forum Annual Meeting in Davos by unveiling its ambition to process one million metric tons (1000kt) of TRUCIRCLE™ solutions annually by 2030. SABIC used its reception hosted in the company's iconic ICEhouse™ (Innovation for the Circular Economy) with global business figures and policymakers, to outline its new advances on its sustainability journey.

Abdulrahman Al-Fageeh, SABIC CEO (A) said, “At SABIC, we are committed to helping provide our customers with more sustainable solutions, and our target of one million metric tons of TRUCIRCLE™ solutions by 2030 intends to help usher in the new circular economy. He added, “Driving circularity for plastics will require a rapid transformation of the entire value chain, which is only possible through collective action, innovation, and collaboration across the industry and eco system of waste management. Therefore, we are working hard with downstream and upstream partners to accelerate this process.”

SABIC pioneered the industry back in Davos in 2019, when it announced plans to build a world-first small-scale commercial unit to produce certified circular polymers from the advanced recycling of used plastics. Since then, SABIC has been employing existing facilities to process smaller volumes of advanced recycled materials for brand owners and customers for a variety of applications already available in the market.

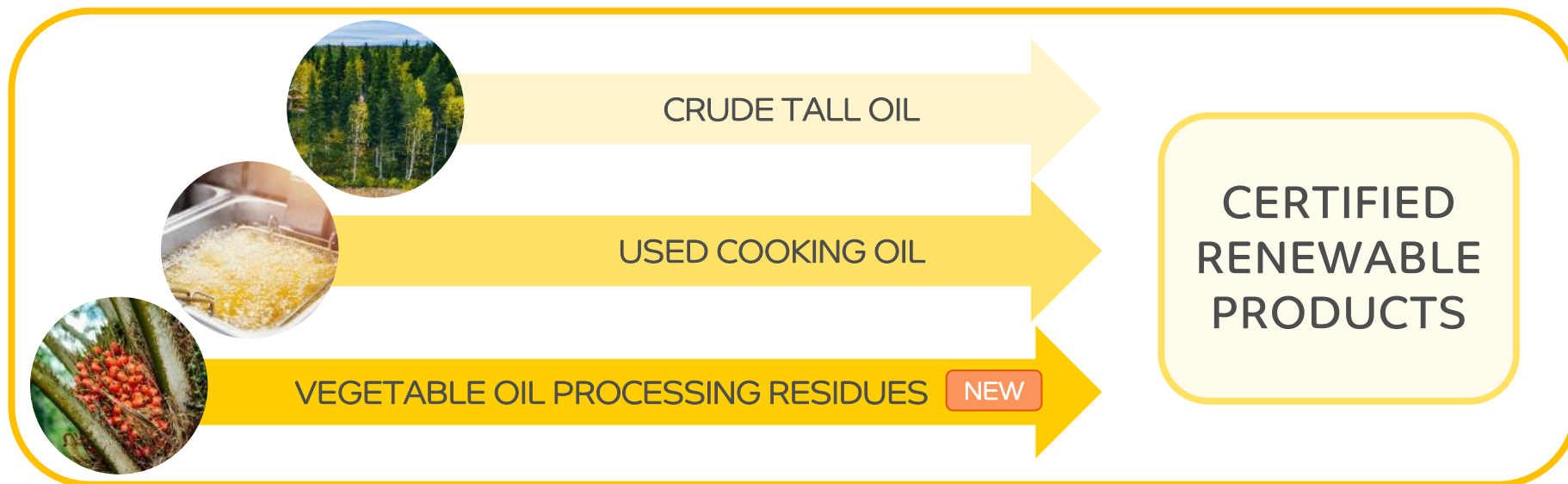
Construction of the company's first commercial unit in Geleen, the Netherlands is now entering the final stages and deliveries of first circular polymers are expected in 2023.

As a next step on the roadmap to meet this 2030 target, SABIC will upscale volumes globally of advanced and mechanical recycling as well as bio-based materials. In that context, SABIC also announced that it is exploring a new world-scale commercial advanced recycling investment that

1

# INTRODUCTION

# THINK OF ...





# OUR JOURNEY SO FAR ...

## PROVEN SOLUTIONS

**MASS BALANCE chain of custody**  
for polymers



2014

**CERTIFIED RENEWABLE PE & PP**  
from second generation bio-based feedstock

**D4R WITH TF-BOPE**  
Mono-material solutions to overcome limits of conventional PE film



2014



2019

**CERTIFIED CIRCULAR PE & PP**  
from advanced recycled feedstock

**CERTIFIED RENEWABLE CHEMICALS**  
supporting launch of new renewable value chains



2019



2019

**CLOSED LOOP**  
with Tesco, Plastic Energy & Partners



2020

**PCR COMPOUNDS**  
up to 70% mechanically recycled content

**CIRCULAR PRODUCTS**  
based on OCEAN BOUND PLASTIC



2021



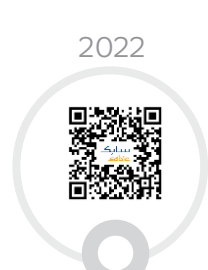
2021

**BLOCKCHAIN PILOT PROJECT**  
for digital traceability and additional transparency

**CIRCULAR PRODUCTS**  
based on OCEAN PLASTIC



2021



2022

**CERTIFIED RENEWABLE PRODUCTS**  
from 'Vegetable oil processing residues'



2022

# CHALLENGES & SABIC'S COMMITMENT TO SUSTAINABILITY

## WORLD WITH MANY CHALLENGES

The background of the central text area is a photograph of a vast, deep blue ocean under a clear sky. The water has a textured surface with small waves.

**CLIMATE CHANGE.**  
**GREENER TRANSPORT. FRESHER FOOD.**  
**BETTER HEALTH- & PERSONAL-CARE. CLEANER WATER.**  
**CIRCULAR ECONOMY**  
**PLASTIC WASTE RECYCLING. RENEWABLE FEEDSTOCK.**

# WASTE AND OPPORTUNITY

## PUBLIC OPINION



**NEGATIVE ATTENTION TO PLASTICS IN MEDIA. WASTE ISSUE** OVERSHADOWS ADVANTAGES OF PLASTIC PRODUCTS

## EXISTING BENEFITS



**BENEFITS** INCLUDING LIGHTWEIGHT, STIFFNESS, IMPACT, DURABILITY, COST, SAFETY, APPEARANCE, ETC.

# A CHALLENGING CONTEXT



# LINKING UN SDG'S TO SABIC'S TOP SUSTAINABILITY PRIORITIES

## Resource Efficiency

SABIC's ambitious goals are to reduce Material Loss intensity 50% and Water Intensity 25% by 2025 since 2010.



## Climate Change & Energy

SABIC's ambitious goals are to reduce GHG and energy intensity 25% by 2025, from 2010 levels.



## Environment, Health, Safety

SABIC is committed to our core EHSS values, with a supportive culture and focus on continuous performance improvement.



## Innovation & Sust. Solutions

Sustainability is the guiding light for SABIC's product and process innovation – to support the development of effective solutions to some of the world's greatest challenges.



## Circular Economy

Circular economy inspires SABIC to adapt our processes to the use of renewable and recycled feedstock, and to create durable, recyclable product design solutions for our customers.



## Governance & Integrity

Integrity is a core value and helps to maintain stakeholder trust. SABIC's Code of Ethics provides guidance to meet stakeholder expectations.



# LINKING UN SDG'S TO SABIC'S TOP SUSTAINABILITY PRIORITIES

## Resource Efficiency

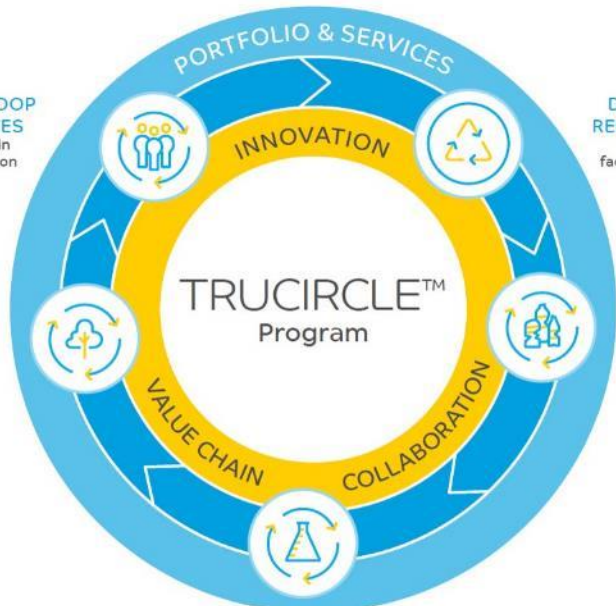
SABIC's ambitious goals are to reduce Material Loss intensity



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SABIC  
redu  
inter  
2010

**CLOSED LOOP INITIATIVES**  
Value Chain Collaboration

**CERTIFIED RENEWABLE PRODUCTS**  
Bio-based feedstock



**DESIGN FOR RECYCLABILITY**  
Designing to facilitate recycling

**MECHANICALLY RECYCLED PRODUCTS**  
Enabling High PCR Content

**CERTIFIED CIRCULAR PRODUCTS**  
Feedstock recycling of used plastic



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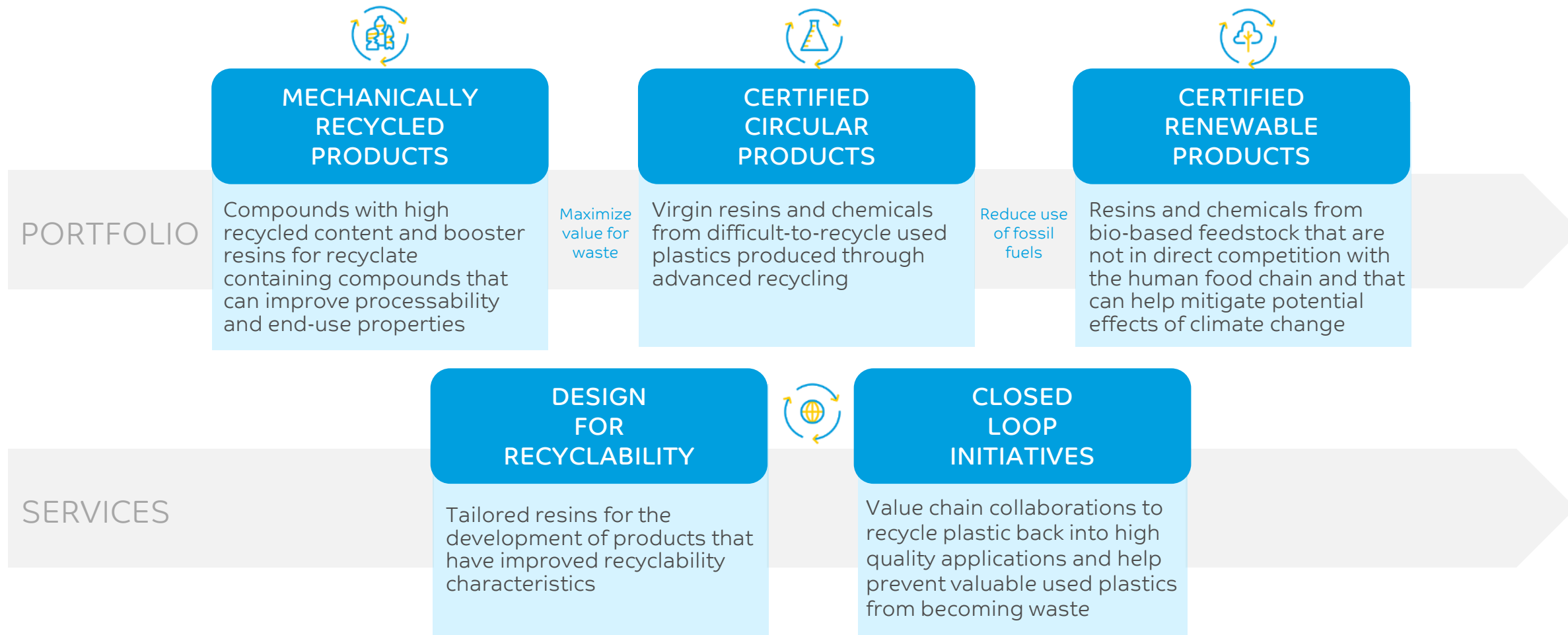
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# SABIC'S TRUCIRCLE™ PROGRAM – COMPLEMENTARY SOLUTIONS



**WORKING SIDE BY SIDE WITH PARTNERS ACROSS THE ENTIRE VALUE CHAIN TO DEVELOP CIRCULAR SOLUTIONS AND FULFILL SABIC'S AMBITION FOR A NEW PLASTIC ECOSYSTEM**



# SABIC'S TRUCIRCLE™ PROGRAM – CASE STUDIES

PORTFOLIO



SERVICES



## CLOSING THE LOOP AND CREATING A CIRCULAR ECONOMY FOR PLASTICS

# COMPLEMENTARY TRUCIRCLE™ PILLARS

TRUCIRCLE™ PROGRAM

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# DESIGN FOR RECYCLABILITY

# CREATING A SUSTAINABLE PACKAGING STARTS AT THE DESIGN STAGE

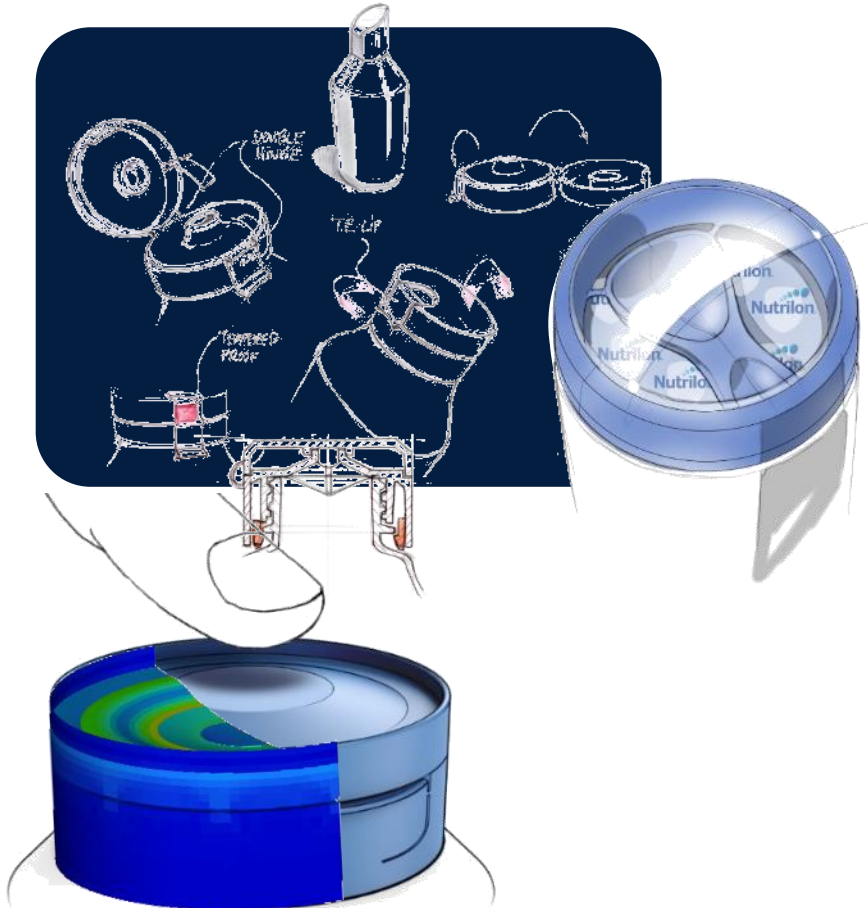
Exploration

Ideas and concepts

Design optimization

Tooling & production

Post processing

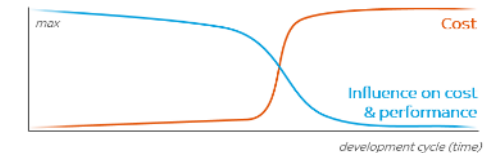


MATERIALS EXPERTISE IN THE COMPLETE APPLICATION DEVELOPMENT CHAIN, from industrial design to predictive engineering and processing.

- Worldwide footprint
- Dedicated segment teams
- Application labs
- Testing capabilities

EARLY INVOLVEMENT IN THE DESIGN PROCESS  
= RETURN ON INVESTMENT:

- Cost reduction
- Performance optimization
- Time to market



# PACKAGING 'DESIGN FOR RECYCLABILITY' CONSIDERATIONS

## GENERAL

### Features complicating packaging recycling

- dark colors
  - especially carbon black
- fillers
  - no change of density
- complicated multi-material structures
  - e.g. PET, PA
- difficult to recycle materials
  - e.g. PVC, PS
- Inseparable paper / plastic structures
- Labels / sleeves covering full product
  - substrate not recognizable for current recycling technologies

## TESCO \*

TESCO, UK retail giant, issued an updated series of [guidelines](#) on the [preferred materials](#) and formats that it will accept as [packaging](#).

Red		Amber		Green	
Not to be used as customers cannot easily recycle (UK)		When functional requirements mean green materials are not an option		Preferred for UK recycling via kerbside or store	
<b>Materials</b>	<b>Formats &amp; Designs</b>	<b>CONTROLLED USE: CONTACT THE PACKAGING TEAM FOR APPROVAL</b> <a href="mailto:packaging.team@tesco.com">packaging.team@tesco.com</a>		<b>Materials</b>	<b>Formats &amp; Designs</b>
Compostable/PLA & Biodegradable Plastics	Rigid Black Plastic	<b>New materials, formats and designs</b>		Glass	Paper/board with plastic; single side lamination ≤10% by weight (incl. windows)***
Oxy/Oxo degradable Plastics	Expanded/ Foamed/Density Modified Plastics	<b>Materials</b>	<b>Formats &amp; Designs</b>	PET (Rigid)	
Polystyrene	Paper/board laminated on both sides	NIR Black HDPE (non food grade)*	Beverage/Liquid Food Cartons	Polyethylene	
PVC	Complex laminates using aluminium layers for decoration	Complex laminates**	Composite Drums	Mono flexible films	
PVdC	Hi/Mid-Cones	Foiled paper	Shrink sleeves (perforated, include messaging to remove, max ink coverage of 60%)	Polypropylene	Mono PET lidding film on PET tray perm-welded
MDF	Plastic straws & cutlery	Wood	Spouted pouches of mixed material	Steel & Aluminium	
Water Soluble Plastics	Glitter	<u>Bio sourced polymers</u>		Cardboard	Mono material spouted pouch
<u>Waxed &amp; Siliconised Paper</u>				Paper	
				Non Siliconised Glassine	

**Underlined denotes 2022 additions/updates** (Production for own brand products to cease by end of 2022)  
 \* Dependant on utilising coloured (jazz) recyclate only – no natural HDPE from food sources (to be reviewed annually with processors)  
 \*\* Complex laminates should only include a metallised layer where no alternatives are available  
 \*\*\* Easily separated in the recycling stream to maximise fibre recovery



## GOLDEN DESIGN RULES \*\*



### GOLDEN DESIGN RULE

#### Increase Recycling Value in Flexible Consumer Packaging

For flexible consumer packaging made mostly from plastic<sup>1</sup>:

1. Regional design guidelines to fit with existing recycling programmes<sup>2</sup> shall be met wherever possible.
2. For packaging that is not accepted by existing recycling programs, and where there is a clear pathway for a future recycling system by 2025<sup>3</sup>, the following requirements apply:
  - A. Maximise polyolefin content:
  - B. Preferably >90% mono PE, or >90% mono PP
  - C. Minimum either >80% mono PE, >80% mono PP or >80% mixed polyolefins
  - D. Density <1 g/cm<sup>3</sup>
  - E. Each barrier layer should not exceed 5% of the total packaging structure weight<sup>4</sup>
  - F. No PVC, PVDC, fibres, aluminium foil, PET

\* Courtesy of Tesco – Tesco Preferred Materials & Formats Guidelines – Feb 2022

\*\* The [Consumer Goods Forum](#) (CGF) has developed “[Golden Design Rules](#)” covering the vast majority of all plastic packaging

## DESIGN FOR RECYCLABILITY

### A MONO-PE STAND-UP POUCH SOLUTION

Multi-material laminates for pouches are NOT easy to recycle

➤ **SABIC® mono-PE solutions are designed for recyclability**  
The structure is based on a reversed printed BOPE film and laminated against a 5-layer blown PE co-extrusion film.



Mono PE resin based pouch for  
dish wash pods.  
Film thickness: 140 µm

Mono PE resin based pouch for  
dried pet food with zipper & tear notch.  
Film thickness: 140 µm



#### SUPERIOR OPTICS

High transparency and planarity of BOPE for (reversed) printing



#### MECHANICAL PERFORMANCE & MACHINABILITY

Comparable pouch forming & filling machinability + mechanical properties vs multi material laminates



#### EXCELLENT SEAL-ABILITY

Low Seal Initiation Temperature and seal through contamination sealing layer



#### SUPPORTING RECYCLABILITY

Full PE based film



#### AVAILABLE AS CERTIFIED RENEWABLE RESIN

Supporting our customers' sustainability goals

## DESIGN FOR RECYCLABILITY

### A PE BAG-IN-BOX SOLUTION WITHOUT PA

Laminates of Polyethylene (PE) films and Polyamide (PA) films are NOT easy to recycle

➤ **SABIC's film solution is based on PE resins - free from PA film** – and contributes to increased recyclability of bag-in-box films



#### SUPERIOR FLEX CRACK- & PUNCTURE RESISTANCE

A reliable flexible packaging that protects the content from flex cracking and puncture hazards. Avoiding exposure to external factors such as air, moisture, bacteria, pressure and friction.



#### EXCELLENT SEALING PROPERTIES

Avoiding leakage and reducing bag failures during handling and transportation



#### BARRIER CONTRIBUTION

EVOH in core layer contributes to preserve the content.



#### SUPPORTING RECYCLABILITY

Mono-material solution for the bag, easy separation of the bag from the box



#### AVAILABLE AS CERTIFIED RENEWABLE RESIN

Supporting our customers' sustainability goals

TRUCIRCLE™ PROGRAM

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# DESIGN FOR RE-USE



# SABIC'S RESIN SOLUTIONS FOR RE-USABLE PRODUCTS

## Polyethylene



M80064S / M864SE / M453SE

Crates & Boxes

ICP4907S

Intermediate Bulk Containers



ICP5602 / ICP5703

Drums

B5823 / B5822

Homecare bottles



M80064S / M864SE / M453SE

Pallets



## Polypropylene



QR674K / RA12MN40

Food containers

PP-UMS

Re-usable e-commerce packaging



QR674KC

Straws

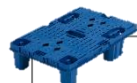
QR673K

Baby bottles



PHC27 / 48M10 / 87MK40T

Crates, boxes and pallets



## ETP



PK2870

5 gallon bottles

164R

Containers  
(refillable milk containers, food containers)



7062(X)

Mugs

164/144

Cereal boxes



164/144

Festival cups

TRUCIRCLE™ PROGRAM

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# MECHANICALLY RECYCLED PRODUCTS

## MAIN CHALLENGES IN THE VALUE CHAIN



### KEY CHALLENGES FOR PCR\* COMPOUNDS:

- Feedstock availability
- Consistent raw material quality
- Odor & color consistency
- Process-ability
- Mechanical properties & performance of end product
- Product safety



COLLECTION



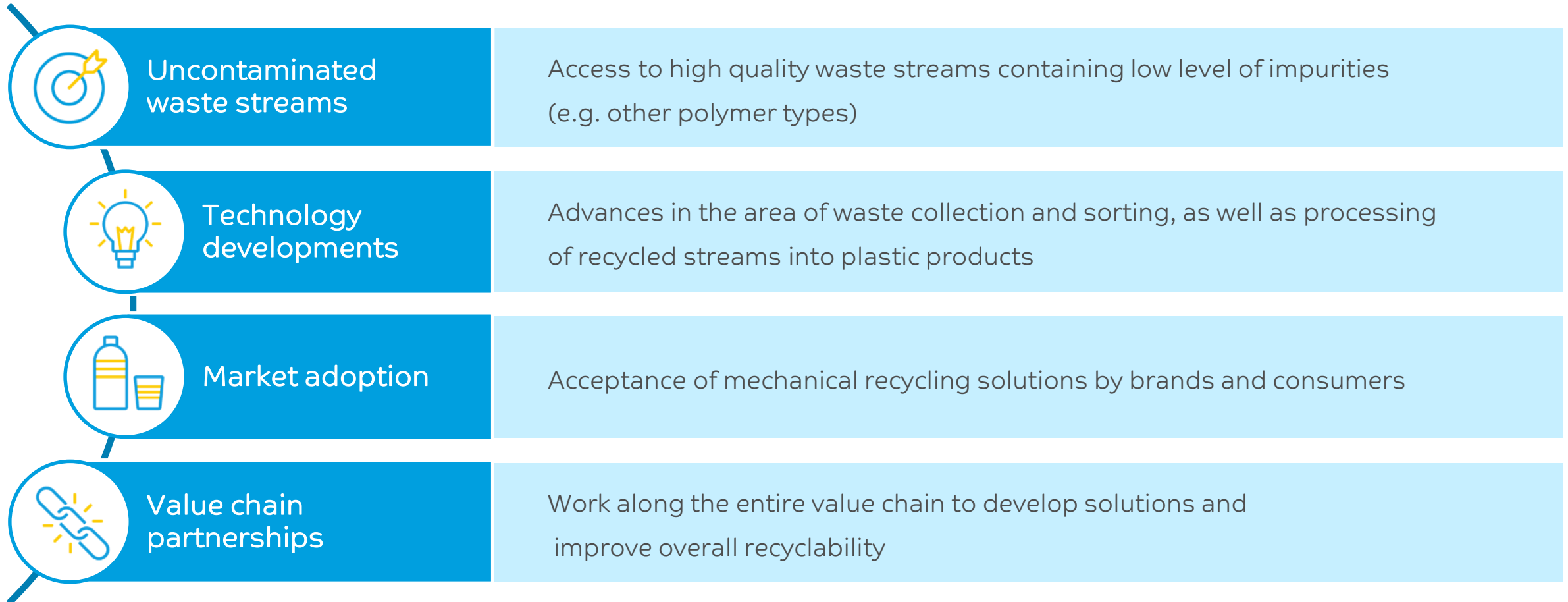
SORTING



RECYCLING

➤ Need for innovative technologies to develop sustainability solutions

## KEY ENABLERS DRIVING PLASTIC MECHANICAL RECYCLING IMPLEMENTATION



Let's **THINK AND WORK TOGETHER** to address main challenges on mechanical recycling

## PCR COMPOUNDS VERSUS BOOSTER RESINS



### PCR COMPOUNDS

Recycled content up to 70% PCR

Consistent quality: homogenous compound (PCR + virgin)

Ready to use: elimination of compounding step at customer

Compounded by SABIC or by SABIC's PCR supplier partner

### BOOSTER RESINS

Virgin resins designed to enable PCR addition without compromising on processing and material quality

Improve process-ability and end-use properties with maximum amount of PCR

Designed based on application requirements

PCR to be sourced and blended by convertor

# WIDE RANGE OF PCR COMPOUNDS BEING DEVELOPED FOR DIFFERENT INDUSTRIES

## ON-SHELF COLLATION SHRINK FILM

### SABIC® LDPE COMPOUND

Containing up to 70% PCR  
Uniform shrinkage  
Similar processing to virgin resin



## NEW PORTFOLIO FOR AUTOMOTIVE

### SABIC® PP COMPOUNDS & PC-blends (LEXAN™, XENOY™ and CYCOLOY™ resins)

From 25 to 50 % mechanically recycled polymer  
Excellent performance similar to incumbent virgin resin  
CO<sub>2</sub> footprint reduction from 10 to 50%  
Available in EUR and AMR



## HOUSEHOLD, IND. & CHEMICAL PACKAGING

### SABIC® HDPE COMPOUND

Containing up to 50% PCR  
Strong ESCR performance  
Potential for light weighting



## DEDICATION FOR ELECTRIC & ELECTRONICS

### ETP COMPOUNDS: LEXAN™, XENOY™ and CYCOLOY™ resins

Containing up to 30% PCR content  
UL certified



 Wide range of PCR compounds being developed for different industries

# RECYCLED OCEAN PLASTIC XENOY™ RESIN

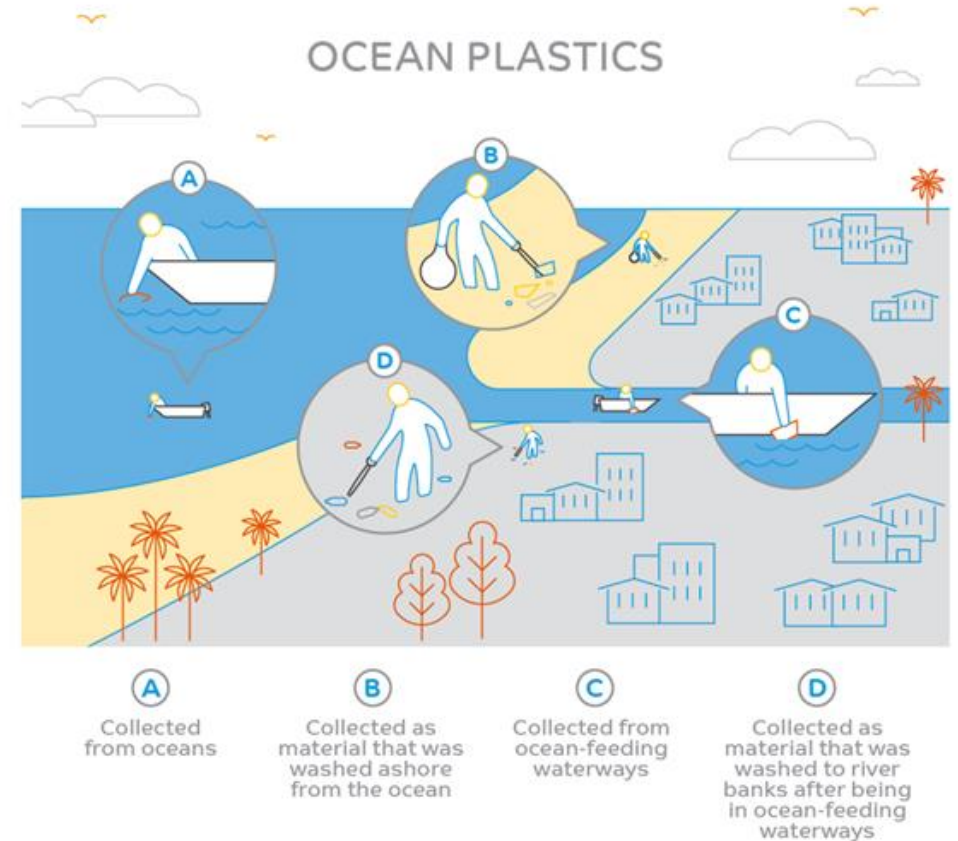
## XENOY™ PC/PET COMPOUND COMPRISING 20% RECYCLED OCEAN PLASTIC PET BLENDED WITH POLYCARBONATE

For every 1kt of product containing recycled ocean plastic XENOY™ PC/PET compound, an equivalent of 24 million single-use 0.5 liter PET water bottles are potentially removed from our oceans\*



### Microsoft Ocean Plastic Mouse

Exterior shell of this eco-friendly mouse is made with 20% recycled ocean plastic.



➤ A breakthrough in materials technology that begins with the removal of plastic waste from oceans and waterways

\* according to an internal SABIC LCA study, which has not undergone 3<sup>rd</sup> party critical review

Images courtesy of Microsoft

# VALUE DRIVERS OF PCR COMPOUNDS & BOOSTERS

## PCR COMPOUNDS

- Batch-to-batch consistency
- Less complexity
- Elimination of compounding step

## BOOSTERS

- Flexibility in PCR selection
- Works with broad quality range of PCRs
- Enables maximizing PCR content

## POSITIVE BRAND EXPERIENCE

- Brand attractiveness and loyalty
- Create positive social impact
- Attracting new or regain customers

## REDUCED CARBON FOOTPRINT

- Enabling CO<sub>2</sub> emission reductions

## MEETING SUSTAINABILITY TARGETS

- Supporting customers in addressing corporate sustainability goals



Risk reduction



Value increase



Societal impact



Cost reduction

MECHANICAL  
RECYCLING



Individualization

## TAILOR MADE SOLUTIONS

- To maximize PCR content

## INCLUDES MIN 30% PCR

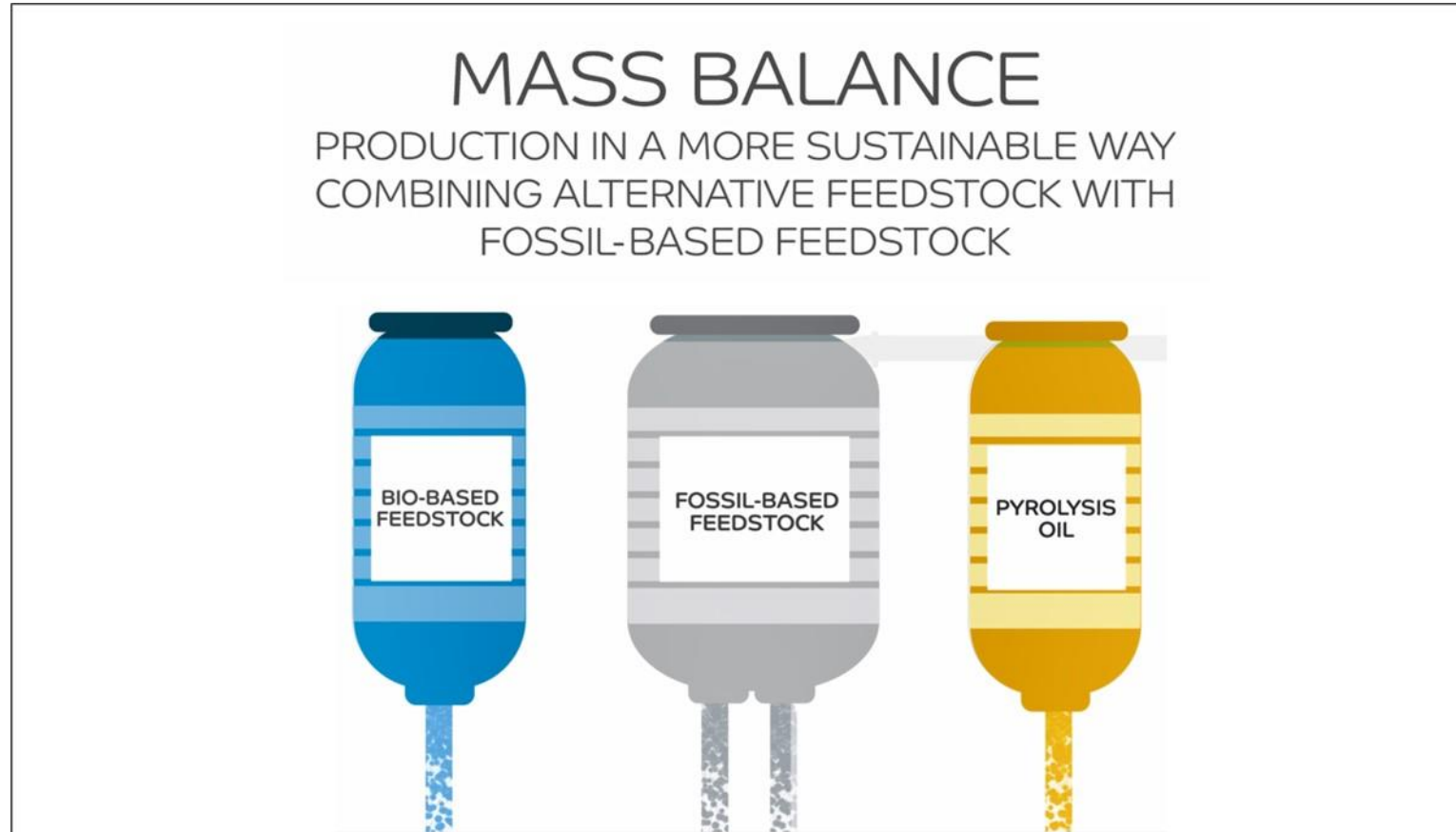
- Avoiding or reducing future plastic taxes
- Limiting risk of EPR penalty\*

Complementary TRUCIRCLE™ solution



# MASS BALANCE CONCEPT

## ACCEPTANCE OF THE MASS BALANCE CONCEPT IS A VITAL STEP



MASS BALANCE IS A SYSTEM WHERE THERE IS A CERTIFIED BALANCE BETWEEN THE AMOUNT OF 'INPUT MATERIAL' INTO A PROCESS AND THE AMOUNT OF 'OUTPUT MATERIAL' FROM THE PROCESS

## WHY MASS BALANCE APPROACH ?



Picture: Naphtha Cracker 4 (Geleen, the Netherlands)



- A **CRUCIAL BRIDGE** between today's linear economy and the sustainable circular plastics economy of the future
- The **RELATIVELY SMALL VOLUMES** of alternative feedstock have to be **MIXED with conventional fossil-based feedstock**
- An innovative & **CRUCIAL INSTRUMENT** to stimulate the **FULL TRANSITION TO NEW FEEDSTOCK** in SABIC's current world-scale production units
- The **MASS BALANCE & CERTIFICATION CONCEPT** allows us to **USE EXISTING COMMERCIAL ASSETS** to convert our products
- **TRACEABILITY / VERIFICATION OF CORRECT MASS BALANCE HANDLING OF INFORMATION**; incoming alternative feedstock and outgoing product

## 'ISCC PLUS' CERTIFICATION

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### INTERNATIONAL SUSTAINABILITY AND CARBON CERTIFICATION PLUS



#### ACTIVITIES

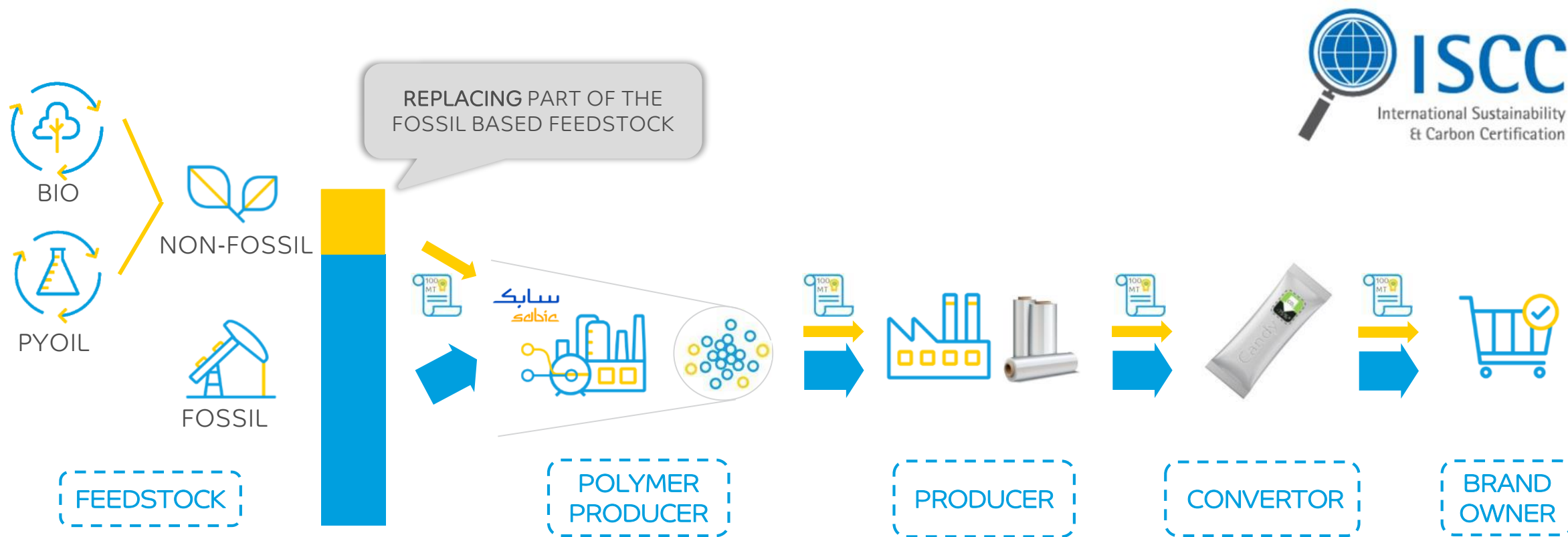
- supports the circular and bio-based economy by offering a [certification that promotes an environmentally, socially and economically sustainable production](#)
- provides credible sustainability certification [for all types of agricultural and forestry raw materials, waste and residues, non-bio renewables, recycled carbon materials and the respective supply chains](#) and is a leading global certification scheme for the bio-based and circular economy

#### INDEPENDENT 3<sup>rd</sup> PARTY CERTIFICATION BODIES accredited by ISCC

- ensure [compliance with the mass balance chain of custody](#)
- certification process can be completed in [3 months](#)

→ Upon request SABIC will send a [sustainability statement](#) along with its certified renewable / circular polymers

# TRACEABILITY OF CERTIFIED PE, PP AND PC SOLUTIONS

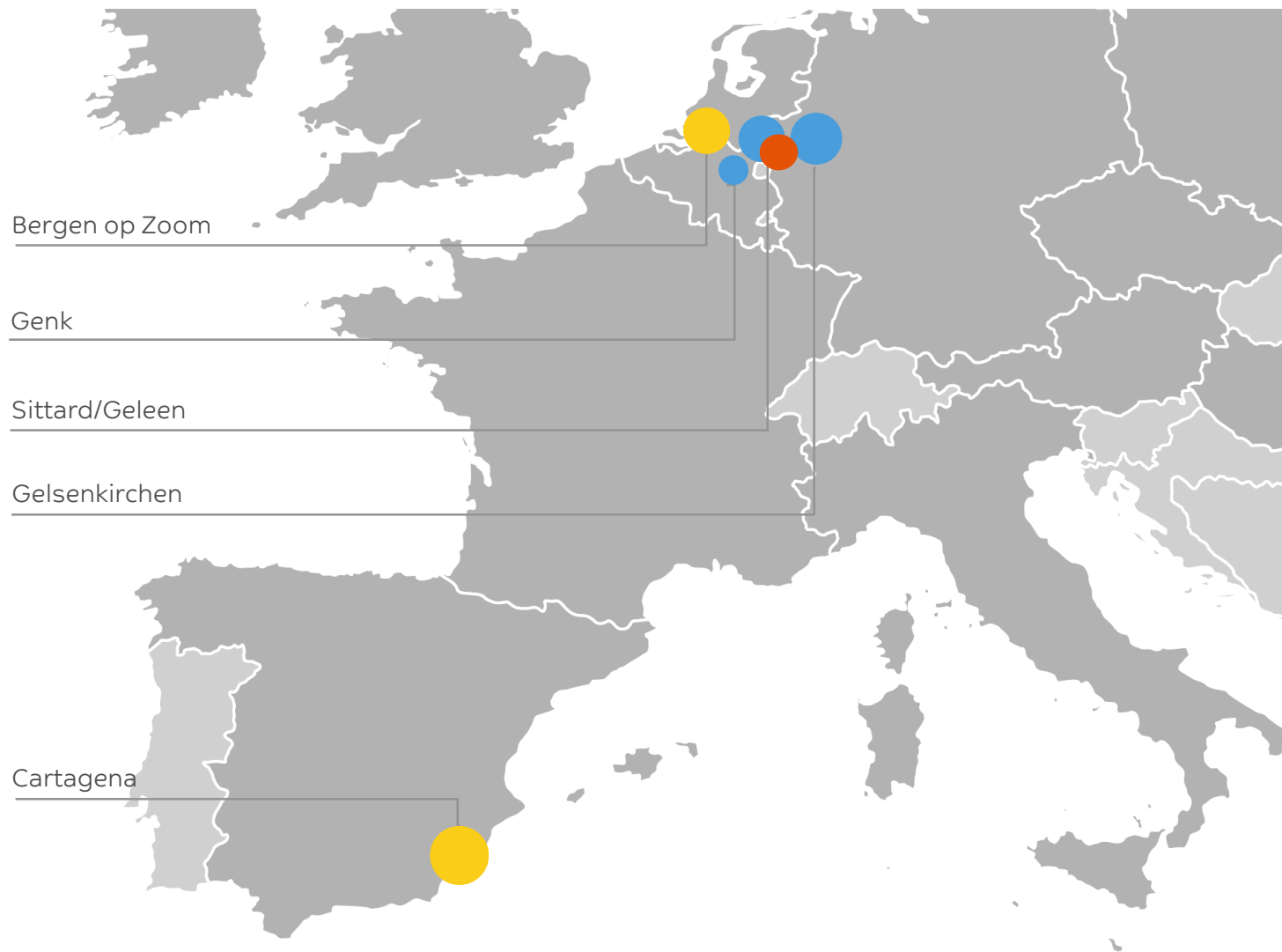


## CERTIFICATION BY MASS BALANCE CHAIN OF CUSTODY

# EUROPEAN PRODUCTION PLANTS FOR CERTIFIED TRUCIRCLE™ PRODUCTS

## CERTIFIED PRODUCTION PLANTS

- PE / PP
- ETP
- Steam cracker



# AMERICAS PRODUCTION PLANTS FOR CERTIFIED TRUCIRCLE™ PRODUCTS

## CERTIFIED PRODUCTION PLANTS

- PE
- PP
- ETP
- REFINERY

CURRENT

FUTURE

*MOUNT VERNON (PENDING)*

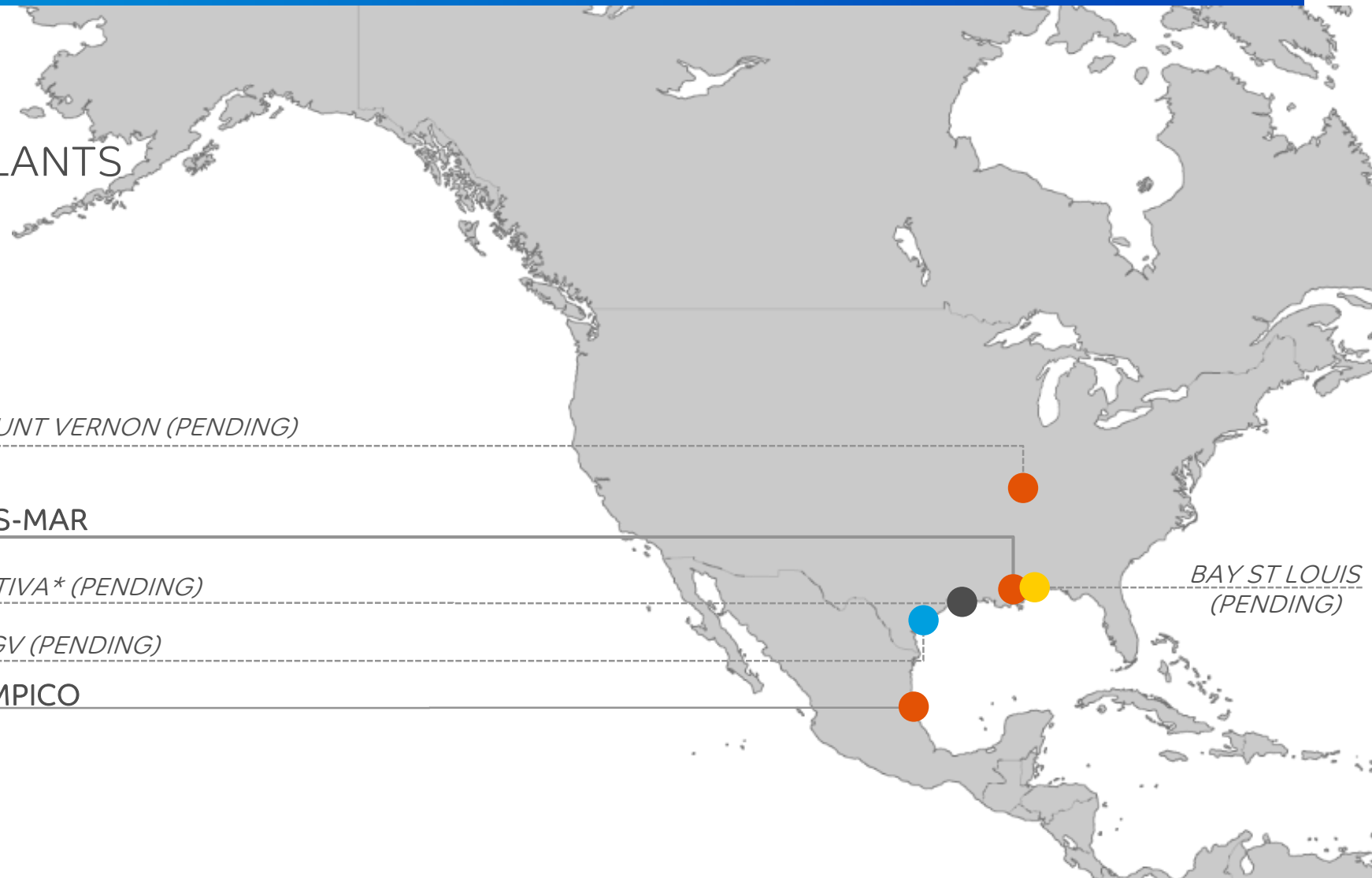
**COS-MAR**

*MOTIVA\* (PENDING)*

*GCGV (PENDING)*

**TAMPICO**

*BAY ST LOUIS (PENDING)*



\*Motiva is a fully owned affiliate of Aramco, which owns a majority share of SABIC.

# AMERICAS SALES OFFICES FOR CERTIFIED TRUCIRCLE™ PRODUCTS

## CERTIFIED SALES OFFICES

SABIC PETROCHEMICALS CANADA

SABIC AMERICAS\*

SABIC INNOVATIVE PLASTICS US

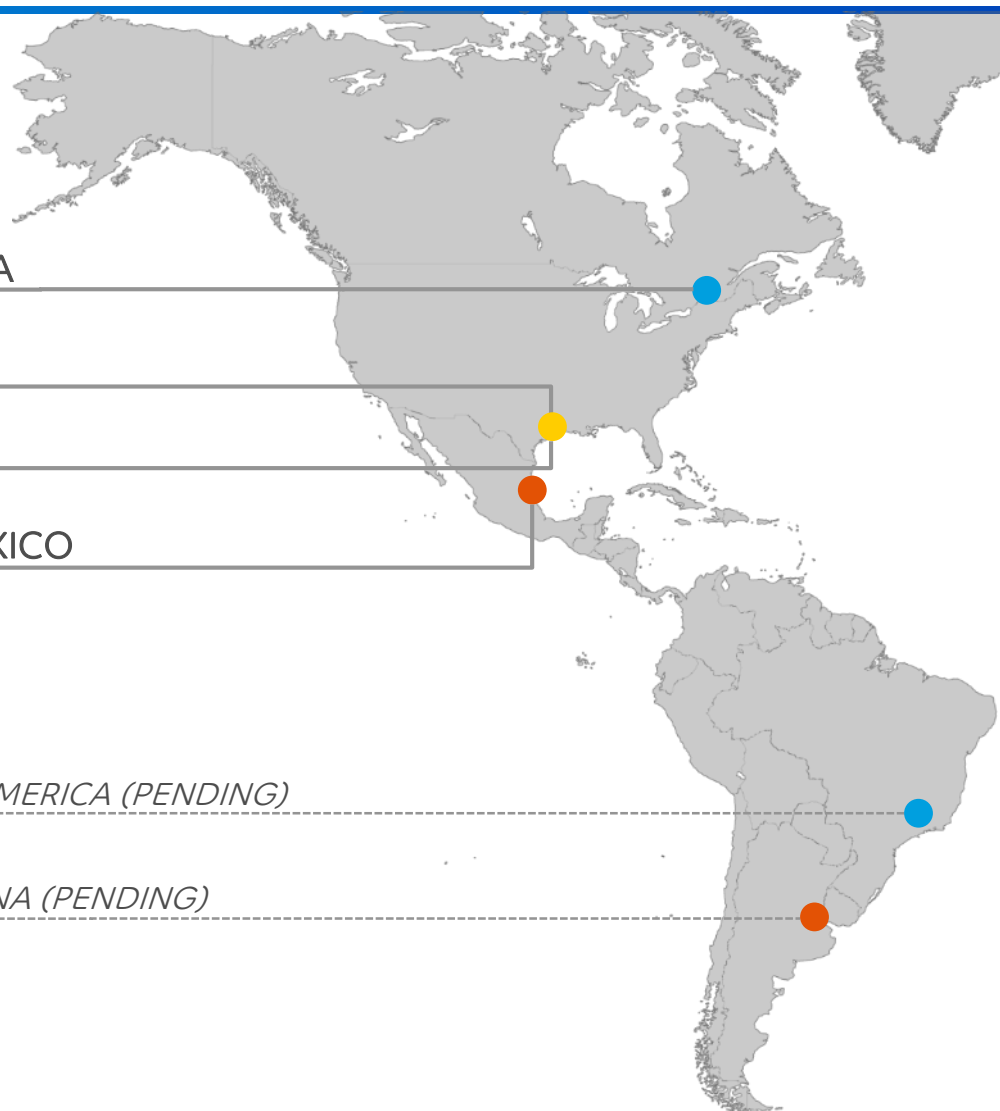
SABIC INNOVATIVE PLASTICS MEXICO

*SABIC INNOVATIVE PLASTICS SOUTH AMERICA (PENDING)*

*SABIC INNOVATIVE PLASTICS ARGENTINA (PENDING)*

CURRENT

FUTURE



\* For select PP and PE products.

Legal entities: SABIC Americas LLC, SABIC Innovative Plastics (SIP) US LLC, SIP Mexico S. de R.L. de C.V, SIP Argentina S.R.L., SIP South America Industria e Comercio de Plasticos Ltda., and SABIC Petrochemicals Canada Inc.



# MEAF PRODUCTION PLANTS FOR CERTIFIED TRUCIRCLE™ PRODUCTS

## CERTIFIED PRODUCTION PLANTS

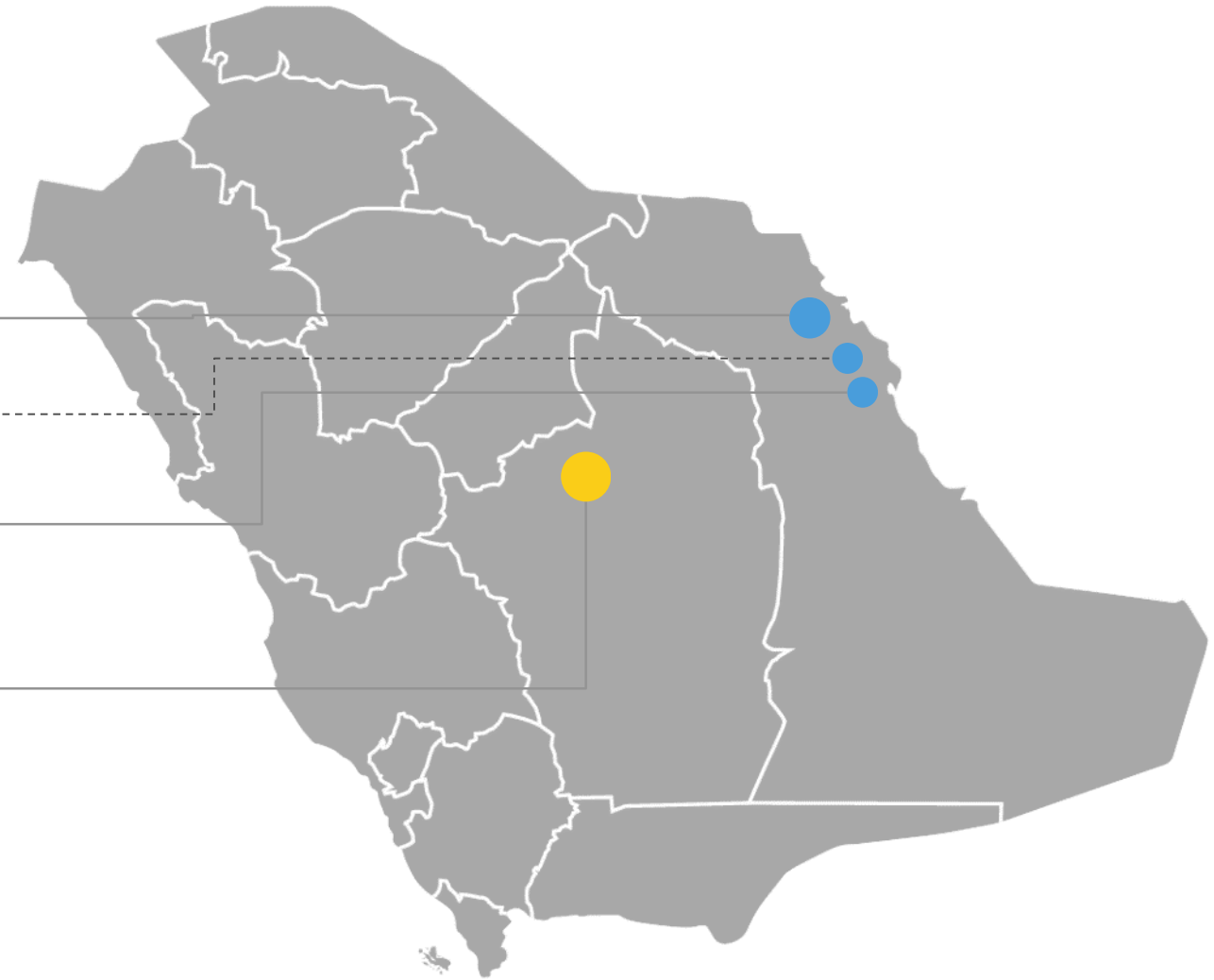
- PE / PP
- Sales office

PETROKEMYA (CERTIFIED)

SAUDI KAYAN (PENDING)

IBN ZAHR (CERTIFIED)

SABIC HQ (CERTIFIED)



CURRENT

FUTURE

## CONTRIBUTIONS OF CERTIFIED POLYMERS

### CERTIFIED RENEWABLE POLYMERS

Contributes to

- A BIO-BASED ECONOMY
- FOSSIL FEEDSTOCK AVOIDANCE
- CAPTURES CO<sub>2</sub> FROM ATMOSPHERE



Resins and chemicals from bio-based feedstock that are not in direct competition with the human food chain and help to mitigate climate change

### CERTIFIED CIRCULAR POLYMERS

Contributes to

- WASTE MANAGEMENT
- FOSSIL FEEDSTOCK AVOIDANCE
- CO<sub>2</sub> EMISSION AVOIDANCE VS INCINERATION

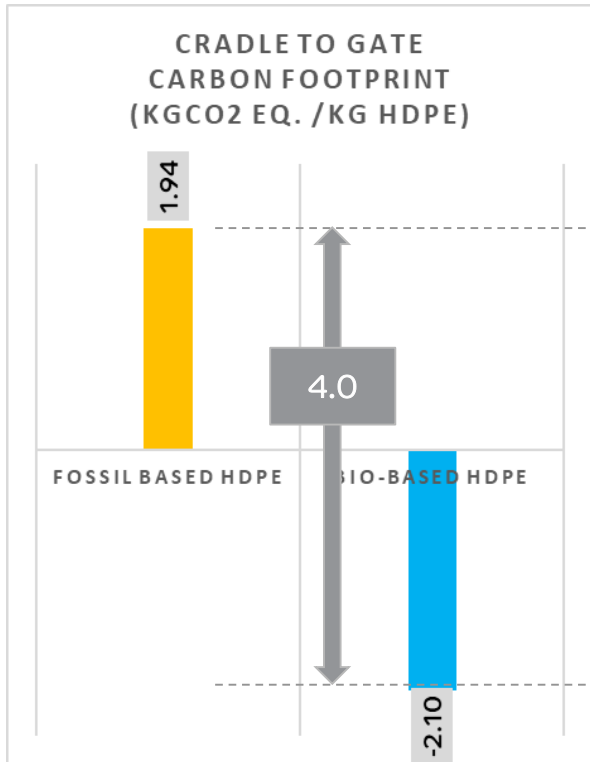


Virgin resins and chemicals from difficult to recycle plastic waste streams produced through feedstock recycling



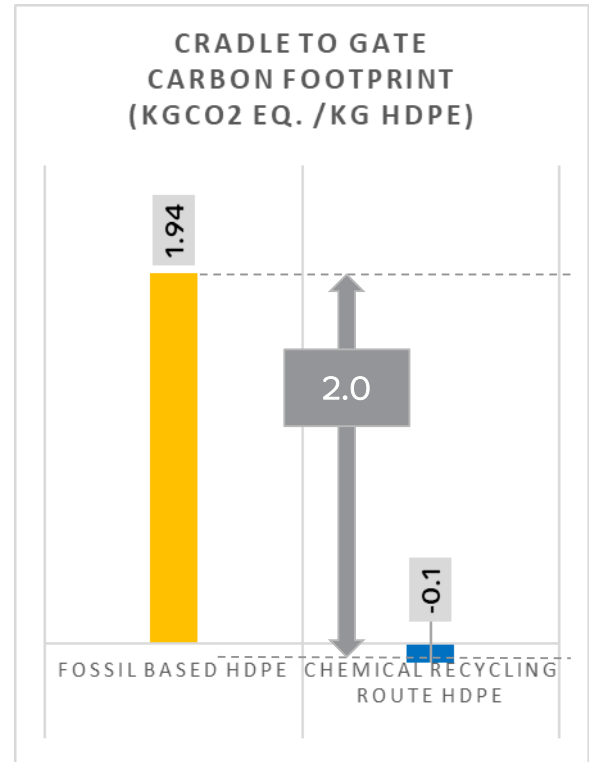
# LCA CONSIDERATIONS

## CERTIFIED RENEWABLE POLYMERS



Based on results of “Cradle to Gate” study on **SABIC certified renewable polymers**, carbon footprint reduction is about 4 kilograms of CO<sub>2</sub> per kilogram of resin in comparison to fossil route to HDPE\*.

## CERTIFIED CIRCULAR POLYMERS



Based on results of “Cradle to Gate” study on **SABIC certified circular polymers**, carbon footprint reduction is about 2 kilograms of CO<sub>2</sub> for every kilogram of polyolefins produced via chemical recycling route in comparison to fossil route\*.

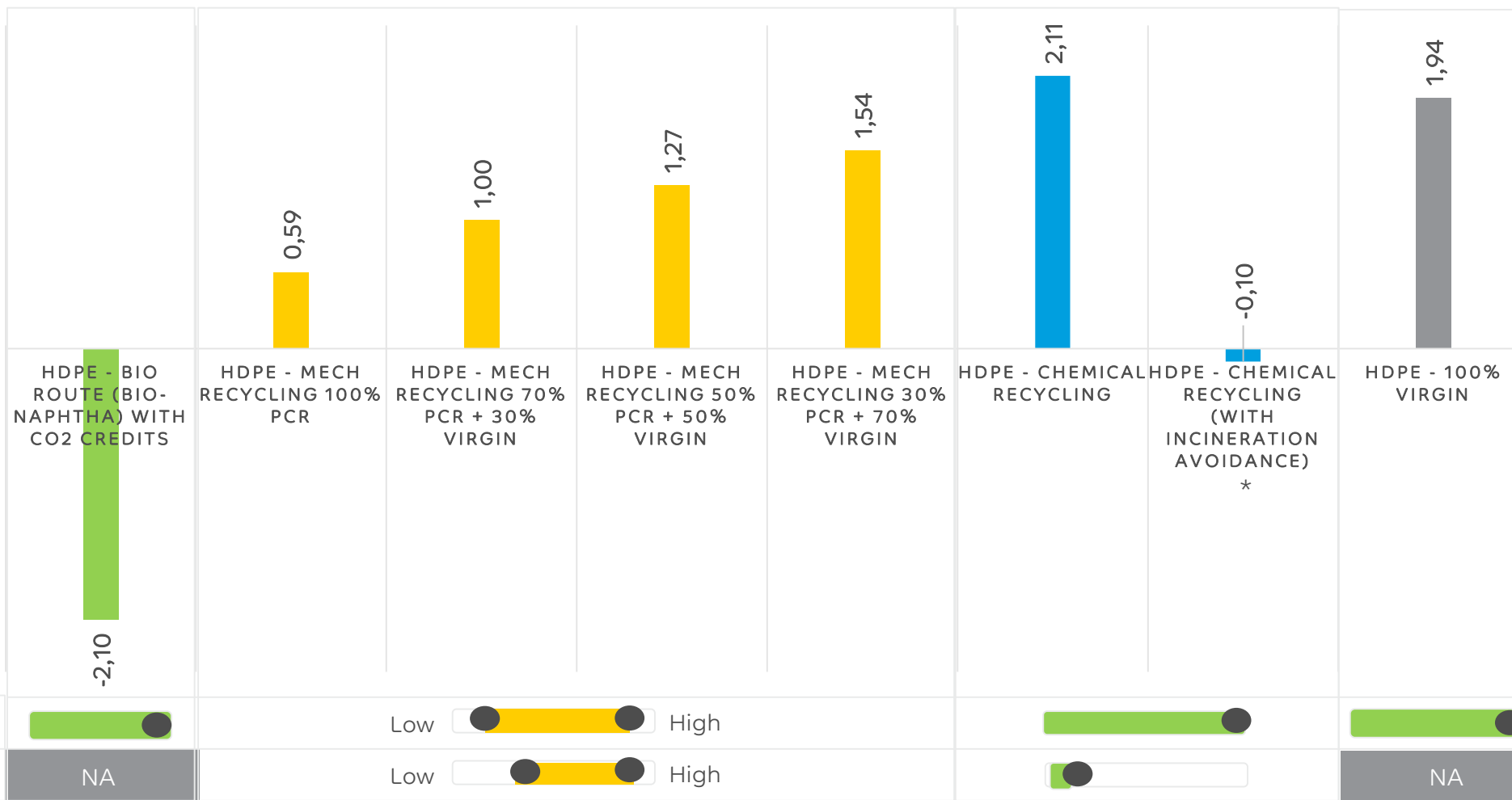
This reduction includes the benefit realized from avoidance of mixed plastic waste diversion to energy recovery.

➤ Other polyolefins show the same relative effect, but with slightly different absolute footprints

\* The above studies have successfully passed ISO Critical Review

# CARBON FOOTPRINT COMPARISON – VARIOUS ROUTES

CARBON FOOTPRINT, CRADLE TO GATE  
(KG CO2 EQ./ KG PRODUCT)



Data source: Franklin Associates, a division of Eastern Research Group, December 2018

\* This reduction includes the benefit realized from avoidance of mixed plastic waste diversion to energy recovery.

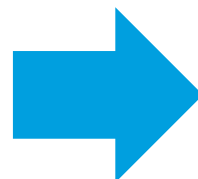
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# CERTIFIED CIRCULAR POLYMERS

THINK OF ...

# PREVENTING PLASTIC PACKAGING



FROM BECOMING WASTE



## THE STARTING POINT FOR SABIC

# NO COMPROMISE ON PACKAGING SAFETY



**SUPPORTS COMPLIANCE  
WITH REGULATIONS\***



**HELPS LIMIT THE POTENTIAL  
MIGRATION OF UNKNOWN  
SUBSTANCES**

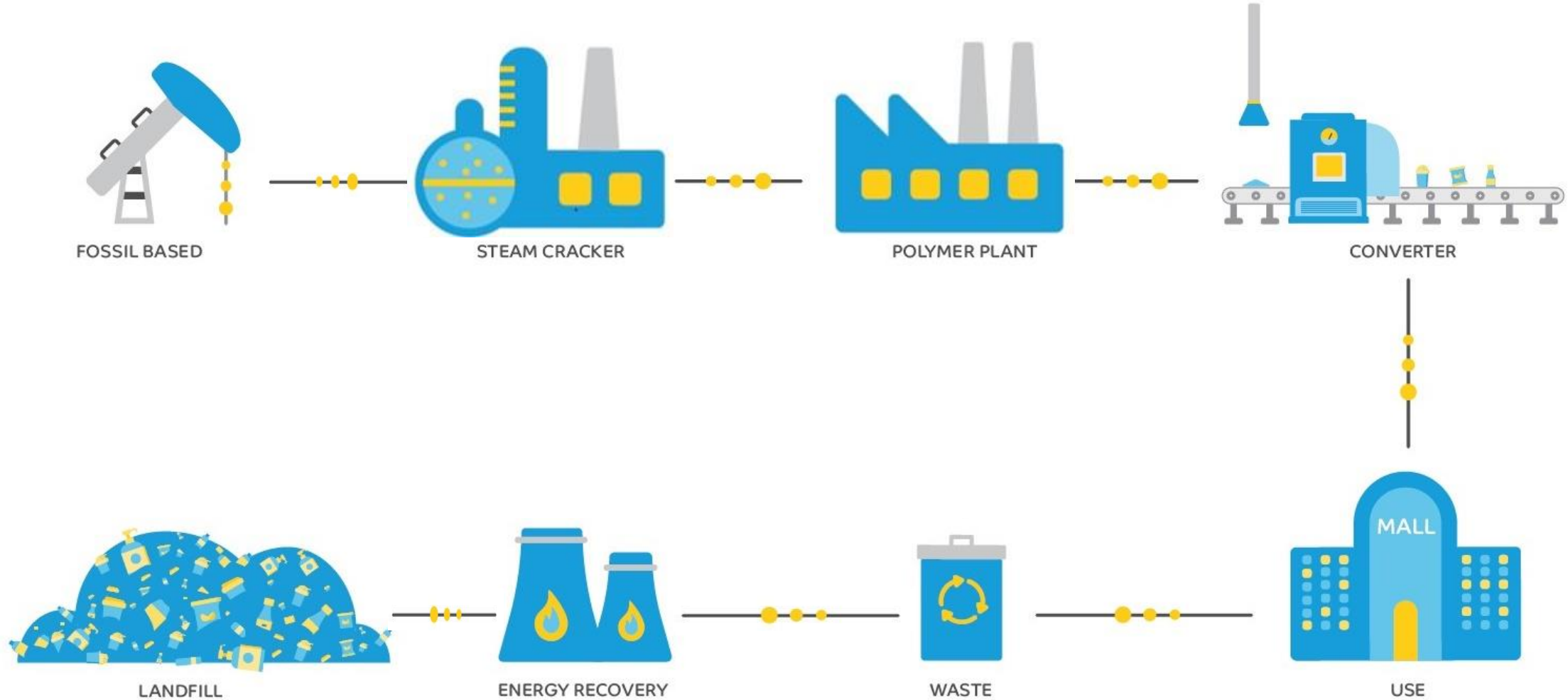


**OFFERS ORGANOLEPTIC  
PERFORMANCE**



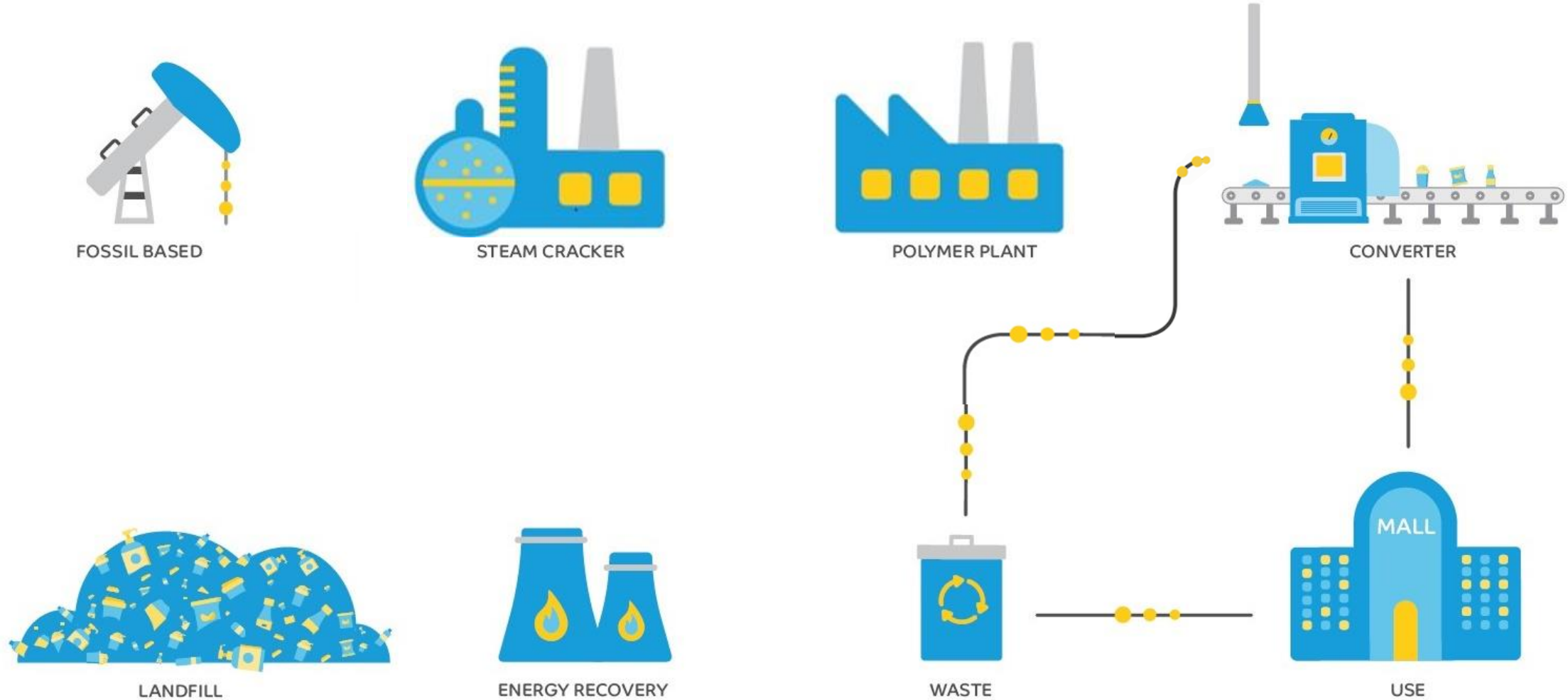


# PLASTIC WASTE TO FEEDSTOCK FOR POLYMERS: FROM LINEAR TO CIRCULAR



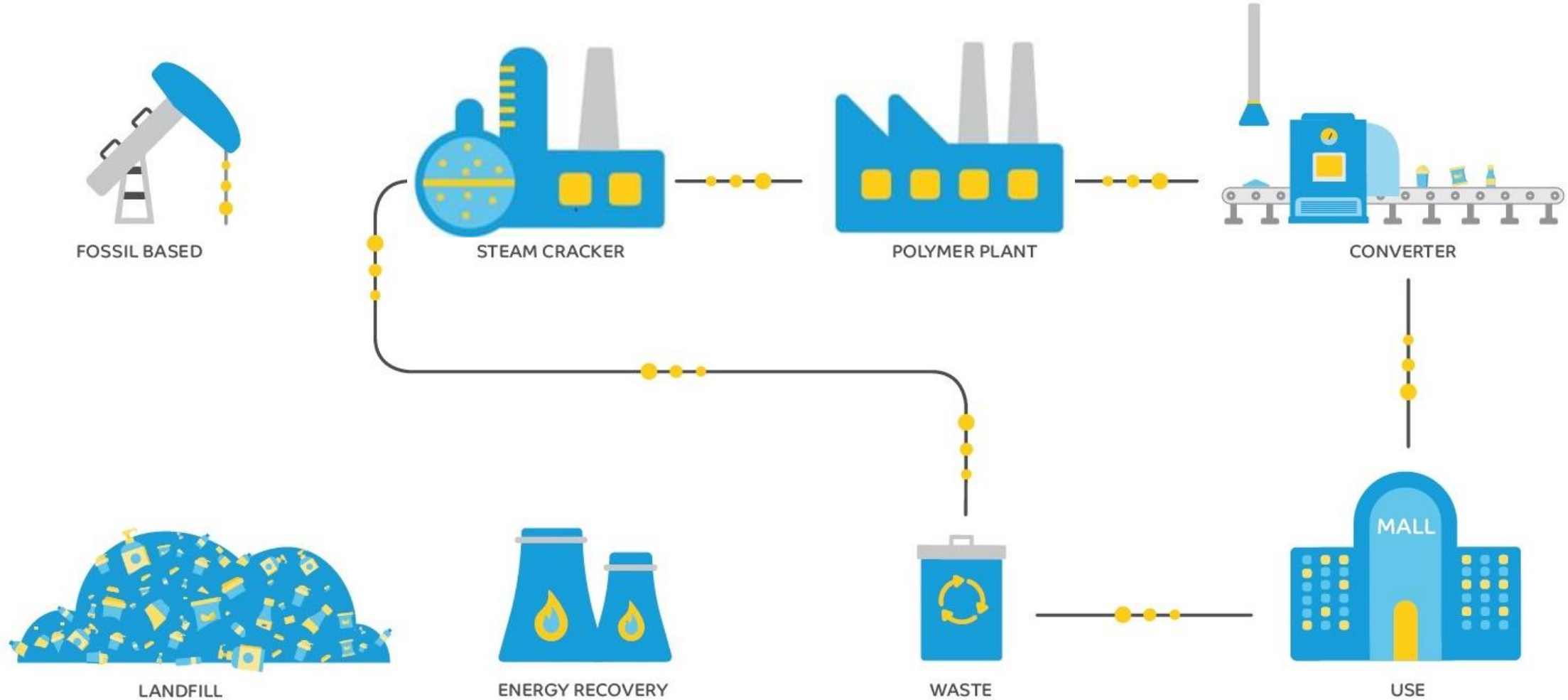
**THE CURRENT MODEL CAUSES MOST OF OUR NATURAL RESOURCES TO END UP IN LANDFILL**

# PLASTIC WASTE TO FEEDSTOCK FOR POLYMERS: FROM LINEAR TO CIRCULAR



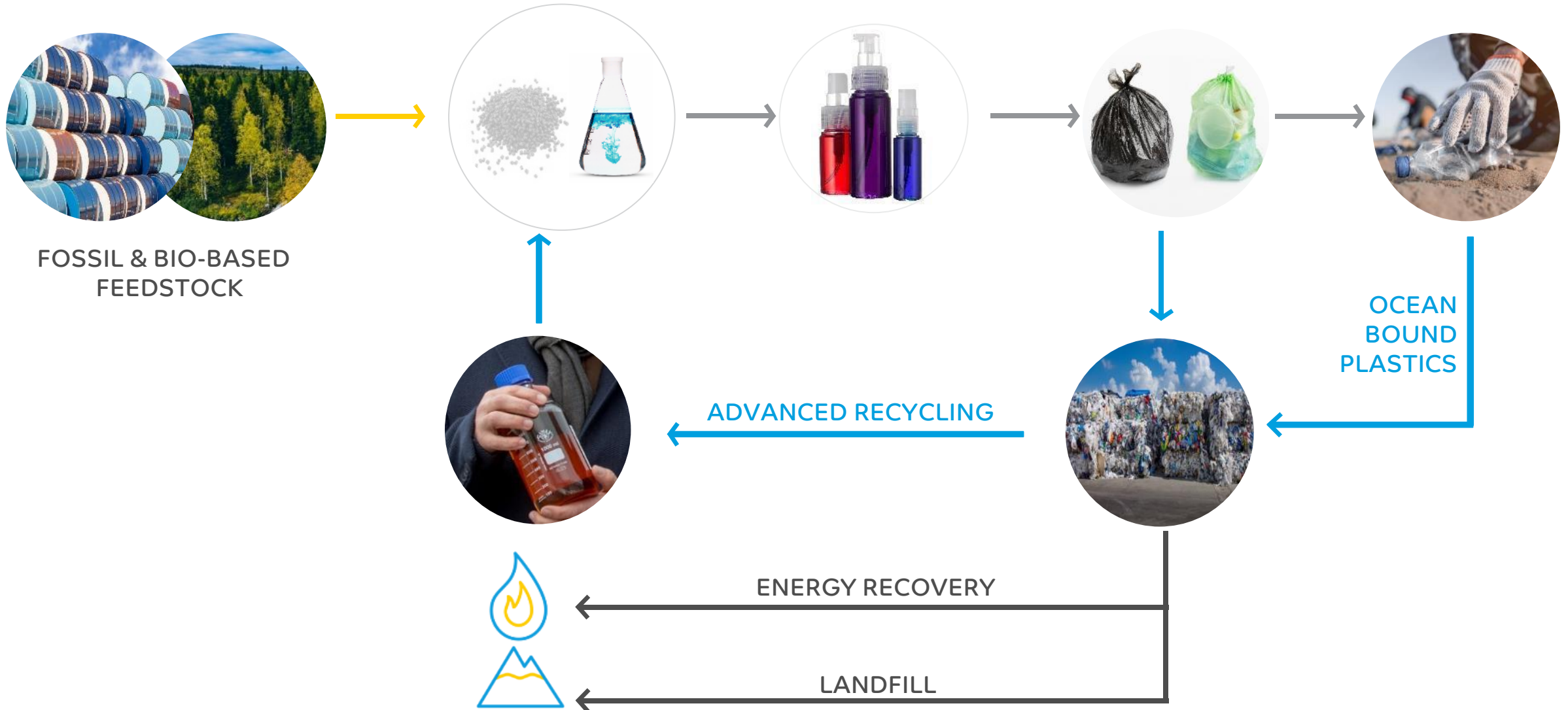
**MECHANICAL RECYCLING IS CURRENTLY LIMITED BY PRODUCT PROPERTIES**

# PLASTIC WASTE TO FEEDSTOCK FOR POLYMERS: FROM LINEAR TO CIRCULAR



**ADVANCED RECYCLING CREATES FEEDSTOCK FROM DIFFICULT-TO-RECYCLE-PLASTICS**

# THE CONCEPT "FROM LINEAR TO CIRCULAR"



\* Simplified process

## BENEFITS OF ADVANCED RECYCLING

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## SUPPORTING CUSTOMERS IN ADDRESSING CORPORATE SUSTAINABILITY GOALS SABIC'S CERTIFIED CIRCULAR POLYMERS



### VERSATILE

NO COMPROMISE ON PRODUCT PROPERTIES  
BIG WINDOW OF APPLICATIONS, INCLUDING F&B CONSUMER PACKAGING, E&E, PERSONAL CARE, AUTOMOTIVE, ...



### DROP-IN SOLUTION

IDENTICAL PRODUCT SPECIFICATIONS TO OUR CURRENT POLYOLFIN GRADE PORTFOLIO  
PROCESS ON EXISTING EQUIPMENT WITHOUT MODIFICATIONS  
DOWN GAUGING OPPORTUNITIES (COMPARED TO MECHANICAL RECYCLING)



### TRULY RECYCLABLE

NO LIMITATIONS IN NUMBER OF RECYCLING STEPS

# SABIC TO GROW **CIRCULAR** PRODUCTS TO >200 KTA IN EUROPE TO REMAIN LEADING POSITION IN ADVANCED RECYCLING



## Market foundation stage

- Direct processing of pyrolysis oil fraction via blending
- SABIC first and leader in certified circular products
- Start advocacy for material recycling



## Commercial unit phase 2023

- ~15-20 kta of raw pyrolysis oil into circular products
- Partners: Plastic Energy & Haldor Topsoe



## World scale phase $\geq$ 2025

- >200 kta of circular products
- Legislative framework fully supporting chemical recycling

## ADVANCED RECYCLING UNIT

# WORLD'S FIRST COMMERCIAL UNIT FOR THE ADVANCED RECYCLING OF USED PLASTIC

- SABIC and Plastic Energy are over one year into the construction of world's first commercial unit to significantly upscale production of **SABIC's certified circular polymers** derived from used plastic
- Considerable milestone on the journey towards **closing the loop** and creating a **circular economy** for plastics
- This pioneering project in Geleen, The Netherlands is expected to get **mechanical completion in Q1 2023**.



# PIONEERING PROJECT

## ADVANCED RECYCLING UNIT



### HYDROTREATMENT PLANT



### PYROLYSIS PLANT





# VALUE DRIVERS OF CERTIFIED CIRCULAR POLYMERS



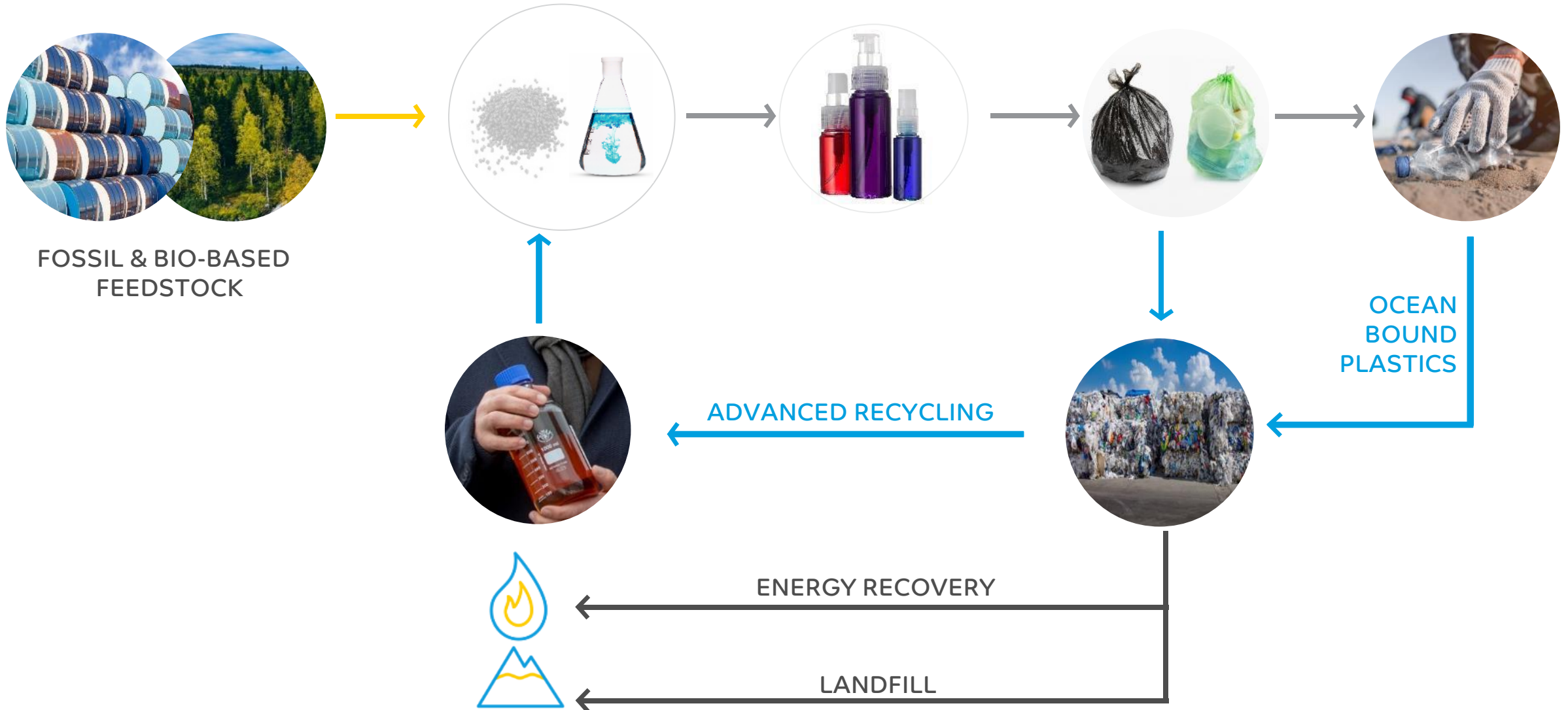
\* Subject to jurisdiction

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# OCEAN BOUND PLASTICS

# ADDRESSING LEAKAGE OF WASTE AND CLOSING THE LOOP



\* Simplified process

# OUR JOINT SOLUTION: PACKAGING WITH OCEAN BOUND PLASTICS

## OCEAN BOUND PLASTICS:

Used mixed plastics that have been collected from land and river areas that are *at risk of flooding the plastic waste into the ocean* as proper disposal facilities are lacking.

→ areas A, B, and C

## AREA WHERE WE MAKE IMPACT:

Collected from South-East Asian beaches and islands under ethical conditions, which are audited.



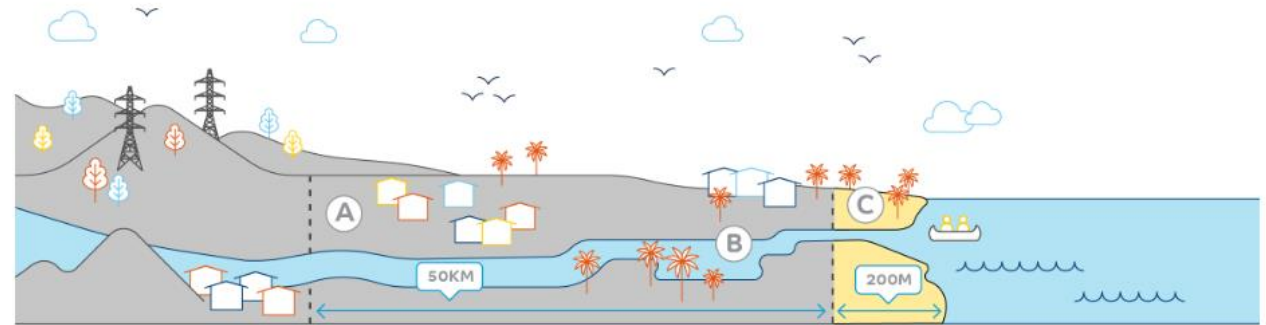
## CERTIFICATION:

Certified by Zero Plastic Oceans under the OBP Certification Program.

[www.obpcert.org/ocean-bound-plastic-certifications/](http://www.obpcert.org/ocean-bound-plastic-certifications/)



## OCEAN BOUND PLASTICS



A

Areas up to 50km inland where waste is mismanaged

B

Waterways and 200m either side of a river stream

C

Shorelines within 200m of the highest tide limit

Source: <https://www.obpcert.org/what-is-ocean-bound-plastic/>

# COMPARING CERTIFIED CIRCULAR POLYMERS FOR DIFFERENT ORIGIN: USED MIXED PLASTICS VS OCEAN BOUND PLASTICS

**Current offering:** based on USED MIXED PLASTICS sourced from Europe

Used mixed plastic diverted from potential incineration: certified circular polymers

## USED MIXED PLASTICS

Pressing environmental challenges in Europe

- Climate change
- Linear economy

**New offering:** based on OCEAN BOUND PLASTICS sourced primarily in Malaysia (MY)

Potential benefits OBP feedstock are:

- Increased collection and recovery in remote regions
- Diverts used plastic entering into oceans.  
Potential to reduce marine littering
- Promotes circular economy
- Reduce fossil resource usage

## OCEAN BOUND PLASTICS

Pressing environmental challenges in South East Asia

- Marine litter / Ocean pollution

# VALUE DRIVERS OF CERTIFIED CIRCULAR POLYMERS (FROM OBP)

## DROP-IN SOLUTION

- Approx. time-to-market < 6 months
- Shortened qualification round
- Easy upscaling

## EQUAL PACKAGING PROPERTIES

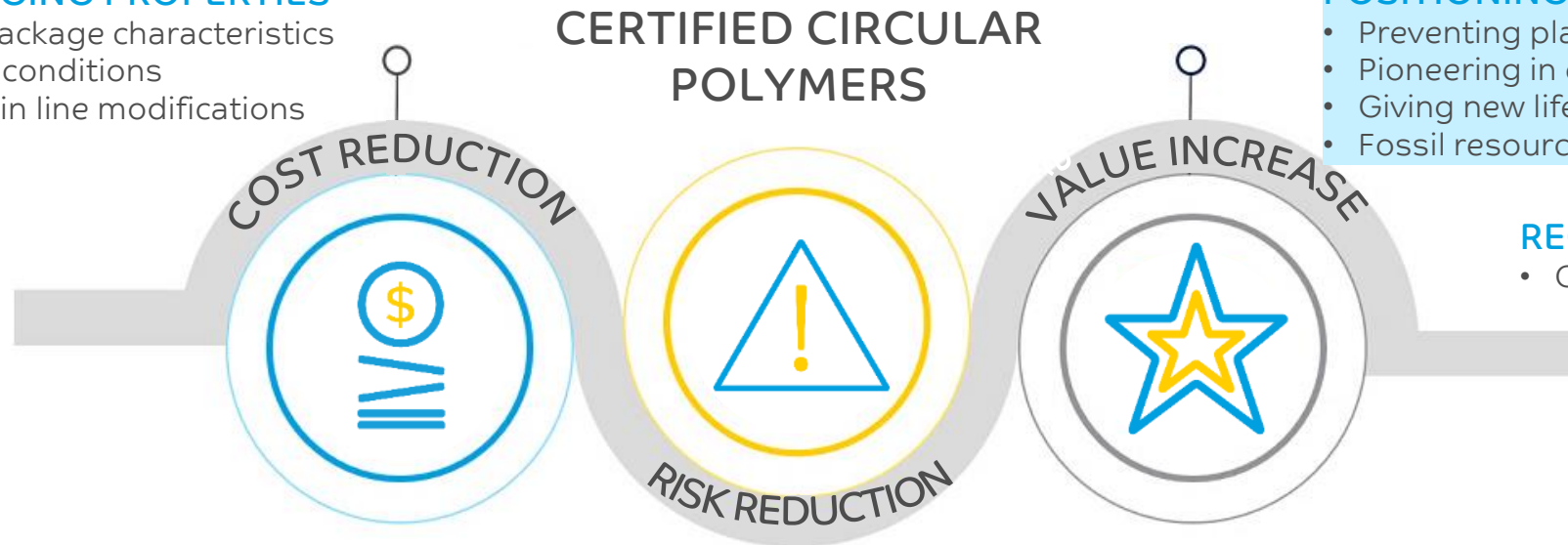
- No change in package characteristics and packaging conditions
- No investment in line modifications required

## POSITIVE BRAND EXPERIENCE

- Improved consumer satisfaction
- Brand attractiveness and loyalty
- Create positive social impact
- Attracting environmentally conscious customers

## POSITIONING

- Preventing plastics from entering the oceans
- Pioneering in environmental clean up
- Giving new life to ocean bound plastic
- Fossil resource savings



## RECYCLABLE PACKAGE

- Can be recycled and used again

## ALTERNATIVE FOR VIRGIN RESINS

- Supporting PCR content pledge
- Limiting risk of EPR penalty\*

## SAFETY

- Meeting certain Food Contact safety regulations
- No compromise on properties compared with virgin resins

## COLOR

- Consistent
- No deviation

## SIMPLICITY

- Global solution
- Less complexity

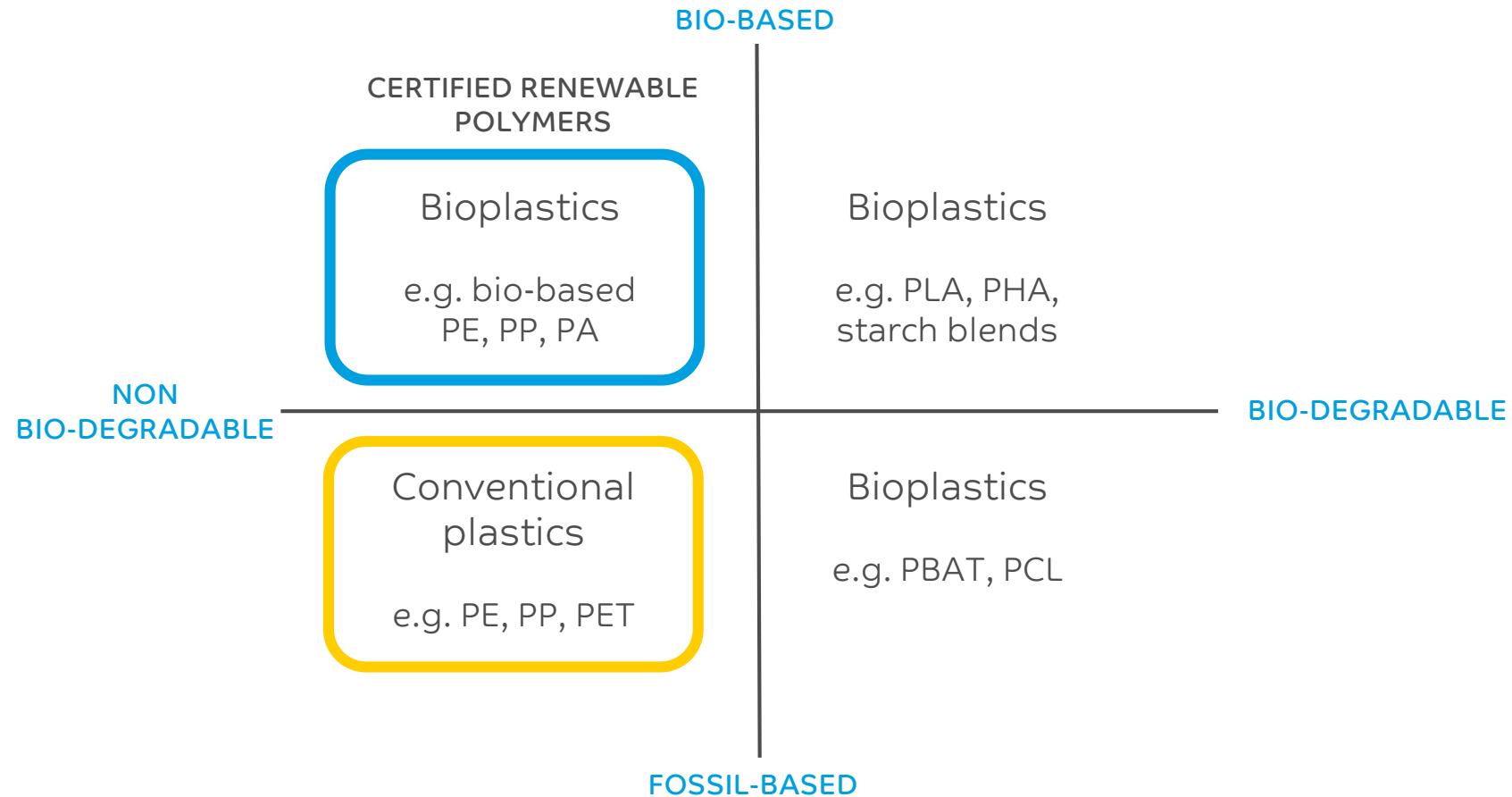
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# CERTIFIED RENEWABLE POLYMERS

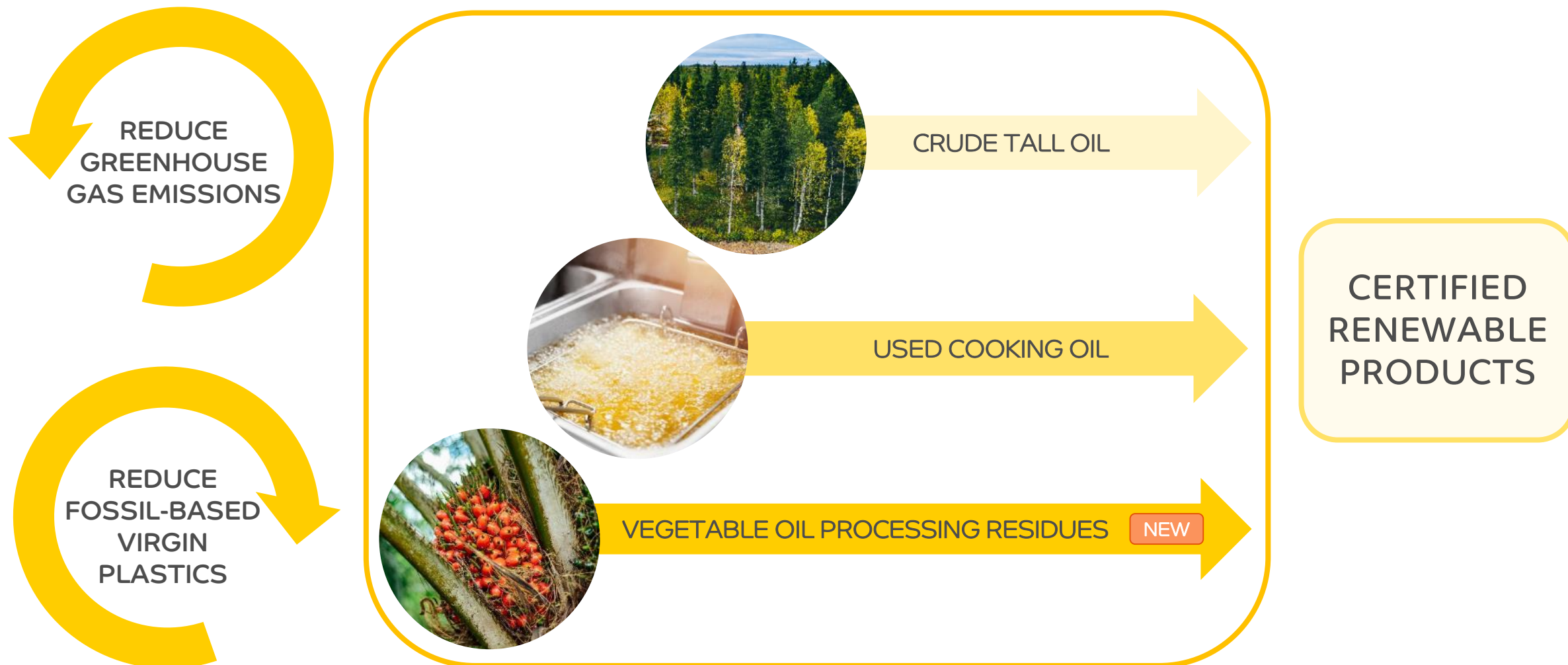
## WHAT ARE BIOPLASTICS?

BIOPLASTICS = PLASTICS THAT ARE BIO-BASED, BIO-DEGRADABLE, OR BOTH





# THINK OF ...



# SABIC'S BIO-BASED FEEDSTOCK ALTERNATIVES

## 2<sup>ND</sup> GENERATION FEEDSTOCK



**CRUDE  
TALL  
OIL**

Wood-based residue of the pulp making process



**USED  
COOKING  
OIL**

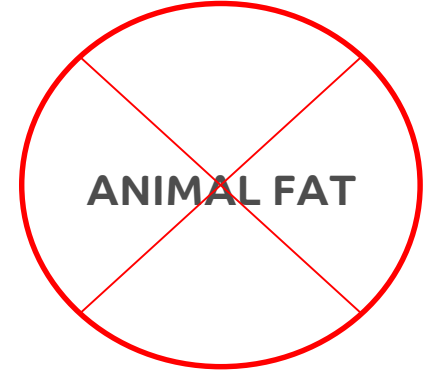
Oils & fats previously used by the food industry, restaurants, households to cook food for human consumption and which no longer fit for human consumption for food hygiene reasons.



**VEGETABLE  
OIL  
PROCESSING  
RESIDUES**

E.g. Palm Fatty Acid Distillate (PFAD), spent bleaching earth oil (SBEO), ...

PFAD is a processing residue derived from the refining of food-grade palm oil for the food & chemical industry uses.



**ANIMAL FAT**

From food industry waste



**PALM  
OIL**

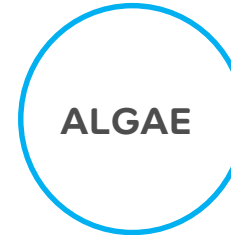


**RAPSEED  
OIL**



**SOYBEAN  
OIL**

## 1<sup>ST</sup> GENERATION FEEDSTOCK



**ALGAE**

## 3<sup>RD</sup> GENERATION FEEDSTOCK



Selected by SABIC



Not commercially available; under consideration by SABIC



Not selected by SABIC

## CERTIFIED RENEWABLE POLYMERS

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- Non-fossil based feedstock
- Feedstock source has a lower carbon footprint compared to fossil alternative
- Second generation renewable feedstock not in competition with the human food chain
- No direct/indirect change in land use
- Derived from waste or residue
  - Crude tall oil
  - Used cooking oil
  - Vegetable oil processing residues
- No compromise on product safety
- Identical product specifications to our current SABIC polymers (PE / PP), chemicals and LEXAN™ resin PC portfolio
- Externally certified chain of custody by ISCC Plus \*
- Can be recycled



## CERTIFIED RENEWABLE POLYCARBONATE

FOR ALL POLYCARBONATE (PC) & PC BASED BLENDS

### Bio-based feedstock used by SABIC **SECOND GENERATION FEEDSTOCK**

- Replacing fossil based feedstock
- Not in competition with the food chain
- Derived from waste or residue streams
  - Used cooking oil
  - Vegetable oil processing residues
- Lower carbon footprint compared to fossil alternative
- ISCC Plus certified value chains



# CERTIFIED RENEWABLE POLYCARBONATE - PROCESS



➤ ALL PLAYERS IN THE VALUE CHAIN HAVE TO BE ISCC PLUS CERTIFIED

# SABIC'S POLYCARBONATE BASED ON CERTIFIED RENEWABLE FEEDSTOCK

**73% CO<sub>2</sub> FOOTPRINT REDUCTION**  
FOR EACH KG OF POLYCARBONATE  
BASED ON CERTIFIED RENEWABLE  
FEEDSTOCK

**WITH FOSSIL DEPLETION REDUCTION  
POTENTIAL OF UP TO 43%**



Collaboration in **lighting industry**



Lenses of several **eyewear end applications**



## BENEFITS OF BIO-BASED FEEDSTOCK ALTERNATIVES

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### SUPPORTING CUSTOMERS IN ADDRESSING CORPORATE SUSTAINABILITY GOALS

#### SABIC'S CERTIFIED RENEWABLE PRODUCTS



##### VERSATILE

No compromise on product properties  
Big window of applications, including Food & Beverage consumer packaging, E&E, Personal Care, Automotive, ...



##### DROP-IN SOLUTION

Identical product specifications to our current grade portfolio  
No modifications to production processes down-stream



##### CARBON FOOTPRINT REDUCTION

Up to 4 kg of CO<sub>2</sub> per kg of resin



## SABIC TO GROW RENEWABLE PRODUCTS BUSINESS



### Market launch 2014

- Processing of bio-based feedstock via direct blending
- SABIC first and leader in certified renewable products
- Promoting ISCC Plus mass balance concept



### Market development ongoing

- Renewable products introduced in various businesses and value chains
- Multiple renewable feedstock sources within portfolio
- LCA externally peer reviewed

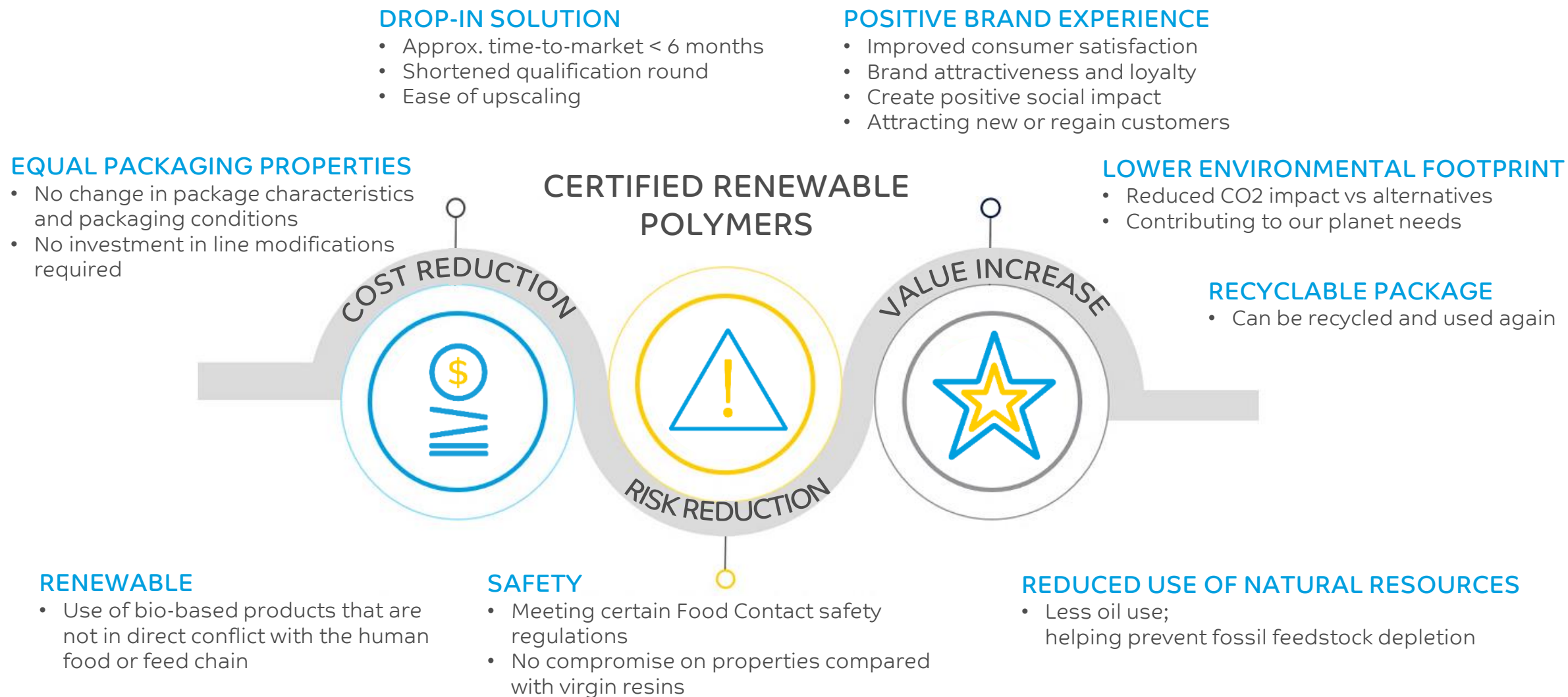


### What's next?

- SABIC is committed to further expand growth in renewable solutions for all our customers



# VALUE DRIVERS OF CERTIFIED RENEWABLE POLYMERS

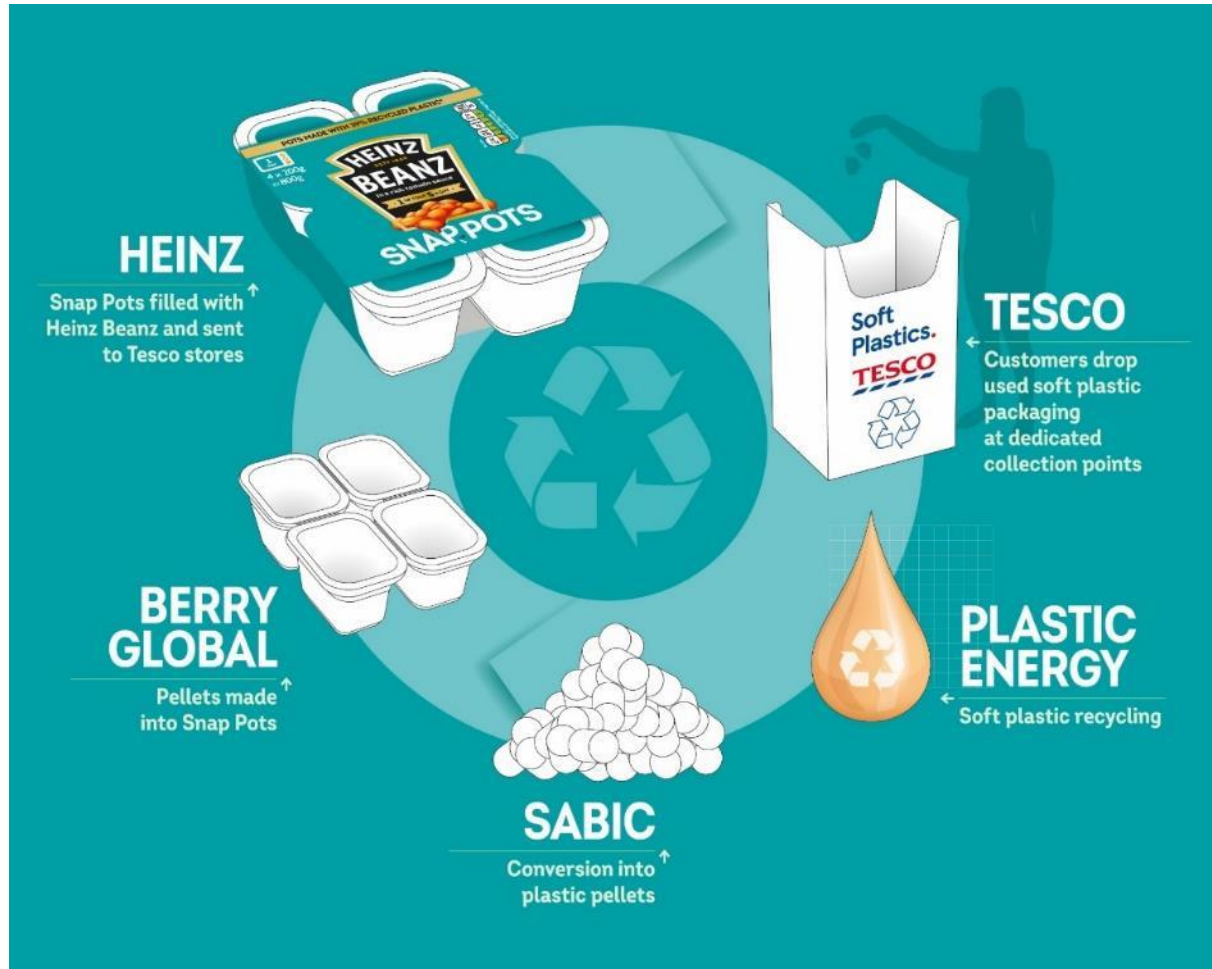


# CLOSED LOOP INITIATIVES

# FROM LINEAR TO CIRCULAR



## CREATING ADDITIONAL VALUE WITH CLOSED LOOP AS A SERVICE ELEMENT



## WHAT'S THE VALUE OF CLOSED LOOP INITIATIVES

- Full traceability from waste to PCR to end-product
- Economic valorization of waste
- Logistic optimization
- Influencing policies and legislation about sorting & collection

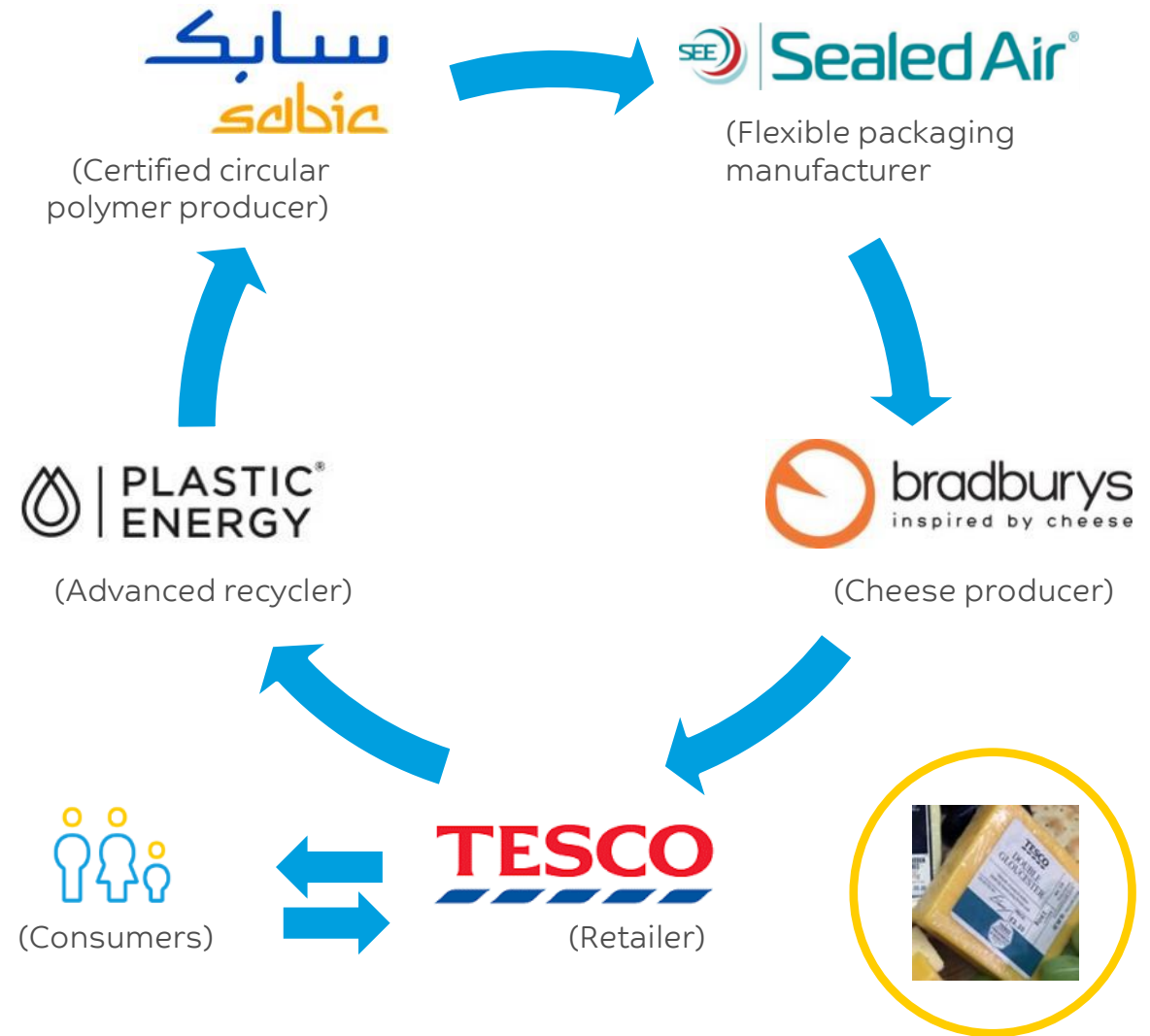
**OPEN INVITATION TO SET-UP A CLOSED LOOP INITIATIVE**

# SABIC COLLABORATION RESULTS IN INDUSTRY FIRST CLOSED LOOP PROJECT

## CIRCULARITY FOR PLASTICS is achievable through VALUE CHAIN COLLABORATION.

**COLLABORATION PARTNERS** of this closed loop recycling system:

- TESCO collected post-consumer flexible packing in ten stores in the UK
- PLASTIC ENERGY converted the packaging into pyrolysis oil
- SABIC used the alternative feedstock to produce certified circular polymers
- SEALED AIR produced the film for cheese producer BRADBURY'S



“First produce in food-grade recycled flexible packaging hits Tesco shelves”

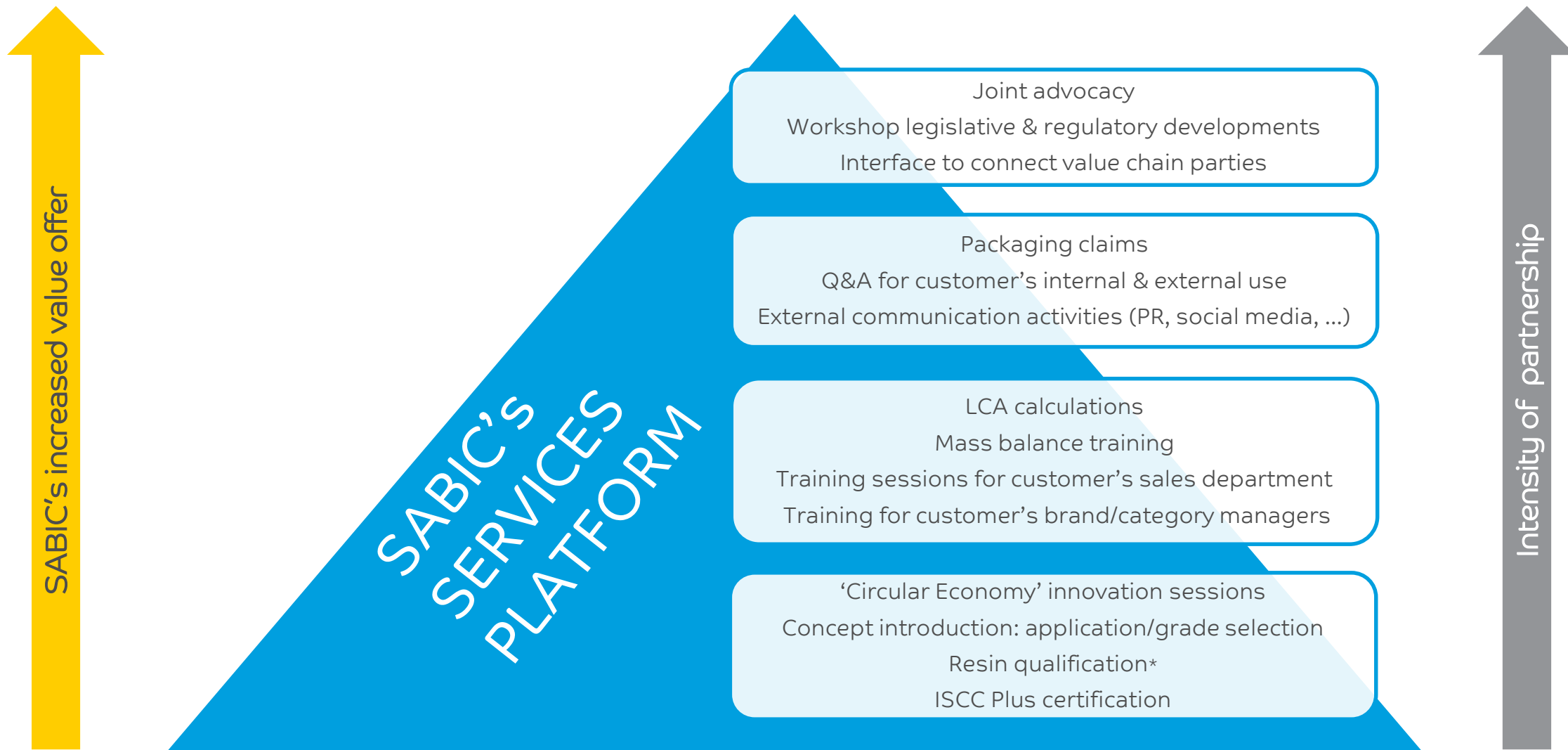
British Plastics and Rubber Magazine, 8 September 2020

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# TRUCIRCLE™ SERVICES

# TRUCIRCLE™ SERVICE ELEMENTS



\* Incl. sustainability statements & compliance certifications

# LET'S EXPLORE FURTHER ... LET'S BRAINSTORM ...



**SABIC SUPPORTS TRANSITION TO SUSTAINABLE PACKAGING AND INGREDIENTS**



## BLOCKCHAIN PILOT – DIGITALIZATION AS ENABLER

# SABIC LAUNCHES BLOCKCHAIN PILOT FOR DIGITAL TRACEABILITY OF CERTIFIED CIRCULAR FEEDSTOCK

Collaboration with technology partner Finboot, Plastic Energy and packaging specialist Intraplas

### GOAL TO CREATE

- ADDITIONAL TRANSPARENCY
- DIGITAL TRACEABILITY

**CHEMISTRY THAT MATTERS™**

**سَابِك**  
**sabic**

**BLOCKCHAIN PILOT**  
**INTRAPLÁS & PLASTIC ENERGY**

**TRUCIRCLE™ SOLUTIONS**  
BLOCKCHAIN PILOT FOR DIGITAL TRACEABILITY OF CERTIFIED CIRCULAR TRUCIRCLE™ FEEDSTOCK

**INDUSTRY CHALLENGE**  
Tracing the journey of feedstock through the complex petrochemical value chain is currently a difficult undertaking. To improve this process and support the delivery of its circular feedstock to customers – part of SABIC's TRUCIRCLE™ portfolio and services –, SABIC has launched this pilot project to demonstrate the feasibility of using a blockchain-based, value-chain IT application.

**SABIC SOLUTION**  
SABIC launched a pilot project with technology company Finboot, advanced recycling pioneer Plastic Energy, and packaging specialist Intraplas to investigate the possibilities of blockchain technology in supporting end-to-end digital traceability of circular feedstock in customer products.

**REGULATORY COMPLIANCE**

**CERTIFIED CIRCULAR SOLUTION**

**VALUE CHAIN COLLABORATION**

**DIGITALIZATION AS ENABLER**

**intraplas**

Enabled by **TRUCIRCLE™**

[CLICK HERE](#) FOR MORE INFORMATION

### EXPERIENCE YOURSELF



**▶ LET'S EXPLORE TOGETHER**

# SABIC'S CARBON NEUTRALITY STRATEGY

# SABIC CARBON NEUTRALITY STRATEGY ANNOUNCED DURING SAUDI GREEN INITIATIVE



"SABIC is uniquely contributing to the SGI goals and taking bold actions that support the Kingdom's ambitions for the circular carbon economy. Our global carbon neutrality strategy reaffirms our commitment to the Paris Agreement goals and the continuous pursuit of solutions that can reduce greenhouse gas emissions"

YUSEF AL-BENYANI  
VC & CEO

## SABIC CARBON NEUTRALITY STATEMENT

SABIC is committed to the Paris Agreement goals and will continually pursue efforts and explore solutions to meet carbon neutrality from operations under our control by 2050, taking into account the different regional and national ambitions, commitments and initiatives.

Focusing on our direct and indirect emissions generated by our own production (Scope 1 & Scope 2), **we aim to reduce our greenhouse gas emissions by 2030 worldwide by 20% compared to 2018.**

In addition, we aim to collaborate with our partners in initiatives that aspire to reduce our indirect Scope 3 emissions along the value chain.

# INTRODUCTION – GREENHOUSE GAS PROTOCOL



**SCOPE 3**  
INDIRECT

*All other indirect emissions* that occur in the value chain of the reporting company, including both *upstream* emissions.

Upstream sourcing activities

**SCOPE 1**  
DIRECT

*Emissions from operations* that are owned or controlled by the reporting company.

Reporting company

**SCOPE 2**  
INDIRECT

*Emissions from the generation of purchased or acquired energy* such as electricity, steam, heating or cooling, consumed by the reporting company.

**SCOPE 3**  
INDIRECT

*All other indirect emissions* that occur in the value chain of the reporting company, including both *downstream* emissions.

Downstream distribution activities

# SCOPE 1, 2 AND 3 EMISSIONS – GREENHOUSE GAS PROTOCOL



**SCOPE 3  
INDIRECT**

**SCOPE 1  
DIRECT**

**SCOPE 2  
INDIRECT**

**SCOPE 3  
INDIRECT**

**Upstream sourcing activities**

- C1 - Purchased goods and services
- C2 - Capital goods
- C3 - Fuel & energy related activities
- C4 - Transport & distribution
- C5 - Waste generated in operations
- C6 - Business Travel
- C7 - Employee commuting
- C8 - Leased Assets

**Reporting company**

- Company facilities
- Company vehicles
- Purchased electricity, heating & cooling for own use

**Downstream distribution activities**

- C9 - Transport & distribution
- C10 - Processing of sold products
- C11 - Use of sold Products
- C12 - End-of-life treatment of sold products
- C13 - Leased assets
- C14 - Franchises
- C15 - Investments

# SABIC'S CARBON ROADMAP OVERVIEW UNTIL 2050: NEXT STEPS

CARBON NEUTRALITY  
by **2050**  
in line with the Paris Agreement goals

**20%** REDUCTION by 2030  
Interim Scope 1&2 emissions target compared to 2018

We aim to collaborate with our partners in initiatives to reduce indirect **SCOPE 3** emissions along the value chain

## WHAT ARE WE CONSIDERING IN OUR 2050 CARBON NEUTRALITY ROADMAP?



### RELIABILITY, ENERGY EFFICIENCY & IMPROVEMENTS

- Technology improvement
- Energy efficiency
- Asset improvement & reliability
- Asset rationalization

### RENEWABLE ENERGY

- Increase renewable energy share in imported energy mix
- Approved strategy of facilitating 4 GW by 2025 and 12 GW installed capacity by 2030

### ELECTRIFICATION

- Using renewable energy
- Electrification of different steam driven rotating equipment
- Electric cracking furnaces for olefins and aromatic based products

### CARBON CAPTURE

- High concentration streams potential for utilization - Leveraging KSA CO2 Hub
- CCUS collaborations

### GREEN/BLUE H2 ALTERNATIVE FEEDSTOCK

- Commercially available solutions and under early R&D
- Renewable & circular feedstock

TRUCIRCLE™ PROGRAM

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# VALUE CHAIN COLLABORATION

# VALUE CHAIN COOPERATION CRITICAL TO OUR FUTURE

## EXTERNAL REPORTING



SABIC IS IN THE **TOP 1% OF COMPANIES**

in category basic chemicals, fertilizers, plastics & rubber assessed by Ecovadis\*

## PARTICIPATING INITIATIVES



SABIC IS A FOUNDING MEMBER OF THE ALLIANCE

Supporting Infrastructure development to manage waste and increase recycling

## AS A VALUE CHAIN



SABIC IS A FOUNDING MEMBER & DRIVER OF WPC

Supporting UN and G20 initiatives to prevent marine litter

- SABIC CSR Sustainability & Performance report Ecovadis 2019
- Carbon Disclosure Project (CDP)

- World Business Council for Sustainable Development (WBCSD)
- China Petroleum and Chemical Industry Federation (CPCIF)



WE BELIEVE ...

THE FUTURE IS BUILT ON

# INNOVATION COLLABORATION

WILL DELIVER STRONGER SOLUTIONS



CHEMISTRY THAT MATTERS™

سابك  
sabic

# COLLABORATION. IT'S MAKING THE CIRCULAR ECONOMY GO ROUND.

**As we adapt to a new normal, we're helping support more sustainable economies.**

That's why SABIC introduced the TRUCIRCLE™ initiative to work with our collaboration partners to rethink recycling. SABIC's collaborations are making it possible to create materials of high enough quality for food packaging by breaking complex, low quality waste plastics down to their original state. We can use, reuse and repurpose more of our resources without using new ones. It's innovative technology that's making the circular economy reality with Chemistry that Matters™.

**Meet one of the world's leading chemical companies at [SABIC.com](https://www.sabic.com)**



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