

CHEMISTRY THAT MATTERS™



# TRUCIRCLE™ : CIRCULAR FUTURE FOR PLASTICS BY INNOVATION AND COLLABORATION

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## SABIC AT A GLANCE



1976

Company  
established



32,000

Employees  
around the world



50

Countries  
of operations



212<sup>th</sup>

Largest public  
company in the world\*



Top 2

Chemical Brand Value\*\*

4.017

US\$ bn  
Estimated  
Brand Value\*\*

79

US\$ bn

Total  
assets

17.8

US\$ mn

Net  
income

31

US\$ bn

Annual  
revenue



≈ 150

New products  
each year



9,946

Global patent  
filings



68

World-class  
plants worldwide

# OUR BUSINESS AND INDUSTRY THAT WE SERVE

## PETROCHEMICALS

Glycols, Olefins, Oxygenates and Aromatics

Chemical Inter. & Industrial Gases

Polyolefins

SABIC® PP, HDPE, LL/LDPE, SUPEER™ COHERE™ grades

Engineering Thermoplastics (ETP)

LEXAN™ resins & SABIC® PC  
CYCOLOY™, XENOY™, VALOX™, GELOY™ resins  
PMMA, POM

PVC, PET, Polystyrene, PU

Synthetic Rubbers

Sheet & Film

## SPECIALTIES

Specialty Engineered Thermoplastics  
(ULTEM™ resins NORLY™ resins, LEXAN™  
copolymers and EXTEM™ resins)

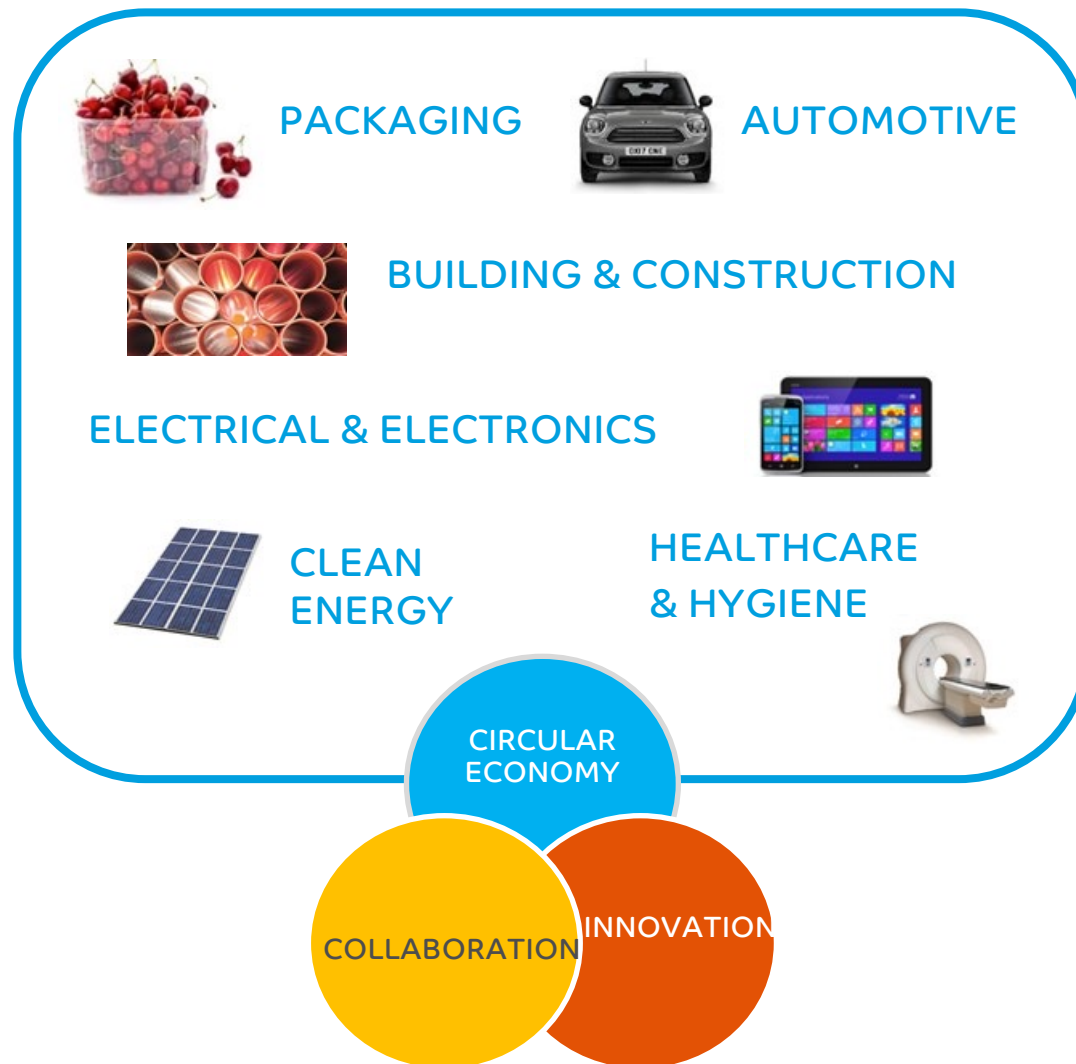
Specialty Compounds (LNP™ compounds)

Thermosets and Additives

## AGRI-NUTRIENTS



## METALS



# CHALLENGES & SABIC'S COMMITMENT TO SUSTAINABILITY

## THE COMMON CHALLENGE

### EXISTING BENEFITS



PROTECTION- LIGHTWEIGHT - STIFFNESS -  
IMPACT - DURABILITY - COST - SAFETY -  
APPEARANCE

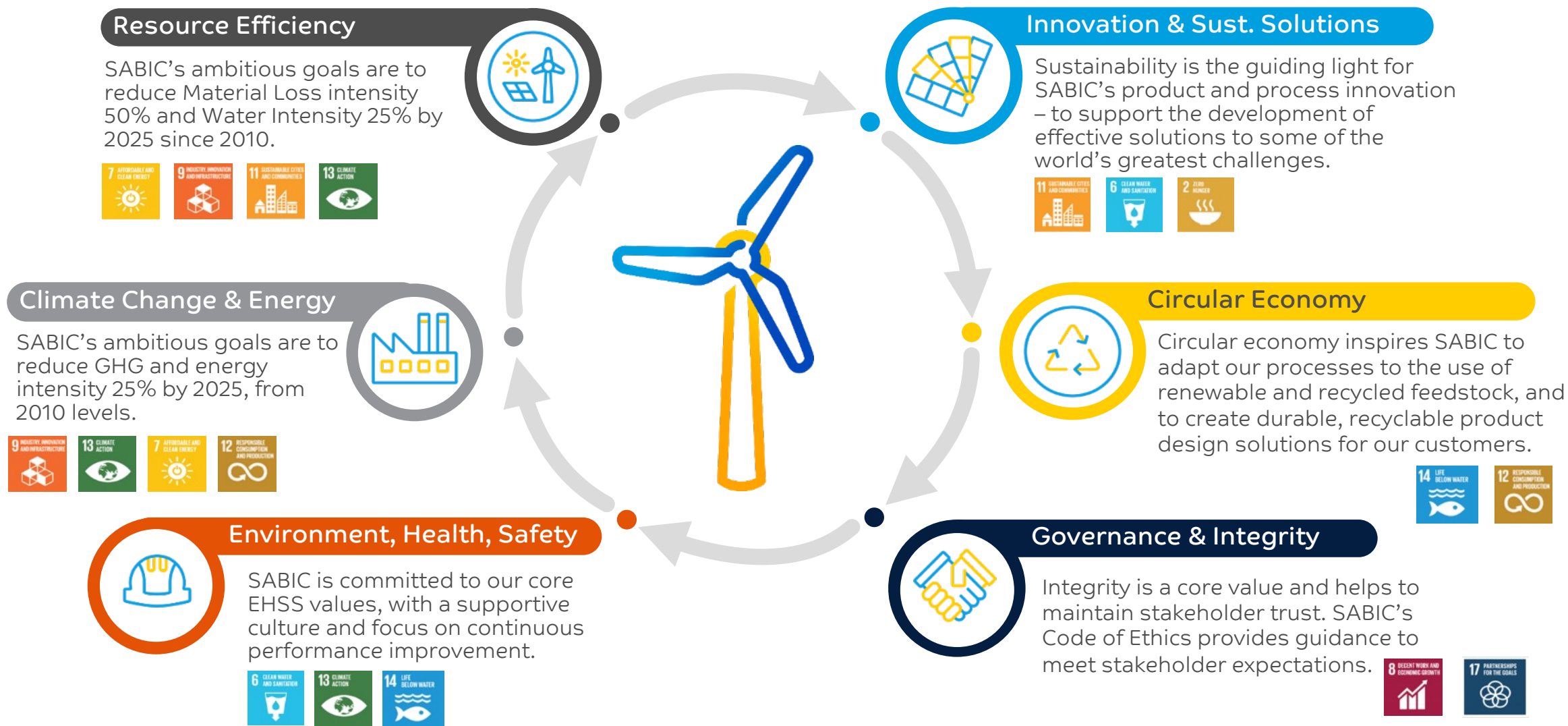
### ISSUES TO BE SOLVED



### ADDRESSING LEGISLATION

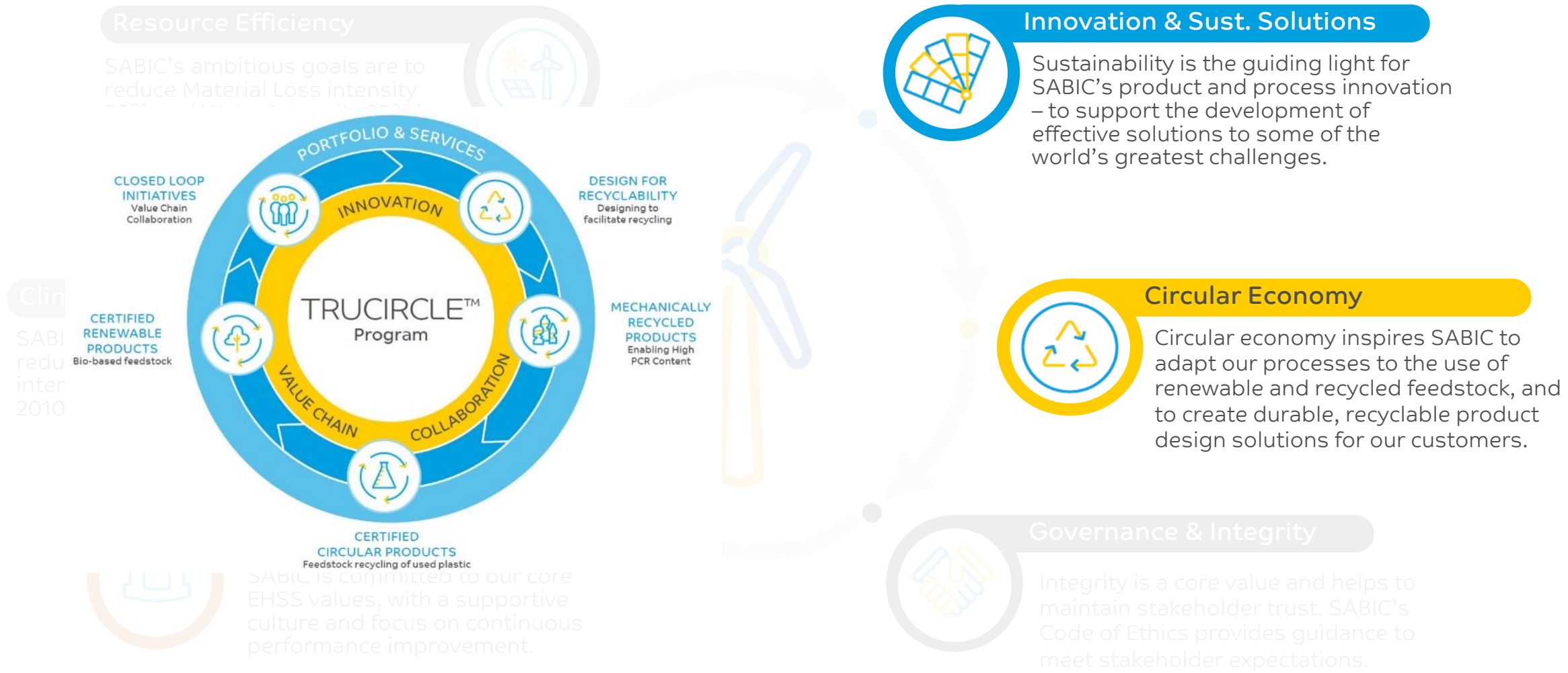


# LINKING UN SDG'S TO SABIC'S TOP SUSTAINABILITY PRIORITIES





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



# SABIC'S TRUCIRCLE™ PROGRAM – COMPLEMENTARY SOLUTIONS

## PORTFOLIO

### MECHANICALLY RECYCLED PRODUCTS



### CERTIFIED CIRCULAR PRODUCTS



### CERTIFIED RENEWABLE PRODUCTS



## SERVICES

### DESIGN FOR RECYCLABILITY



### CLOSED LOOP INITIATIVES

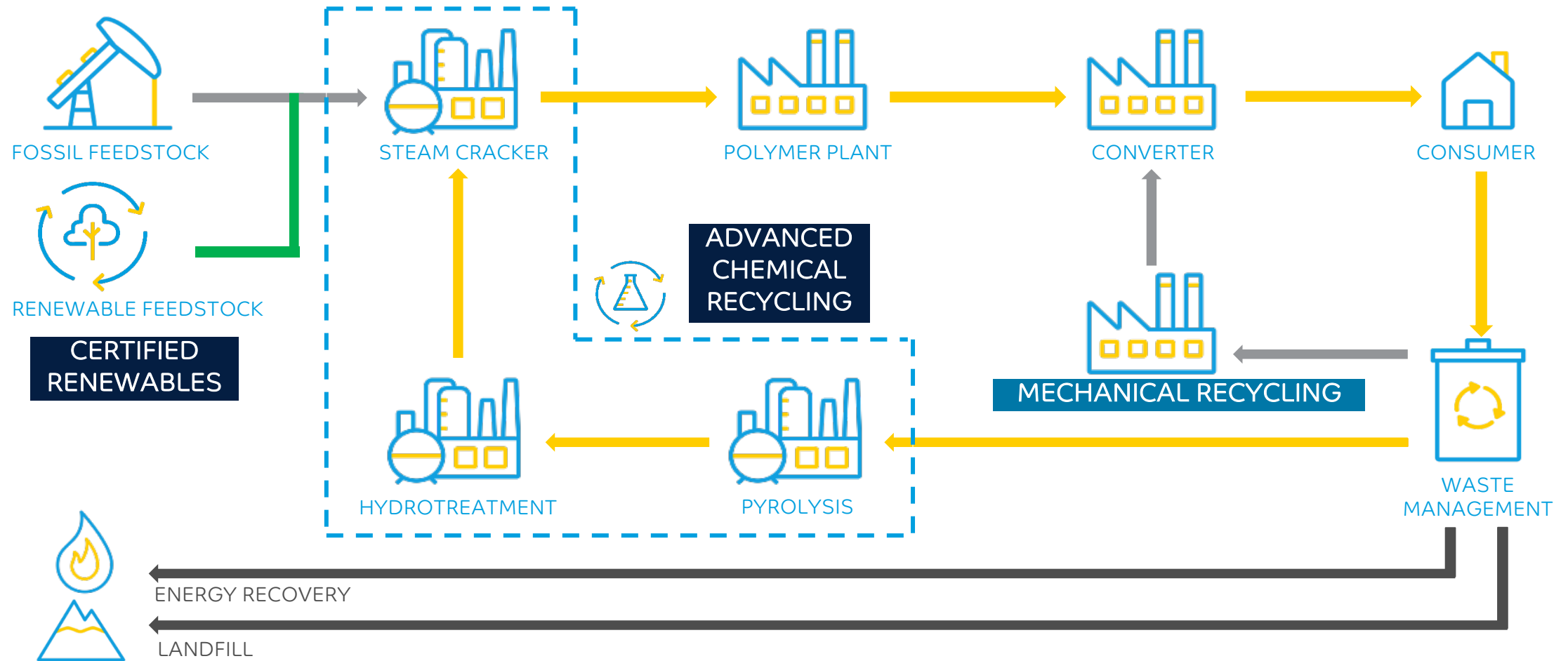


Closing the loop and creating a Circular Economy for plastics

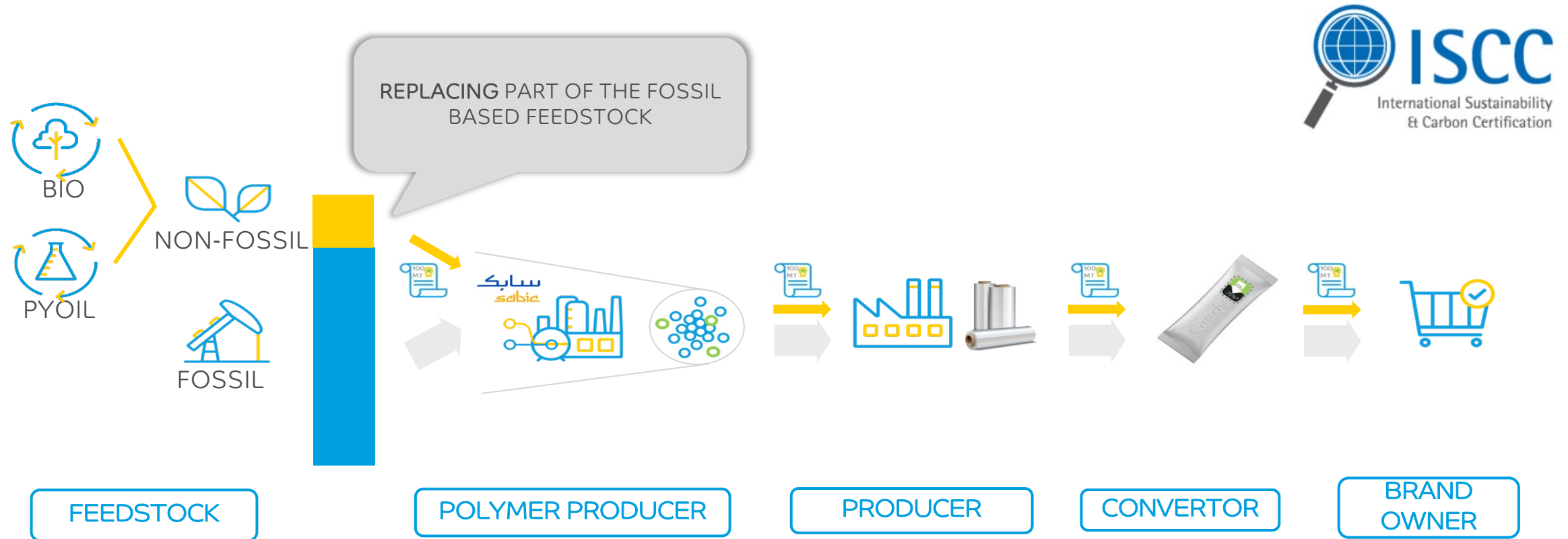


# CERTIFIED RENEWABLE PRODUCTS & ADVANCED CHEMICAL RECYCLING

# THE CONCEPT "FROM LINEAR TO CIRCULAR"




# TRACEABILITY OF CERTIFIED PC & PP SOLUTIONS



For Renewable and Chemical recycling: Certification by mass balance chain of custody

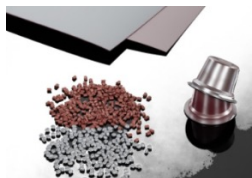
## VALUE OFFER FOR SABIC'S CERTIFIED RENEWABLE POLYMERS

- NON-FOSSIL BASED
  - Feedstock source has a lower carbon footprint compared to fossil alternative
  - 2<sup>nd</sup> GENERATION RENEWABLE FEEDSTOCK, not in direct competition with the human food chain
  - DERIVED FROM WASTE RESIDUE
    - Crude tall oil from wood industry
    - Used cooking oil (UCO)
    - Residues from vegetable oil processing
- 
- No compromise on product safety
  - Identical product specifications to our current SABIC PE, PP and LEXAN<sup>TM</sup> resin PC portfolio (first renewable PP, PC in the market)
  - EXTERNALLY CERTIFIED VALUE CHAINS: ISCC Plus\*
  - Can be recycled

\* through mass balance approach and physical connection/ISCC Plus certified value chains

# CERTIFIED RENEWABLE POLYOLEFINS & POLYCARBONATE

## SABIC® PP & PE resins



PP for **coffee capsules**  
food industry



Enabling solutions  
with PP for  
**cosmetics**  
packaging



PP expanding  
to **healthcare**  
packaging

EACH KG OF RENEWABLE PE/PP  
CAPTURES **UP TO 4 KG OF CO<sub>2</sub>**  
FROM THE ATMOSPHERE WITH  
FOSSIL DEPLETION REDUCTION  
POTENTIAL BY **UP TO 80%**

PE in several **food industry**  
applications (milk, juice..)



## LEXAN™ resin

**61% CO<sub>2</sub> FOOTPRINT REDUCTION**  
FOR EACH KG OF POLYCARBONATE

Collaboration in **lighting industry**



*elkamet*

Lenses of several  
**eyewear** end  
applications



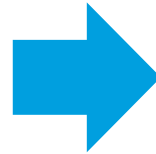
**POLYRAY**

# ADVANCED CHEMICAL RECYCLING



## ADVANCED CHEMICAL RECYCLING

### PREVENTING PLASTIC FROM BECOMING WASTE



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

SABIC and Plastic Energy **started construction** of world's first commercial unit to significantly upscale production of **SABIC's certified circular polymers** derived from used plastic

**SABIC pioneering on the journey towards creating a circular economy for plastics**

# MECHANICAL RECYCLING

## KEY ENABLERS DRIVING PLASTIC MECHANICAL RECYCLING IMPLEMENTATION



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

## MECHANICALLY RECYCLED POLYMERS

### ON-SHELF COLLATION SHRINK FILM

#### SABIC® LDPE COMPOUND

Containing up to 50% PCR  
Uniform shrinkage  
Good processing



### 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 BOUND XENOY™ RESIN

### XENOY™ PC/PET COMPOUND COMPRISING 20% RECYCLED OCEAN BOUND 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 the oceans\*



#### Microsoft Ocean Plastic Mouse

Microsoft's 1<sup>st</sup> consumer electronic product  
Exterior shell 20% recycled ocean plastic

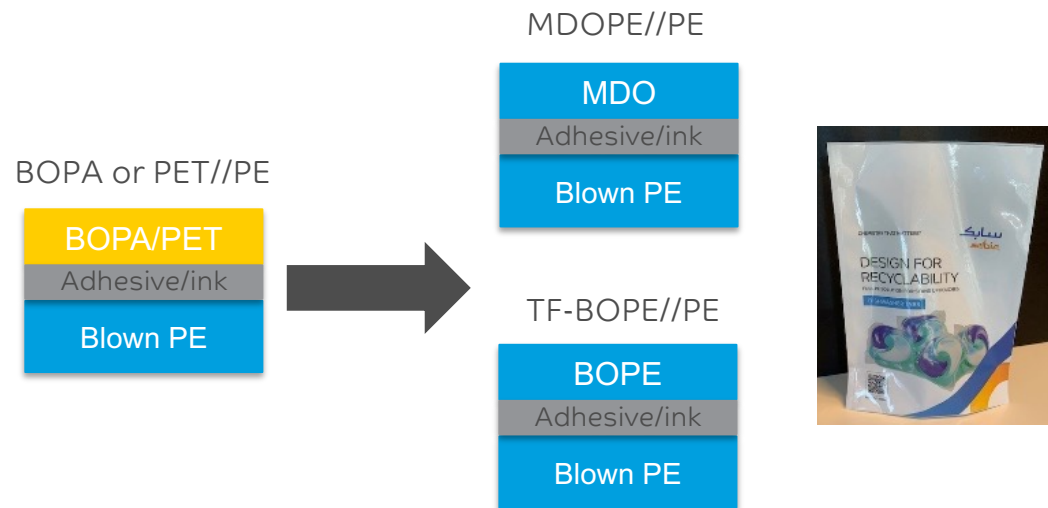
**New XENOY™ resin with recycled ocean plastic can help reduce plastic waste in the ocean**

# DESIGN FOR RECYCLABILITY



# PACKAGING: TOWARDS MONO-MATERIAL PACKAGING SOLUTIONS WITH BOPE

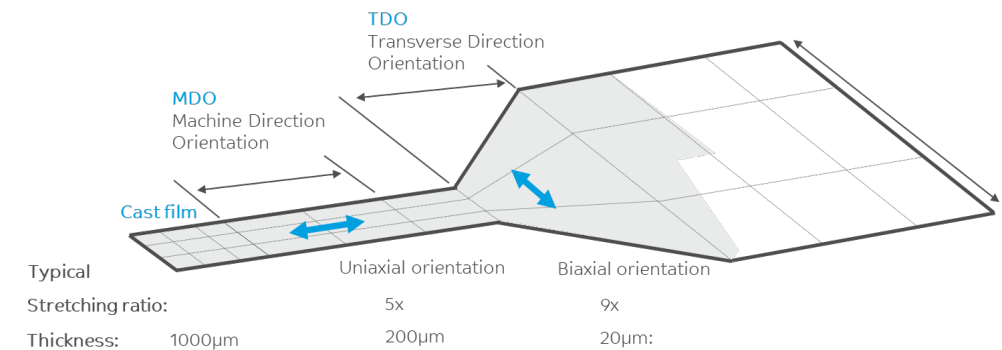
## THE CONCEPT



## TENTER FRAME BOPE FILM

Unique building block for multi-layer packaging solutions

Bi-axially oriented PE films from SABIC PE BX202



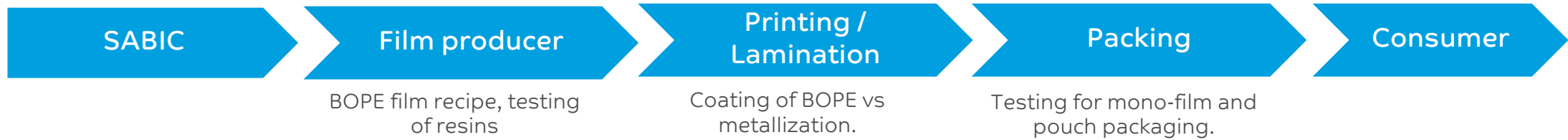
Processing developments to enable mono-material solutions



## BOPE: VALIDATIONS AT VALUE CHAIN

**PRODUCTION LINE TESTING**  
thicknesses (18 – 55  $\mu\text{m}$ )

**FILM TESTING**  
i.e. sealing (using SABIC® SUPEER™ or  
COHERE™ grades), white colored, anti-fog...



### CASE STUDY: FROZEN FOOD PACKAGING

- Down gauging vs blown PE (40 $\mu\text{m}$  blown PE film versus 20 $\mu\text{m}$  BOPE)
- Easy opening
- Broad processing window & robust sealing performance
- Increased packaging speed via decreased sealing/cooling time

Collaboration with partners to accelerate market adoption

# POLYETHYLENE BASED HINGE CAP

## Market Trend

Bottle and cap produced from same material to improve recyclability

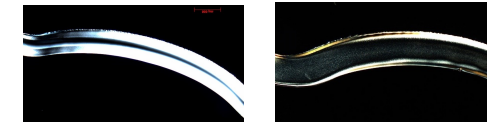
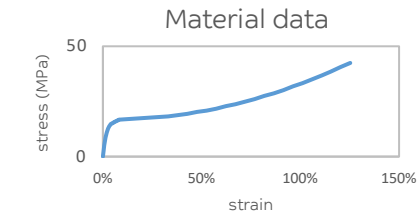
## Situation Today

- Bottles made from high-density polyethylene
- Hinge caps produced from polypropylene due to intrinsic material properties

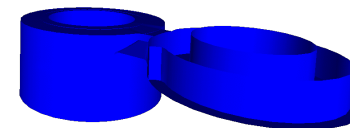
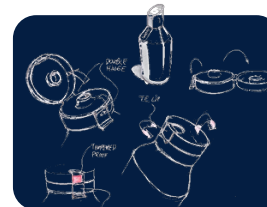
## Sustainability Solution

- Material – Design – Processing combination to enable polyethylene based hinge caps

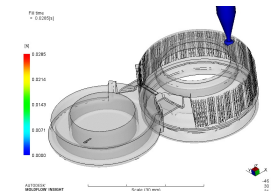
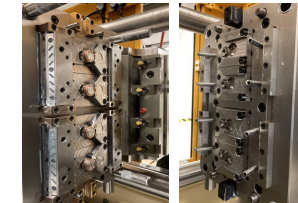
Leveraging our key competencies and collaboration models to develop new concepts



Material



Design



Processing

# CLOSED LOOP INITIATIVES

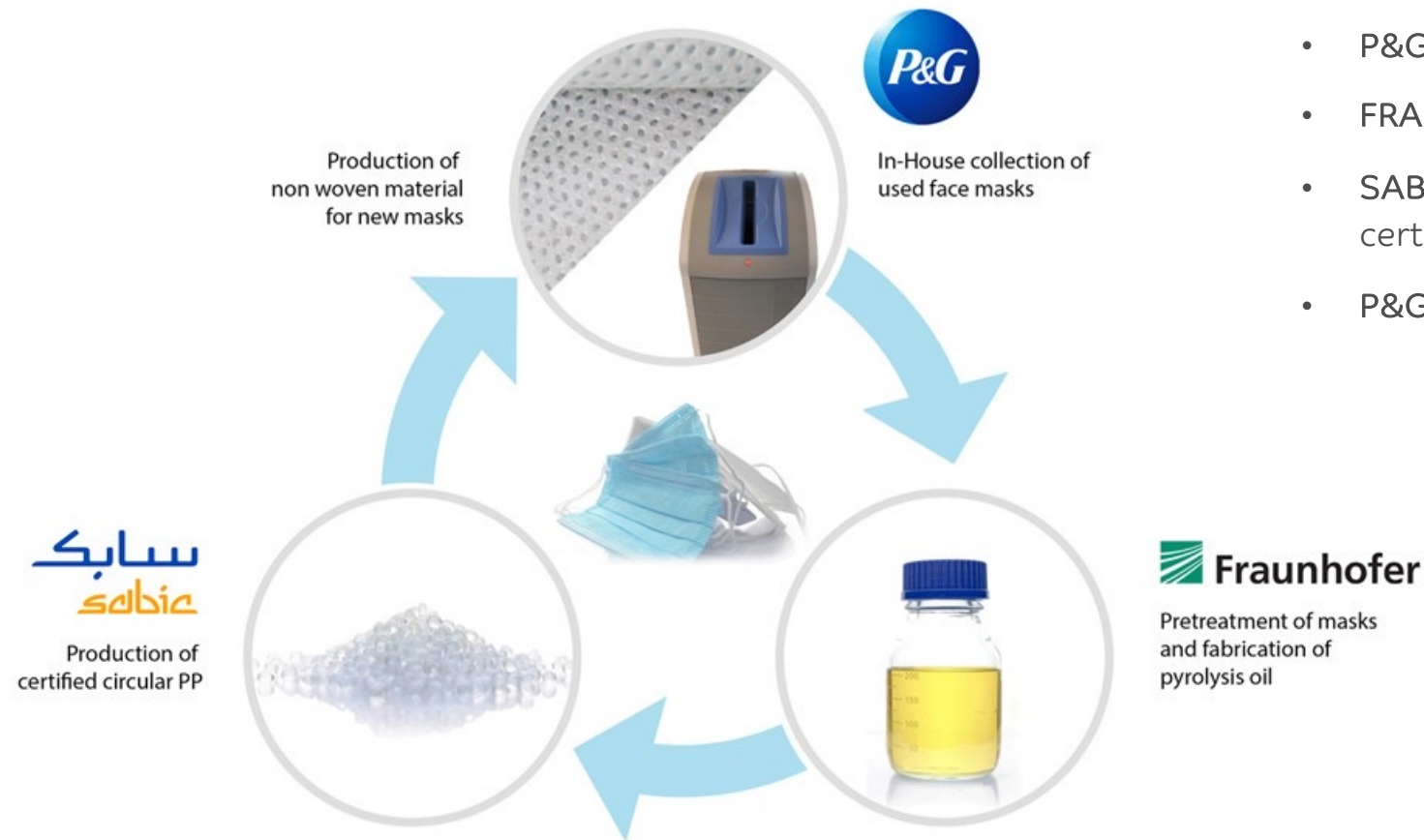
# SABIC COLLABORATION: INDUSTRY FIRST CLOSED LOOP PROJECT



Trial involving an entire supply chain

**CIRCULARITY FOR PLASTICS** is achievable through **VALUE CHAIN COLLABORATION**

## CLOSED LOOP RECYCLING PILOT PROJECT FOR SINGLE USE FACEMASKS



- P&G collected post-consumer facemask in-house
- FRAUNHOFER converted masks into pyrolysis oil
- SABIC used the alternative feedstock to produce certified circular polymers
- P&G produced nonwovens for new masks

Validating loops for different industries and with variety of partners



# ENABLING CIRCULAR BUSINESS MODELS

## ENABLING NEW CIRCULAR BUSINESS MODELS

### THINKING OUT OF THE LIGHTWEIGHT BOX

Development of a **returnable box** for converter of retail company

- Light weight for transportation: *15% vs exiting*
- Pallet and lid should have FR-properties: *UL-94 V0 @ 2mm*
- High impact and stiffness properties
- Processing: Low pressure **Foam Injection molding**



Developed new foam & lightweight PP compounds portfolio

### TRACKING CIRCULARITY

#### SABIC Member of HolyGrail 2.0

Initiative to prove viability of digital watermark technologies for more accurate sorting of packaging and higher quality recycling



#### Pilot blockchain traceability project

Enabling the traceability of polyolefins and polycarbonate through the chemical and mechanical recycling loop



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# SUMMARY

## MANY FIRSTS

### PROVEN SOLUTIONS

**MASS  
BALANCE**  
chain of  
custody  
for polymers



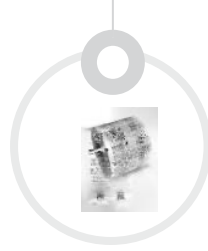
2014

**CERTIFIED  
RENEWABLE  
PE & PP**  
2<sup>nd</sup> generation  
bio-based  
feedstock

2014



**D4R WITH  
TF-BOPE**  
Mono-material  
solutions



2019

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

2019



**CERTIFIED  
RENEWABLE  
POLYCARBONATE**  
2<sup>nd</sup> generation  
renewable feedstock



2019

**CERTIFIED  
RENEWABLE  
CHEMICALS**  
new renewable  
value chains

2019



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



2020

**CIRCULAR  
PRODUCTS**  
based on Ocean  
Bound Plastic

2021



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



2021

**CERTIFIED  
RENEWABLE  
PRODUCTS**  
from 2<sup>nd</sup> gen  
used cooking oil

2021



**CERTIFIED  
CIRCULAR  
PC**  
from chemically  
recycled  
feedstock



2021

## TRUCIRCLE™ SOLUTIONS

Delivering on a Circular Future for Plastics by

# INNOVATION & COLLABORATION



OUR DISTRIBUTOR IN ITALY



BIG THANKS

TO ALL OUR ITALIAN CUSTOMERS & PARTNERS