CHEMISTRY THAT MATTERS™

SABIC'S SPECIALTIES - SOLUTIONS FOR CIRCULAR ECONOMY

ULTEM™, NORYL™, LNP™

Julien Cathelin – Sr. Technical Development Engineer

SABIC AT A GLANCE

SABIC AT A GLANCE

1976
Company established

31,000
Employees around the world

50
Countries of operations

10,090
Global patents and pending applications

Top 2
Chemical Brand Value*

4.67
US$ bn
Estimated Brand Value*

84.9
US$ bn
Total assets

6.15
US$ bn
Net income

46.6
US$ bn
Annual revenue

≈ 150
New products each year

66
World-class plants worldwide

*Brand Finance, 2022

SABIC IS ONE OF THE WORLD'S MOST DIVERSIFIED CHEMICALS BUSINESS

BUSINESS PORTFOLIO

PETROCHEMICALS

- Polyolefins
- Polycarbonates and Blends
- PVC , Polyester and Polystyrene
- Functional Forms
- Synthetic Rubbers
- Specialty Polymers & Polymer Additives
- Fluids
- Glycols, Olefins, Oxygenates and Aromatics
- Chemical Intermediates & Industrial Gases

SPECIALTIES

ULTEM™ resins
Polyetherimid (PEI)

NORYL™ resin blends
Polyphenylenether (PPO/PS;PA;PP)

LNP™ resins
Polycarbonate copolymers

LNP™ compounds
Structural, Conductive, Lubricated...

Additives & Oligomers

AGRI-NUTRIENTS

Nitrogen
- Prilled Urea
- Granular Urea
- Ammonia

Phosphate
- DAP and Dark DAP
- MAP

Specialty
- NPK
- TGU

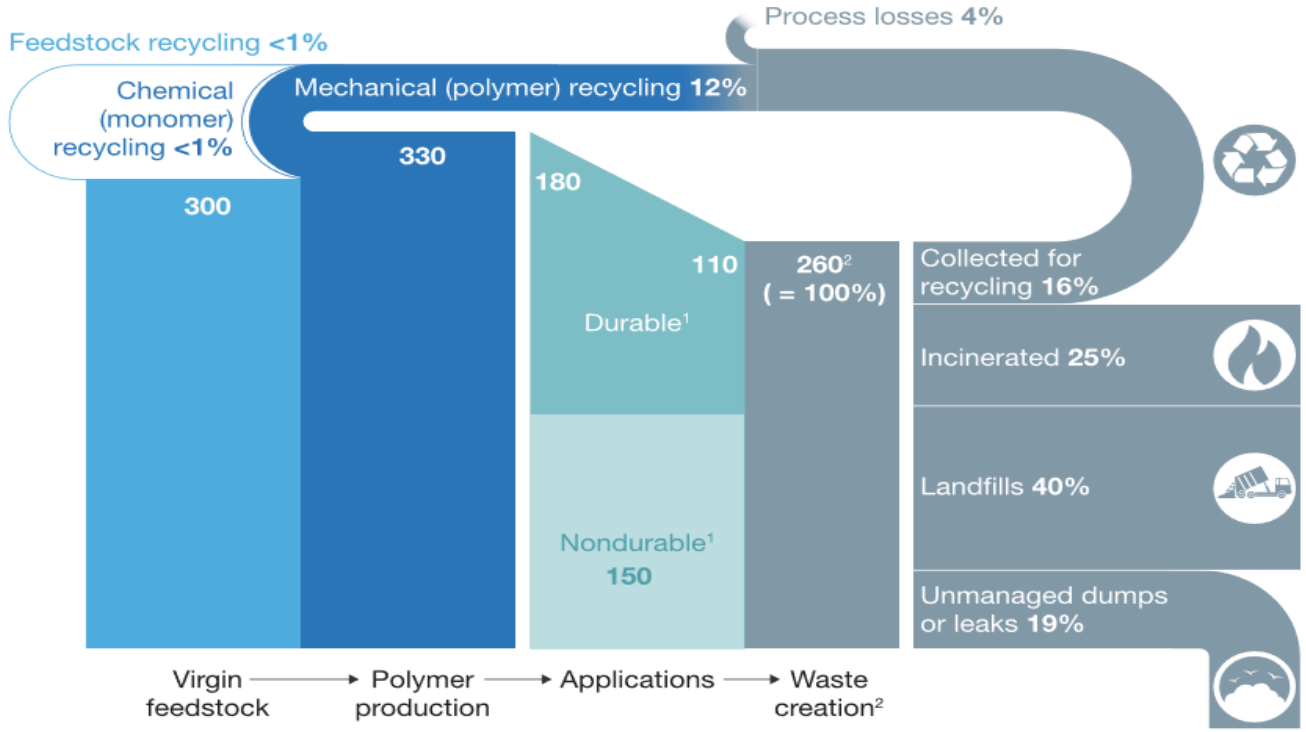
METALS

Long Steel
- Rebar
- Wire Rod
- Rebar in Coil

Flat Steel
- Hot Rolled Coils
- Cold Rolled Coils
- Galvanized Rolled Coils
- Pre-painted Rolled Coils

SUSTAINABILITY AS A MACRO TREND

THE GLOBAL POLYMER FLOWS 2016 (MILLIONS OF METRIC TONS PER ANNUM)



¹Durable applications with an average lifetime >1 year will end up as waste only in later years; nondurable applications go straight to waste.
²150 million metric tons of mixed plastic waste from nondurable applications that end up as waste in same year, plus 110 million metric tons of mixed plastic waste from production in previous years.

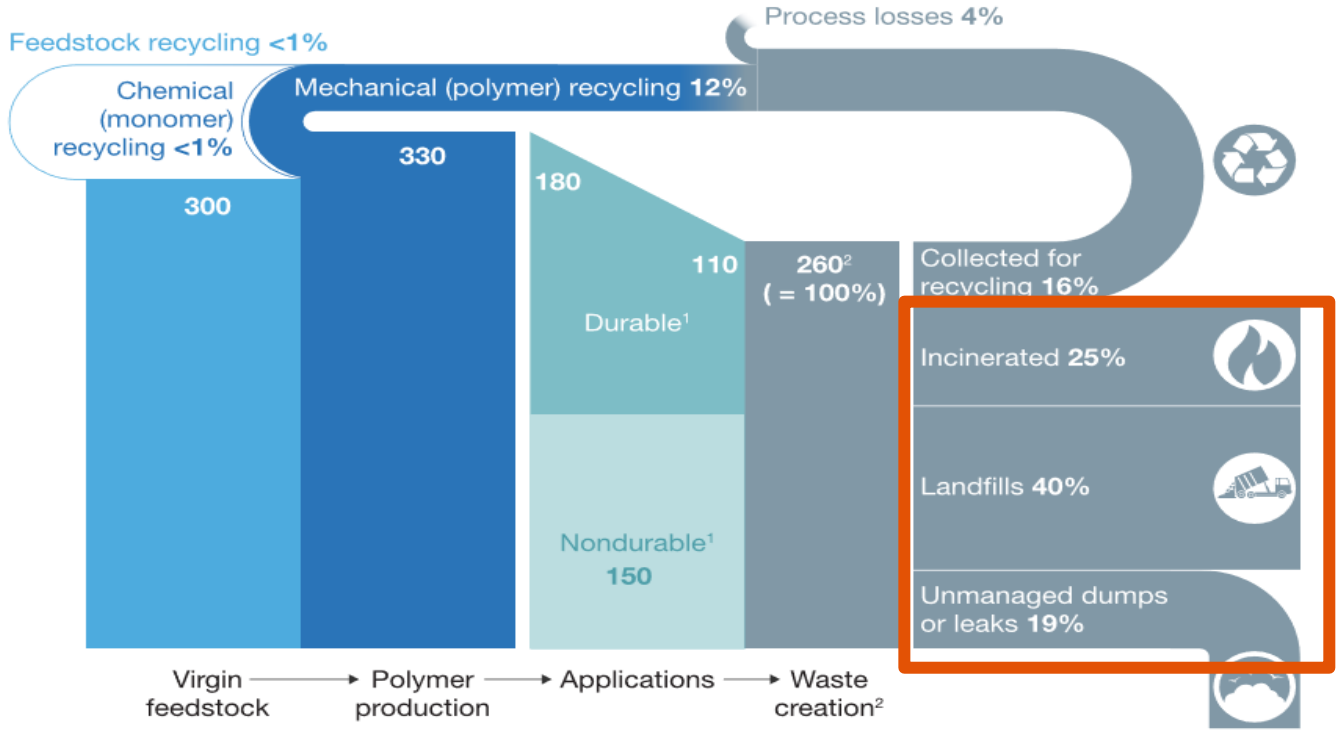
McKinsey&Company https://www.mckinsey.com/industries/chemicals/our-insights

Plastic end of life

*via a combination of mechanical recycling, monomer recycling (depolymerization) and pyrolysis to feedstock

** ACC Study Link

THE GLOBAL POLYMER FLOWS 2016 (MILLIONS OF METRIC TONS PER ANNUM)



¹Durable applications with an average lifetime >1 year will end up as waste only in later years; nondurable applications go straight to waste.
²150 million metric tons of mixed plastic waste from nondurable applications that end up as waste in same year, plus 110 million metric tons of mixed plastic waste from production in previous years.

McKinsey&Company

https://www.mckinsey.com/industries/chemicals/our-insights

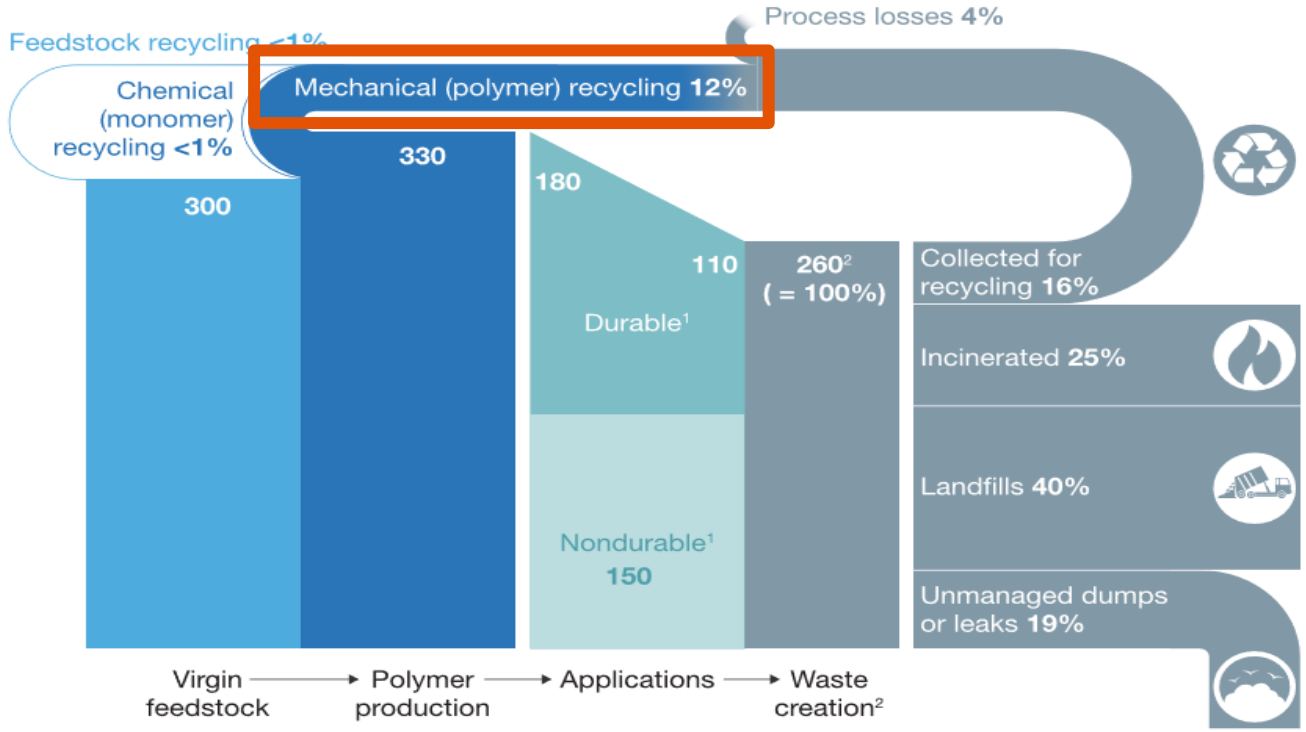
84% of the plastic materials are not recycled

Currently, most plastics are not recycled after their disposal

*via a combination of mechanical recycling, monomer recycling (depolymerization) and pyrolysis to feedstock

** ACC Study Link

THE GLOBAL POLYMER FLOWS 2016 (MILLIONS OF METRIC TONS PER ANNUM)



¹Durable applications with an average lifetime >1 year will end up as waste only in later years; nondurable applications go straight to waste.
²150 million metric tons of mixed plastic waste from nondurable applications that end up as waste in same year, plus 110 million metric tons of mixed plastic waste from production in previous years.

McKinsey&Company

https://www.mckinsey.com/industries/chemicals/our-insights

Only 12% of the plastic waste end up being recovered

Not sustainable situation where plastic waste is becoming excessive

*via a combination of mechanical recycling, monomer recycling (depolymerization) and pyrolysis to feedstock

** ACC Study Link

CIRCULAR ECONOMY ARGUMENTS

EARTH OVERSHOOT DAY

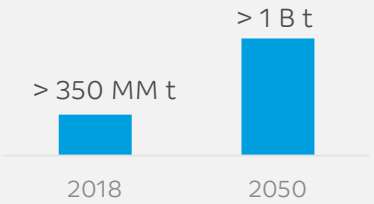
July 29
2019

When human demand for resources and services has surpassed what the Earth can regenerate in a year. The earliest Earth Overshoot Day since ecological overshoot started in the early 1970s.

MARINE LITTER

150 million tons of plastic waste are in the ocean today – without significant action, there may be more plastic than fish in the ocean, by weight, by 2050.

PLASTICS DEMAND



Annual global plastics production exceeds 350 million tons and demand growth projected to surpass 1 billion tons by 2050.

PLASTIC WASTE

460 MM t/year
by 2030

Annual global plastic waste volumes could reach 460 million tons by 2030.

PROMOTING ECONOMIC GROWTH

50% = $60 B

Recycling rate

Achieving a 50% recycling rate* by 2030 could generate up to $60 billion.

REGULATIONS

More and more directives and potentially regulatory & legislation driving circularity.

PUBLIC OPINION

Increasing public awareness and demand for more action to reduce carbon footprint and waste.

*via a combination of mechanical recycling, monomer recycling (depolymerization) and pyrolysis to feedstock

LINEAR ECONOMY

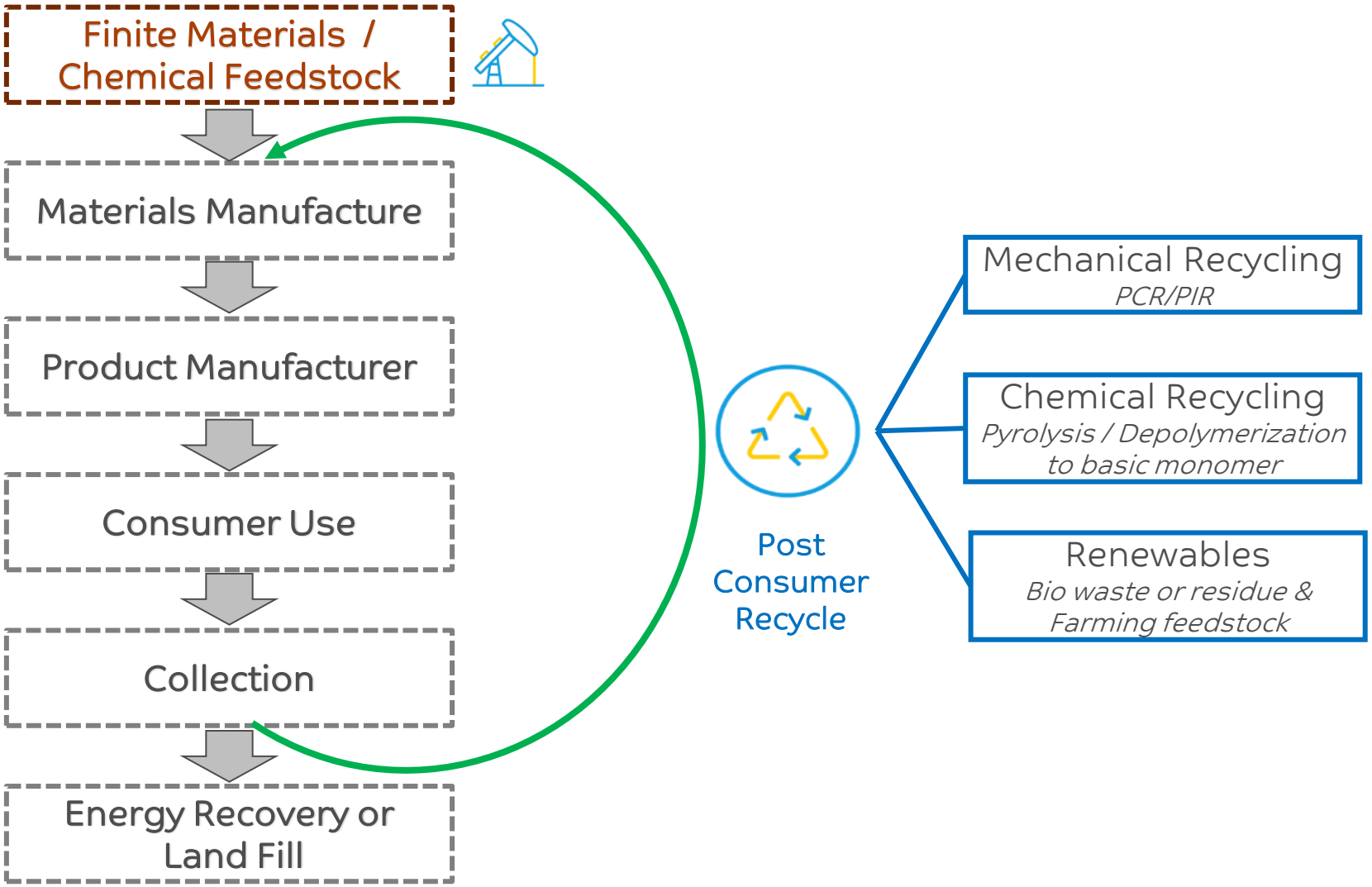
CIRCULAR ECONOMY

PRODUCE . USE . RECYCLE

What are the solutions today to achieve a close loop?

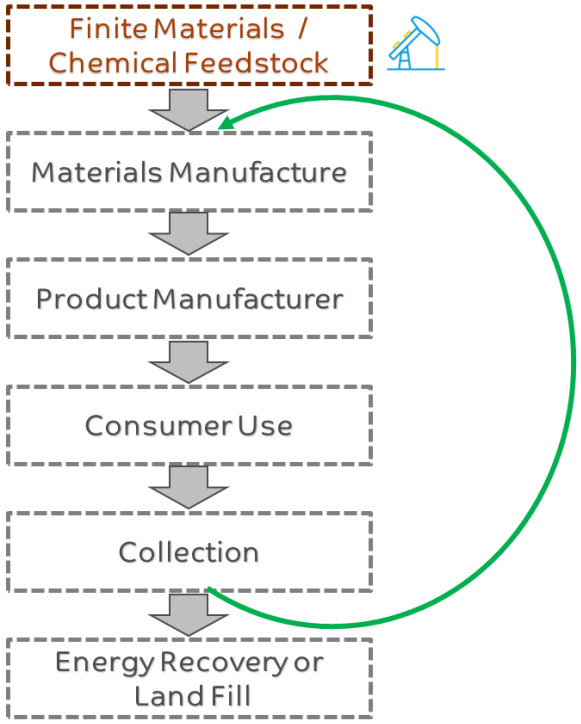
SUSTAINABILITY SOLUTIONS

CIRCULAR ECONOMY
GOAL: MINIMIZE LEAKAGE TO ENVIRONMENT/OCEANS



- *Adapted from Ellen MacArthur Foundation diagram and others: Biological and Technological Cycles*
- *PCR= Post Consumer Recycle, PIR= Post Industrial Recycle . Both are secondary raw materials*

CIRCULAR ECONOMY
GOAL: MINIMIZE LEAKAGE TO ENVIRONMENT/OCEANS



Post Consumer Recycle

Mechanical Recycling
PCR/PIR

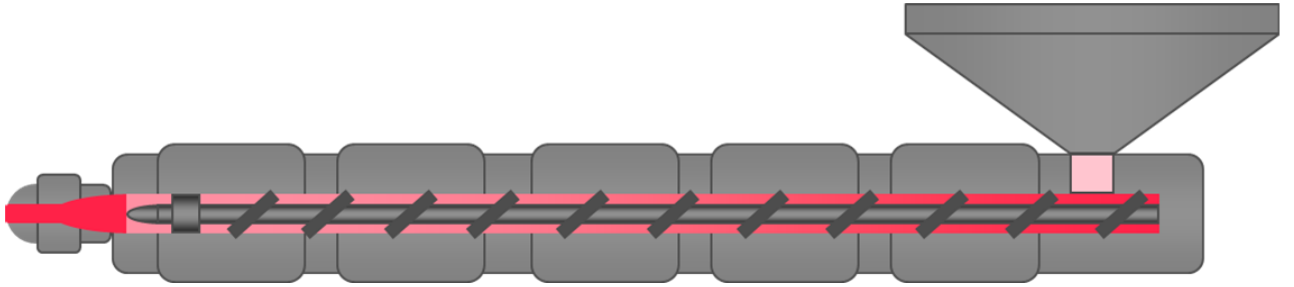
Chemical Recycling
Pyrolysis / Depolymerization to basic monomer

Renewables
Bio waste or residue & Farming feedstock

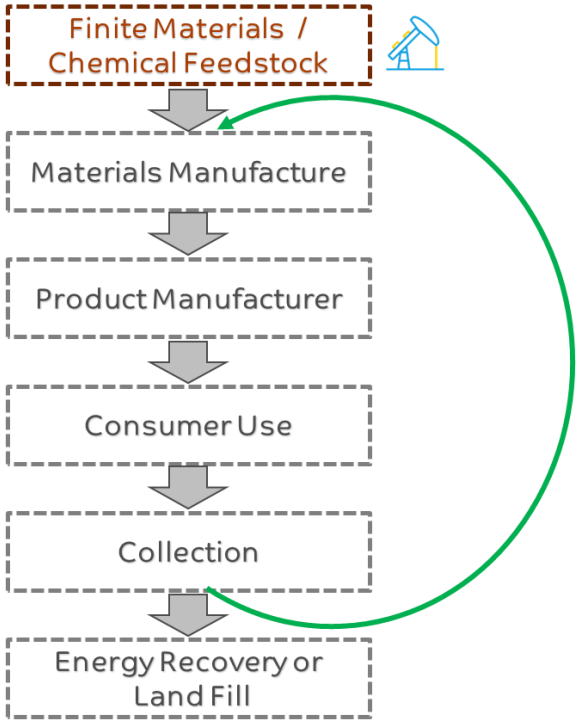
Virgin resin

Collection
Sorting
Washing
Drying
Crushing
Metal Removal
Extrusion
Inspection

PCR/PIR COMPOUNDS

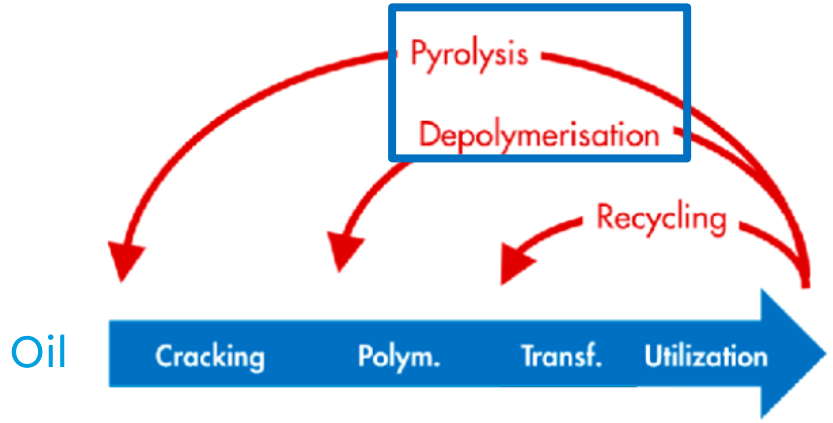


CIRCULAR ECONOMY
GOAL: MINIMIZE LEAKAGE TO ENVIRONMENT/OCEANS

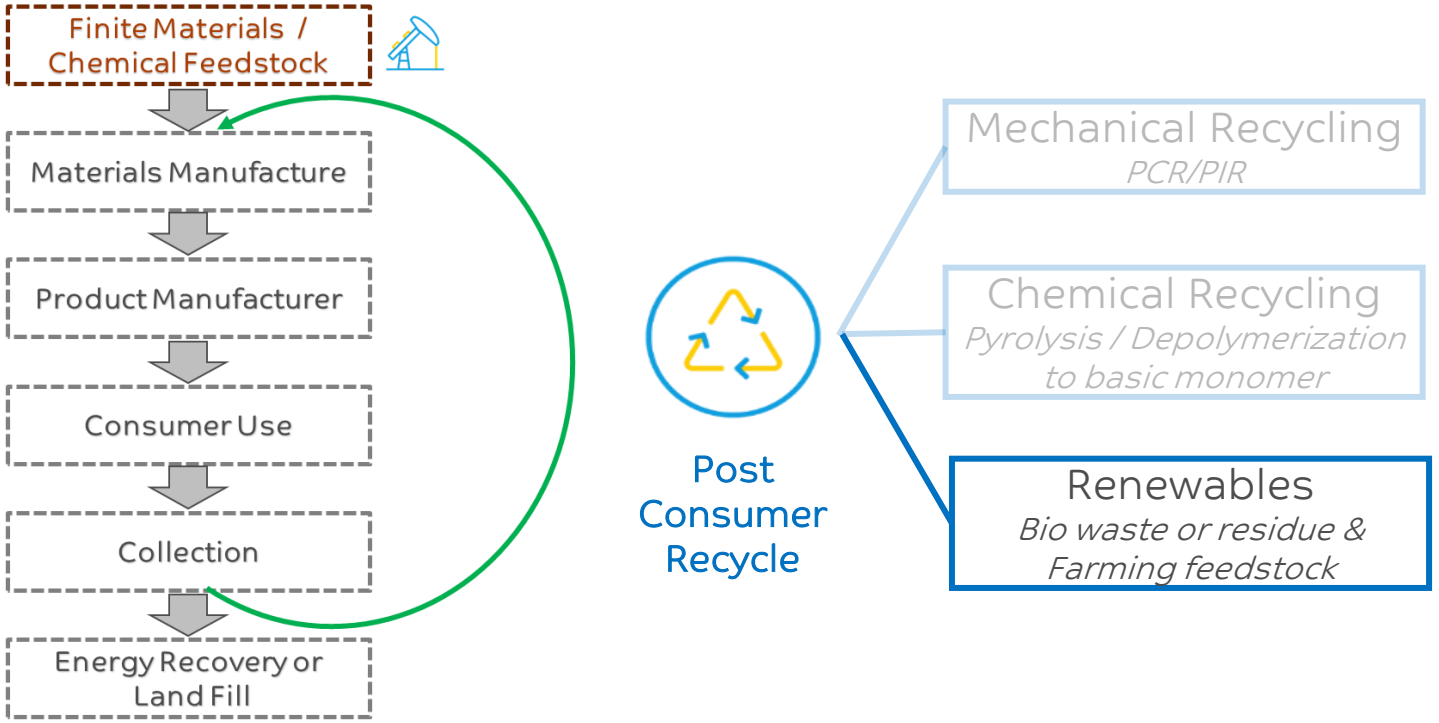


Post Consumer Recycle

- Mechanical Recycling *PCR/PIR*
- **Chemical Recycling** *Pyrolysis / Depolymerization to basic monomer*
- Renewables *Bio waste or residue & Farming feedstock*



CIRCULAR ECONOMY
GOAL: MINIMIZE LEAKAGE TO ENVIRONMENT/OCEANS



Feedstock derived from waste or residue, such as crude tall oil from the wood industry (pulp & paper) and HVO*

*Hydrotreated vegetable oils, such as used cooking oil, rapeseed, and technical corn oil residue from ethanol fermentation

INTEGRATE CIRCULAR SOLUTIONS IN YOUR VALUE CHAIN

MECHANICAL RECYCLING

Mechanically recycled resins and/or fillers:

- ✓ Closed loop opportunities
- × Potential property drop
- ✓ Hybrid solution; mix with virgin material
- ✓ Opportunities for PCR & PIR

CHEMICAL RECYCLING

Chemically recycled resin:

- ✓ De-polymerization
- ✓ Pyrolysis using post-consumer mixed-plastic waste
- ✓ Virgin equivalent property
- ✓ Potential use in certain healthcare and food-contact applications

RENEWABLE COMPOUNDS

Bio-based resins (mass balance)

- ✓ Easy drop in
- ✓ Virgin equivalent properties
- ✓ Opportunity to source intermediates
- ✓ Feedstock not competitive with the human food chain

SUSTAINABLE DESIGN

Design to improve reuse, durability & recyclability:

- ✓ Mono-material, part simplification
- ✓ Reduce weight & material use
- ✓ Non-halogenated FR
- ✓ Processing efficiency

SABIC circular ambition is driven by the growing industry desire for sustainable solutions and fueled by our vision to compound the answer.

OVERVIEW LNP™ SUSTAINABLE SOLUTIONS[1,2]

MECHANICAL RECYCLING

20-80%
Sustainable Content

Up to:
46%
CO_2 reduction

CHEMICAL RECYCLING

20-60%
Sustainable Content

Up to:
41%
CO_2 reduction

RENEWABLE COMPOUNDS

30-60%
Sustainable Content

Up to:
63%
CO_2 reduction

1. Lower carbon footprint in comparison to same materials containing 100% crude oil feedstock.
2. Based on preliminary data from ELCRIN iQ PBT 3rd generation development

CERTIFICATION

PRODUCT CERTIFICATIONS – RECYCLED & RENEWABLE CONTENT

- Certification provides traceability for materials and products, using third-party audits
- 2 types of certifications are currently available for Specialties' products, providing transparent documentation to customers

Recycled content certification (SCS Global)

- Allows demonstration of products containing pre-consumer or post-consumer material classified using definitions based on ISO 14021:1999(E)
- Verifies marketing claims conform with the Federal Trade Commission (FTC) Guides for the Use of Environmental Marketing Claims

SCS Global Services does hereby certify that an independent assessment has been conducted on behalf of:

SABIC Innovative Plastics US LLC, and affiliated companies

2500 City West Boulevard, Houston, TX, United States

For the following product(s):

Compounded Thermoplastic Resin Pellets:
LEXAN™ EXL8454

The product(s) meet(s) all of the necessary qualifications to be certified for the following claim(s):

SCS RECYCLED CONTENT CERTIFIED

Conforms to SCS Recycled Content Standard V7-0 for a **Minimum 50% Post-Consumer Recycled (PCR) Content.** The material quantification and mass-balance calculations are completed on a dry-weight basis.

CERTIFIED RECYCLED CONTENT — MINIMUM 50% RECYCLED CONTENT POST-CONSUMER

Registration # SCS-RC-05418
Valid from: March 12, 2020 to March 11, 2021

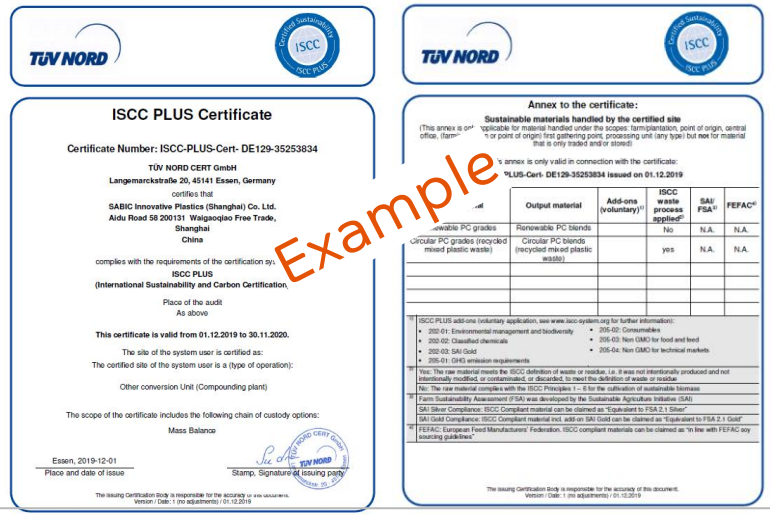
Example

SCSglobal SERVICES

Stanley Mathuram, PE, Vice President
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA

International Sustainability & Carbon Certification Plus (ISCC+)

- Circular and bio-based economy certification of environmentally, socially and economically sustainable production
- Provides credible certification for all types of agricultural and forestry raw materials, waste and residues, non-bio renewables, recycled carbon materials and supply chains
- Ensures compliance with the mass balance chain of custody



TÜV NORD — ISCC

ISCC PLUS Certificate

Certificate Number: ISCC-PLUS-Cert- DE129-35253834

TÜV NORD CERT GmbH
Langemarckstraße 20, 45141 Essen, Germany
certifies that

SABIC Innovative Plastics (Shanghai) Co. Ltd.
Aidu Road 58 200131 Waigaoqiao Free Trade, Shanghai
China

complies with the requirements of the certification sy
ISCC PLUS
(International Sustainability and Carbon Certification)

Place of the audit
As above

This certificate is valid from 01.12.2019 to 30.11.2020.

The site of the system user is certified as:
The certified site of the system user is a (type of operation):

Other conversion Unit (Compounding plant)

The scope of the certificate includes the following chain of custody options:
Mass Balance

Essen, 2019-12-01
Place and date of issue

Stamp, Signature of issuing party

The issuing Certification Body is responsible for the accuracy of its documents.
Version / Date: 1 (no adjustments) / 01.12.2019

TÜV NORD — ISCC

Annex to the certificate:

Sustainable materials handled by the certified site

(This annex is only applicable for material handled under the scopes: farm/plantation, point of origin, central office, (farm or point of origin) first gathering point, processing unit (any type) but not for material that is only traded and/or stored)

This annex is only valid in connection with the certificate:
"PLUS-Cert- DE129-35253834 issued on 01.12.2019

	Output material	Add-ons (voluntary)[1]	ISCC waste process applied[2]	SAI/ FSA[3]	FEFAC[4]
Renewable PC grades	Renewable PC blends		No	N.A.	N.A.
Circular PC grades (recycled mixed plastic waste)	Circular PC blends (recycled mixed plastic waste)		yes	N.A.	N.A.

[1] ISCC PLUS add-ons (voluntary application, see www.iscc-system.org for further information):
- 202-01: Environmental management and biodiversity
- 202-02: Classified chemicals
- 202-03: SAI Gold
- 205-01: GHG emission requirements
- 205-02: Consumables
- 205-03: Non GMO for food and feed
- 205-04: Non GMO for technical markets

[2] Yes: The raw material meets the ISCC definition of waste or residue, i.e. it was not intentionally produced and not intentionally modified, or contaminated, or discarded, to meet the definition of waste or residue
No: The raw material complies with the ISCC Principles 1 – 6 for the cultivation of sustainable biomass

[3] Farm Sustainability Assessment (FSA) was developed by the Sustainable Agriculture Initiative (SAI)
SAI Silver Compliance: ISCC Compliant material can be claimed as "Equivalent to FSA 2.1 Silver"
SAI Gold Compliance: ISCC Compliant material incl. add-on SAI Gold can be claimed as "Equivalent to FSA 2.1 Gold"

[4] FEFAC: European Feed Manufacturers' Federation. ISCC compliant materials can be claimed as "in line with FEFAC soy sourcing guidelines"

Example

The issuing Certification Body is responsible for the accuracy of this document.
Version / Date: 1 (no adjustments) / 01.12.2019

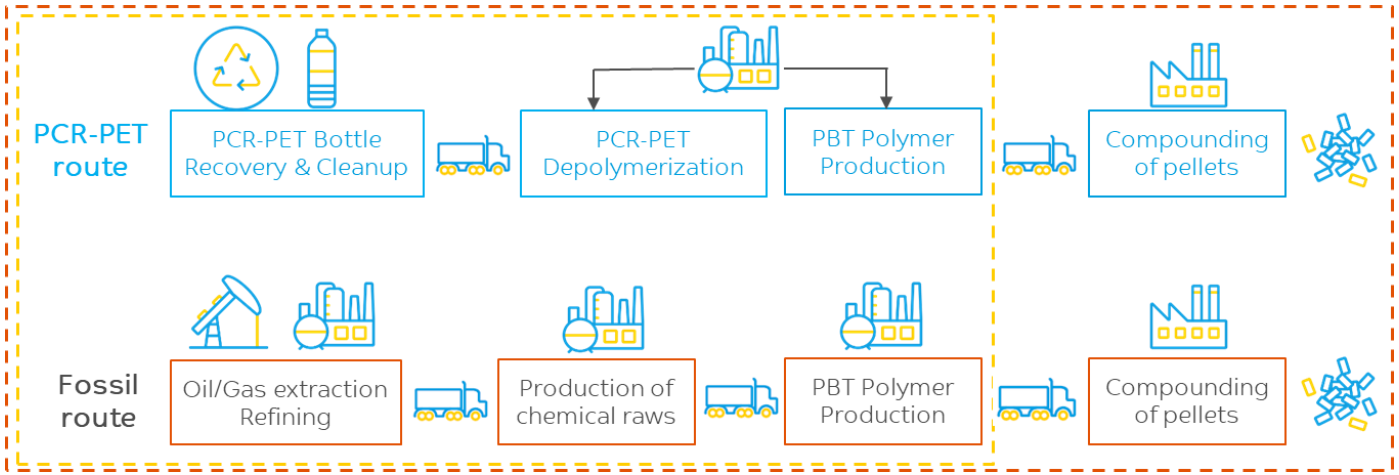
Certifications create a market mechanism and common standards for the circular economy

https://www.scsglobalservices.com/
https://www.iscc-system.org/

LIFECYCLE ASSESSMENT (LCA)

LCA enables measurement of environmental impacts of products throughout the life cycle arising from:

- use of natural resources (fossil resources, water, land, minerals)
- emissions to environment (CO2, SOx, NOx, VOC, toxic releases, etc.)



System boundaries for

Resin LCA

Grade LCA

SABIC follows industry standard methods and databases

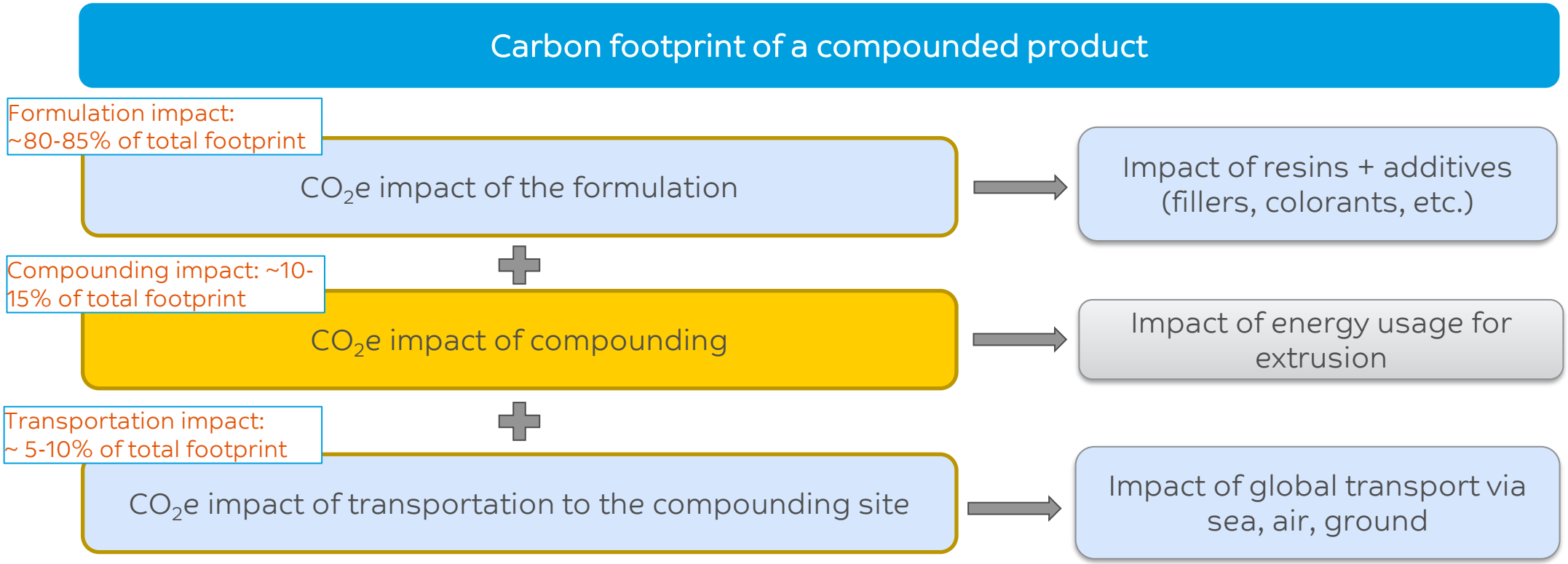
ISO 14040:2006
ISO 14044:2006

Pass 2050

GaBi / SimaProSoftware

LCA is an industry accepted tool to calculate carbon footprints of products and processes

DETAILS OF LCA CALCULATIONS FOR COMPOUNDED PRODUCTS - INPUTS



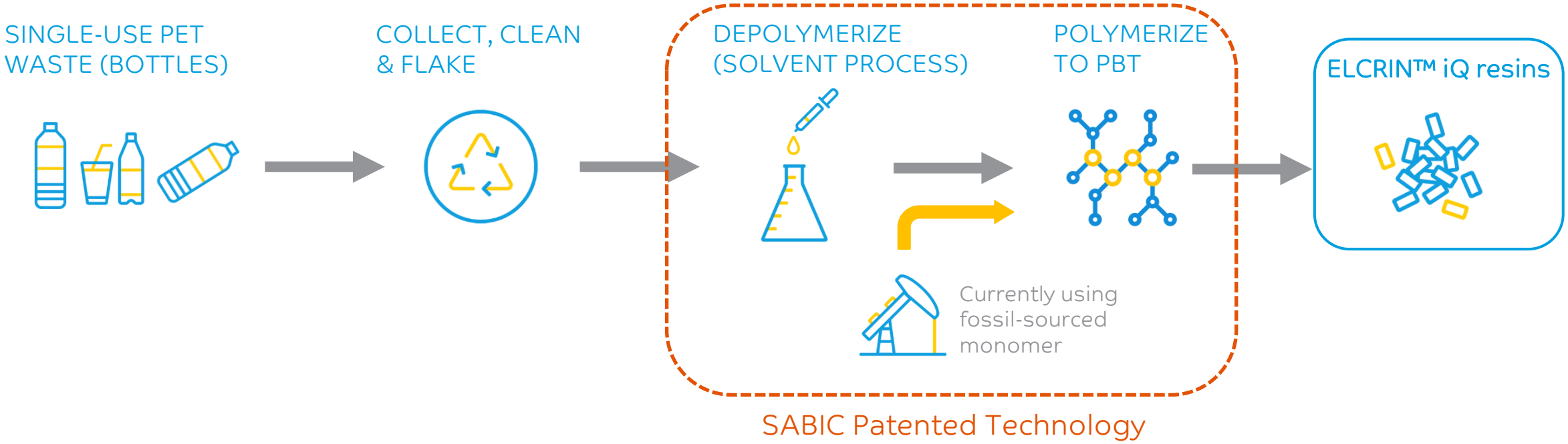
Base resin choice is the most impacting factor on environmental footprint

Estimated based on SABIC internal values based on a broad range of resins

CASE STUDY

CASE STUDY:
LNP™ ELCRIN™ IQ (PBT) RESIN

LNP™ ELCRIN™ iQ PBT – CHEMICAL UPCYCLING* OF PET WASTE

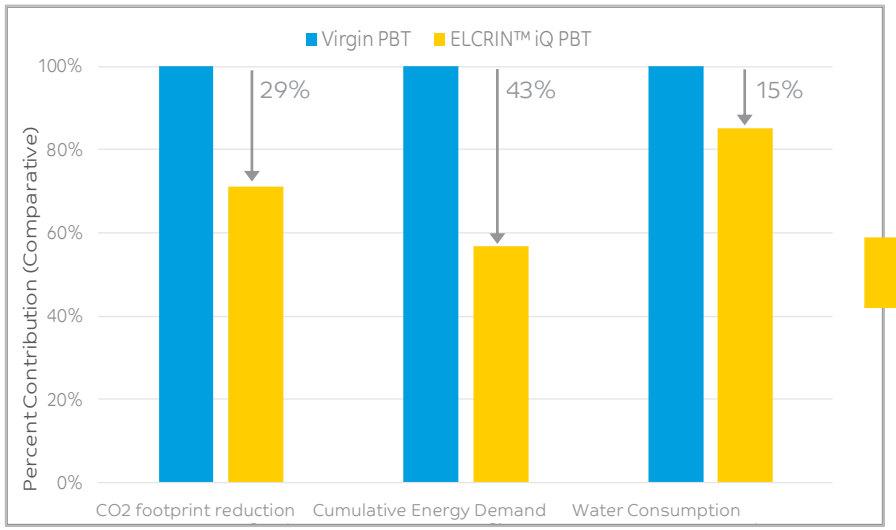


Every 1kg of ELCRIN iQ resins = 0.87kg of post-consumer recycled PET = 67 PET bottles of 0.5 liter

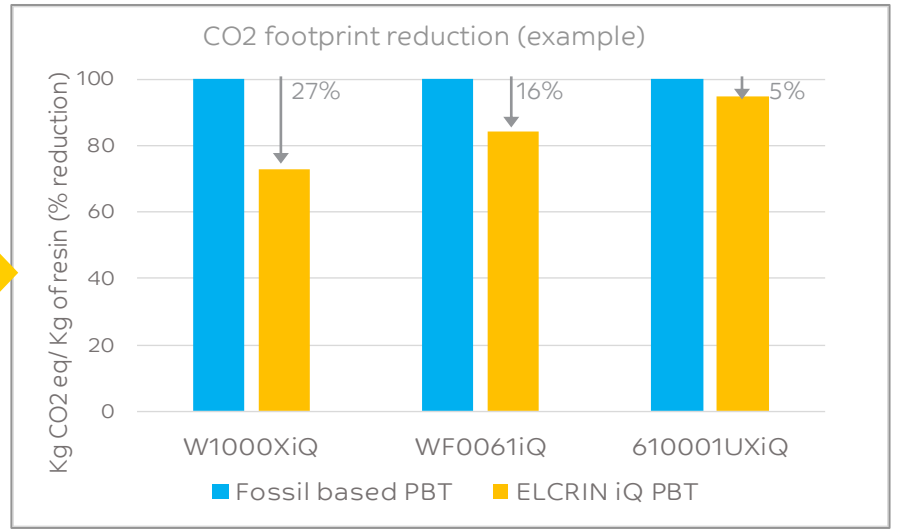
*Upcycling of a single-use polymer (PET) to a non-single use, durable polymer (PBT)

CRADLE-TO-GATE LCA RESULTS

LCA Results for ELCRIN™ iQ (PBT) resin



LCA Results for Compounds



W1000XiQ: **PBT**
WF0061iQ: **PBT-GF30-FR**
610001UXiQ: **PC/PBT-FR**

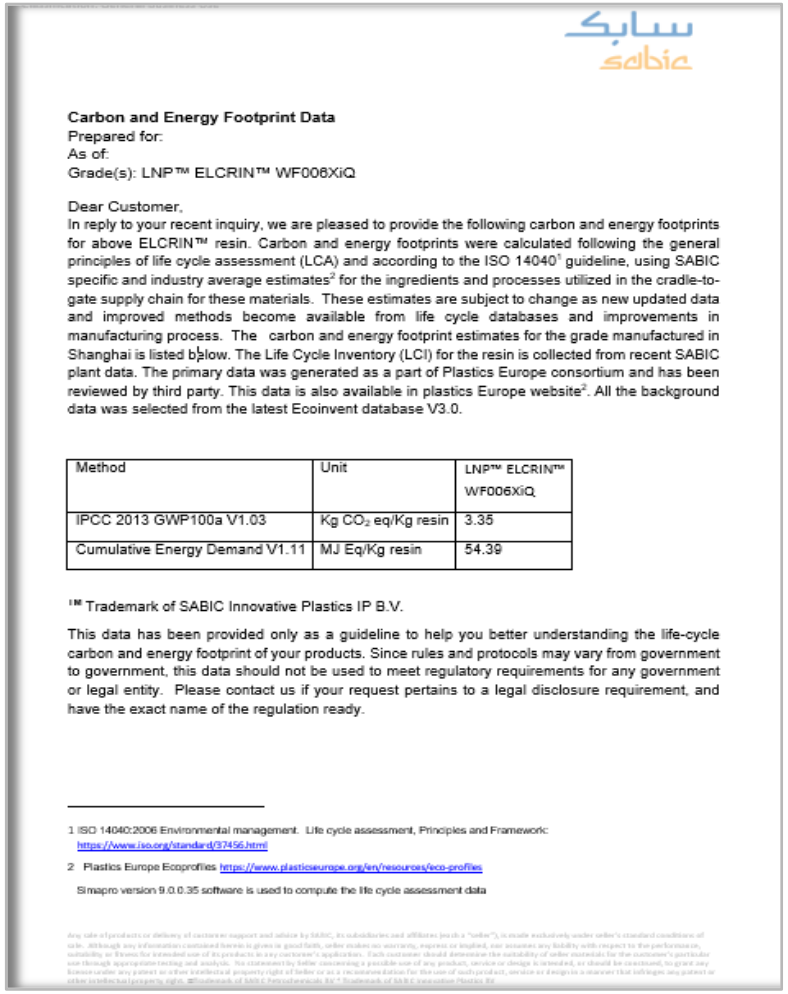
Results from the resin LCA can be used to calculate footprints of compounds used by customers

LCA for compounds incorporates:
- impact of formulation ingredients
- impact of compounding process
- impact of transportation

Resin data from ISO 14040/14044 compliant, 3rd party reviewed study can be shared externally

Virgin and ELCRIN™ iQ PBT LCA completed in 2020 per ISO 14040/14044 standards and underwent 3rd party critical review
LCA for compounds containing ELCRIN™ iQ PBT completed per ISO14040/14044 standards and underwent internal review

CUSTOMER COMMUNICATION PROTOCOLS



Carbon and Energy Footprint Data
Prepared for:
As of:
Grade(s): LNP™ ELCRIN™ WF006XiQ

Dear Customer,
In reply to your recent inquiry, we are pleased to provide the following carbon and energy footprints for above ELCRIN™ resin. Carbon and energy footprints were calculated following the general principles of life cycle assessment (LCA) and according to the ISO 14040[1] guideline, using SABIC specific and industry average estimates[2] for the ingredients and processes utilized in the cradle-to-gate supply chain for these materials. These estimates are subject to change as new updated data and improved methods become available from life cycle databases and improvements in manufacturing process. The carbon and energy footprint estimates for the grade manufactured in Shanghai is listed below. The Life Cycle Inventory (LCI) for the resin is collected from recent SABIC plant data. The primary data was generated as a part of Plastics Europe consortium and has been reviewed by third party. This data is also available in plastics Europe website[2]. All the background data was selected from the latest Ecoinvent database V3.0.

Method	Unit	LNP™ ELCRIN™ WF006XiQ
IPCC 2013 GWP100a V1.03	Kg CO_2 eq/Kg resin	3.35
Cumulative Energy Demand V1.11	MJ Eq/Kg resin	54.39

™ Trademark of SABIC Innovative Plastics IP B.V.

This data has been provided only as a guideline to help you better understanding the life-cycle carbon and energy footprint of your products. Since rules and protocols may vary from government to government, this data should not be used to meet regulatory requirements for any government or legal entity. Please contact us if your request pertains to a legal disclosure requirement, and have the exact name of the regulation ready.

1 ISO 14040:2006 Environmental management. Life cycle assessment, Principles and Framework: https://www.iso.org/standard/37456.html

2 Plastics Europe Ecoprofiles https://www.plasticseurope.org/en/resources/eco-profiles

Simapro version 9.0.0.35 software is used to compute the life cycle assessment data

Any sale of products or delivery of customer support and advice by SABIC, its subsidiaries and affiliates (each a "seller"), is made exclusively under seller's standard conditions of sale. Although any information contained herein is given in good faith, seller makes no warranty, express or implied, nor assumes any liability with respect to the performance, suitability or fitness for intended use of its products in any customer's application. Each customer should determine the suitability of seller materials for the customer's particular use through appropriate testing and analysis. No statement by seller concerning a possible use of any product, service or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Seller or as a recommendation for the use of such product, service or design in a manner that infringes any patent or other intellectual property right. ®Trademark of SABIC Petrochemicals B.V. ™ Trademark of SABIC Innovative Plastics BV

Customer letter discloses:

- Global Warming Potential or
  CO_2 footprint
- Cumulative Energy Demand

Additional categories can be reported upon demand

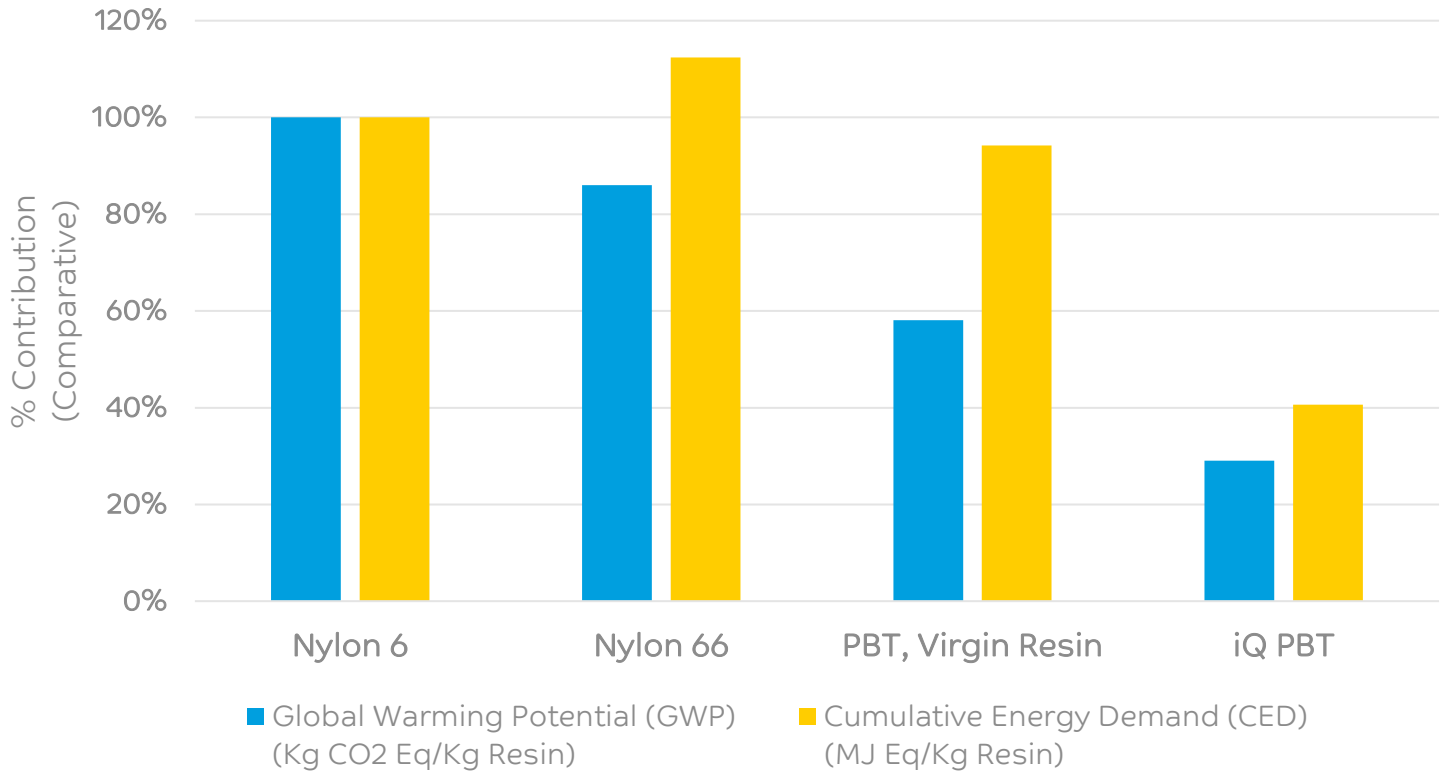
Methodologies and data sources are shared for transparency

There are **different systems to calculate LCA** with different simplification approach . That is why it makes also sense to share the **% of improvement** of Carbon footprint vs. an existing & new version together with absolute data.

LIFE CYCLE ASSESSMENT

Sustainability and social responsibility drivers are changing the plastics industry – to reduce waste and carbon + energy footprints for materials

COMPARISON OF RESIN CRADLE TO GATE FOOTPRINT DATA*



COMPARED WITH VIRGIN PBT*:

- ↓ 34% Global Warming Potential
- ↓ 56% Cumulative Energy Demand
- ↓ 25% Water consumption

*Data on Nylon 6 and 66 Resins from Ecoinvent; iQ and virgin PBT data from 2021 critically-reviewed LCA Study, which is currently being updated

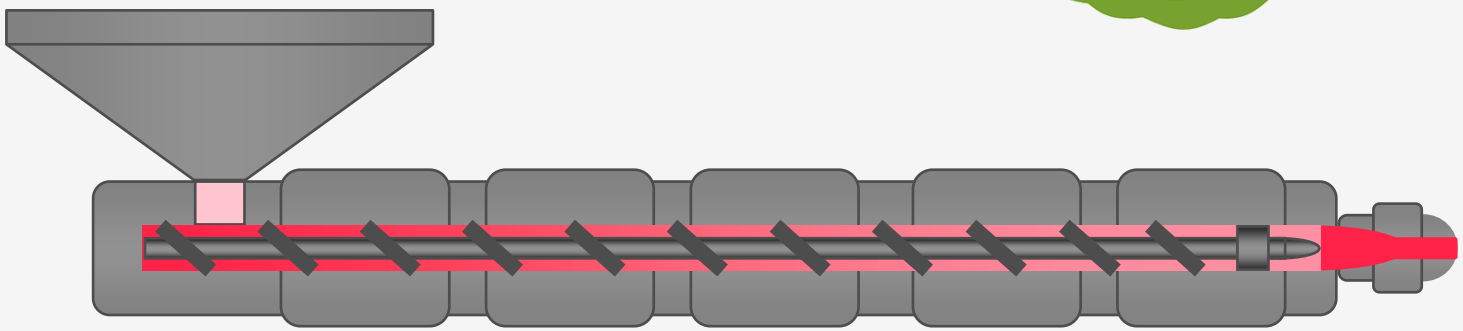
CASE STUDY:
LNP™ ELCRES™ (PC) RESIN

OUR MECHANICAL RECYCLING PROCESS EXPLAINED

PCR

Specialties resins
and copolymers

Collection
Sorting
Washing
Drying
Crushing
Metal Removal
Extrusion
Inspection

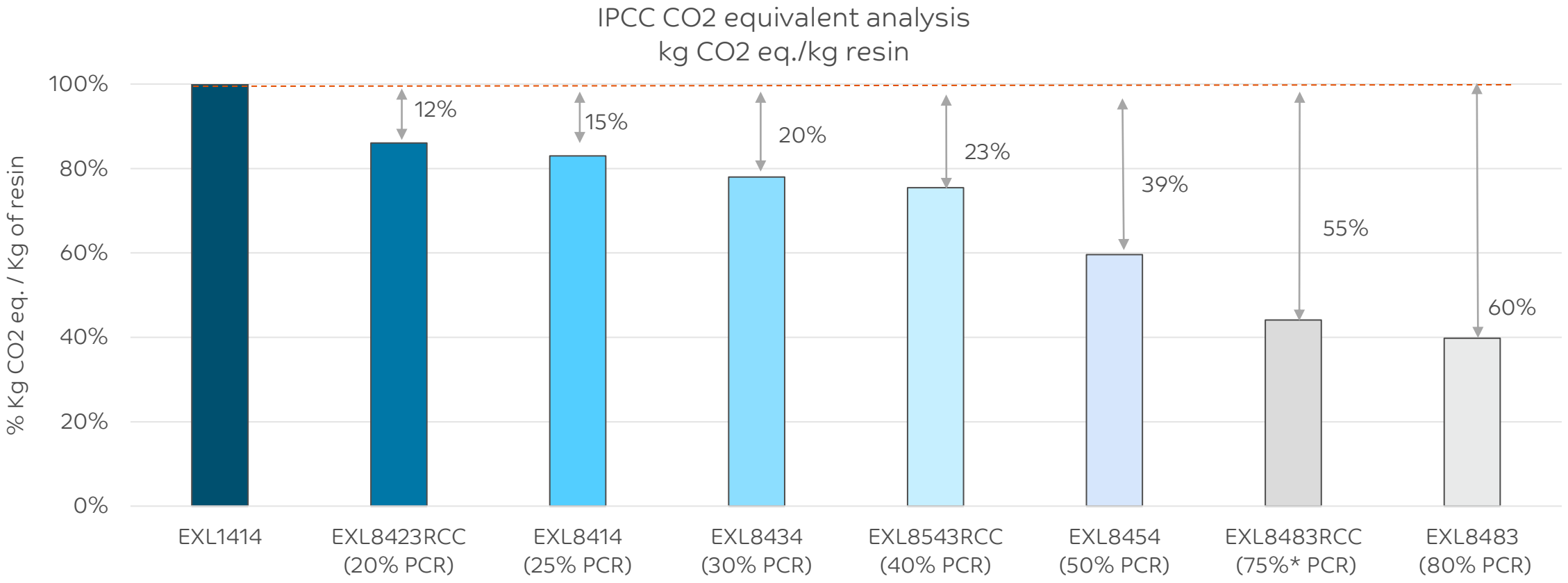


Third-party certification of PCR content conducted by SCS Global Services.

PCR COMPOUNDS

SCS Global Services certification conforms with the Federal Trade Commission (FTC) Guides for the Use of Environmental Marketing Claims and ISO 14021:1999

LNP™ PCR EXL (PC-COPOLYMER) RESINS COMPARISON

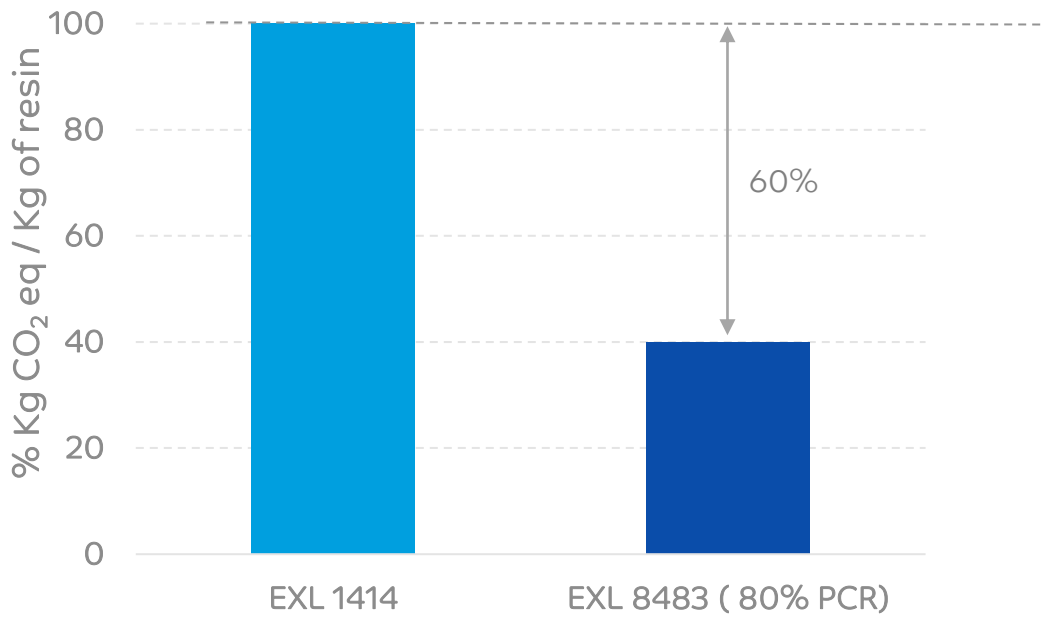


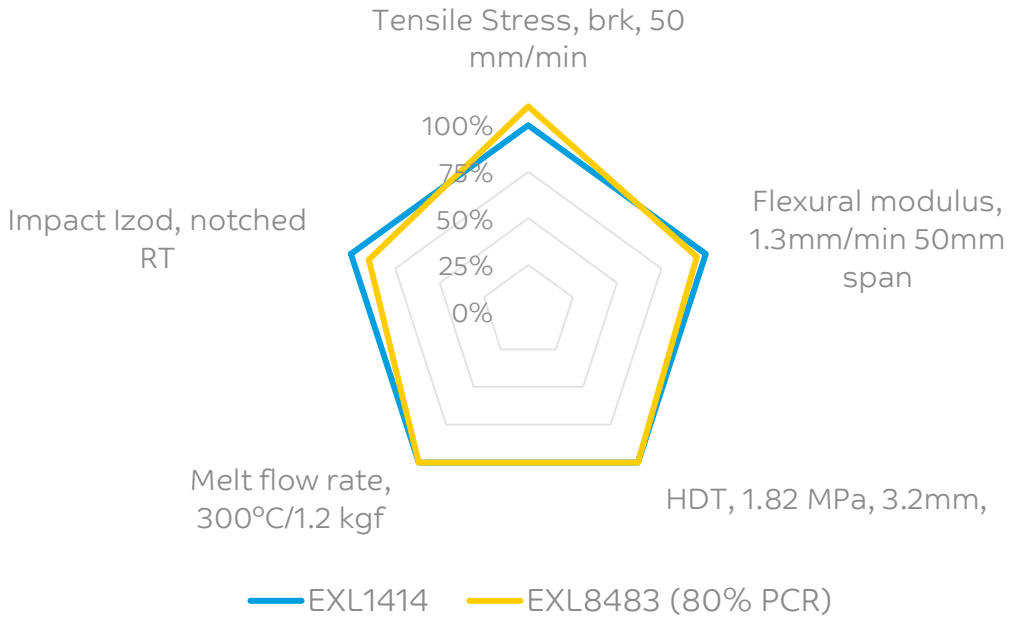
Significant savings in CO_2 footprint can be obtained depending on PCR content
Product managers can provide such data upon request for sharing with customers

* All reduction claims are based on internal life cycle assessment

DROP IN SOLUTION WITH REDUCED CO_2 FOOTPRINT EXL1414 (VIRGIN GRADE) VS. EXL8483 (80% PCR)

IPCC CO_2 equivalent analysis





Compared with standard EXL1414 resin:

60% CO_2 reduction*

Drop in solution for standard EXL resins

Properties performance close to virgin EXL grades such as EXL1414

* Based on internal life cycle assessment

CASE STUDY: RENEWABLES

SABIC RENEWABLE FEEDSTOCK

RENEWABLE FEEDSTOCK

- Second generation feedstock, not in competition with food chain
- Non-fossil based
- Derived from waste or residue, such as crude tall oil from the wood industry (pulp & paper) and HVO*
- Externally certified value chains
  - ISCC plus
  - FSC® and PEFC™ sustainable forest management certifications for UPM forests (applies to bio-naphtha from crude tall oil)

*Hydrotreated vegetable oils, such as used cooking oil, rapeseed, and technical corn oil residue from ethanol fermentation

ISCC+ CERTIFIED PORTFOLIO IN EUROPE

NOW: Potential portfolio of 60+ grades available containing ISCC+ certified renewable feedstock

LNP™ EXL, HCX, SLX, XHT, CXT products form EU production

17 – 55%* Rnw Carbon

21 – 62 %* CO_2

ULTEM™ resin

All grade

10 – 25%* Rnw Carbon

5 – 10 %* CO_2

NORYL™ resin

As of 2022 for PPE parts

10 – 50%* Rnw Carbon

10 – 25 %* CO_2

LNP Compounds EU production

PC, PEI & PPE based

10 – 55%* Rnw Carbon

5 – 50 %* CO_2

AMBITION: to have sustainable versions available for:

- Any PC based compound
- Any PEI based compound
- Any PPE based compound

*under review

ROADMAP

CHALLENGES

- Availability & consistency of feedstock are a limiting factor for mechanical & chemical recycling.
- Demand on PCR is strongly growing but customer have not yet in place a close loop-based stream and are not using design for recycling & repair.
- Regulatory and standards in many cases are still missing – therefore customers are not so sure what they want*: CO2, water, energy reduction, waster usage, …
- There are different systems to calculate LCA with different simplification approach (SIMAPRO and GABI). Data are currently not comparable!
- Wording & definition are still under development and sometime used differently. Deep dive discussion are needed to really understand what customer wants.
- (B to B) and (B to C) have a different view & timelines on sustainability and value CO2 saving differently. It will take some time until the sustainability market will establish.

*Different elements of LCA: (EU website link

INTEGRATE RAW MATERIAL STRATEGY SOLUTIONS IN OUR VALUE CHAIN

MECHANICAL RECYCLING

Mechanically recycled resins and/or fillers:

- ✓ PCR PC
- • PCR HIPS
- ✓ Reclaimed CF
- • Opportunities for closed loop
- • Copolymer as performance booster

CHEMICAL RECYCLING

Chemically recycled resin using post-consumer mixed-plastic waste for virgin equivalent property

- ✓ IQ PBT
- • Upcycled Polyamides
- ✓ Pre consumer GF

RENEWABLE RESINS

Bio-based building blocks/resins (ISSC+):

- ✓ ISSC+ PC & copolymers
- • Bio PA
- • ISSC+ PPE & copolymers
- ✓ ISSC+ PEI & copolymers

SUSTAINABLE DESIGN

Design to improve reuse durability & recyclability:

- ✓ Mono-material (1K), part simplification
- ✓ Reduce weight* & material use (thinwall)
- ✓ Non-halogenated FR, alternative additives
- ✓ Processing efficiency
- ✓ Paint out solutions

- • Ongoing implementation in SABIC Specialties portfolio
- ✓ Implemented in SABIC Specialties portfolio

** Metal replacement – requires different design to keep mechanical performance*

OUTLOOK SABIC SUSTAINABLE APPROACH

- Broad offering of bio-based Specialties portfolio. Readily available as drop-in solution in existing tools.
- PCR Copolymer solution for virgin properties using the advantages of copolymer technology
- Chlorine & bromine free and Antimony-trioxide free flame-retardant solutions
- Fluorine (PTFE) free solution for self lubricated compounds – Lubriloy™ compounds
- Longer lifetime by enhanced chemical resistance with ELCRES CRX resin.
- LNP™ SLX resin solution for advance weathering, anti scratch & diffusive colors for paint replacement
- Noryl™ resin for excellent hydro ageing and low density for water management and EV-batteries.
- Advanced simulation support for thin wall design and metal replacement for weight out solution

DISCLAIMER

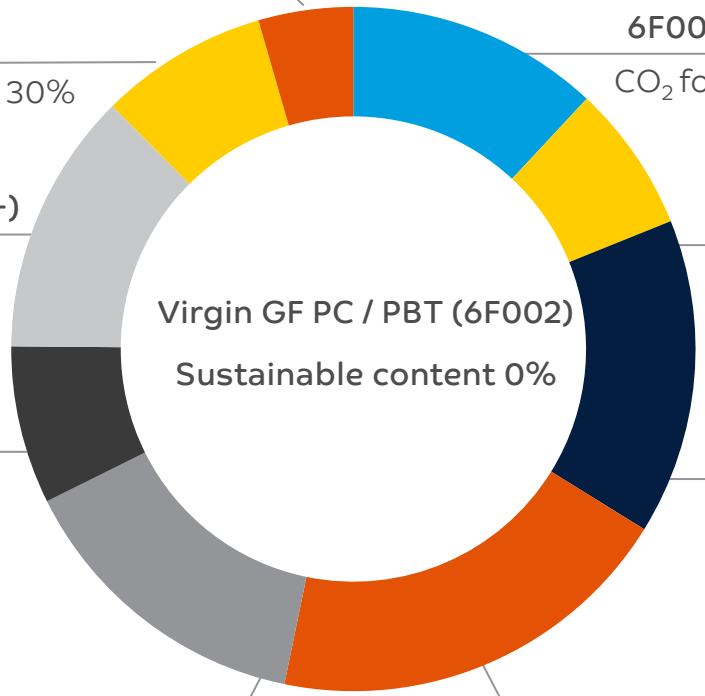
DISCLAIMER: THE MATERIALS, PRODUCTS AND SERVICES OF SAUDI BASIC INDUSTRIES CORPORATION (SABIC) OR ITS SUBSIDIARIES OR AFFILIATES SELLER "") ARE SOLD SUBJECT TO SELLER S STANDARD CONDITIONS OF SALE, WHICH ARE AVAILABLE UPON REQUEST. INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS DOCUMENT ARE GIVEN IN GOOD FAITH. HOWEVER, SELLER MAKES NO EXPRESS OR IMPLIED REPRESENTATION, WARRANTY OR GUARANTEE (i) THAT ANY RESULTS DESCRIBED IN THIS DOCUMENT WILL BE OBTAINED UNDER END USE CONDITIONS, OR (ii) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN OR APPLICATION INCORPORATING SELLER S MATERIALS, PRODUCTS, SERVICES OR RECOMMENDATIONS. UNLESS OTHERWISE PROVIDED IN SELLER S STANDARD CONDITIONS OF SALE, SELLER SHALL NOT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS, SERVICES OR RECOMMENDATIONS DESCRIBED IN THIS DOCUMENT. Each user is responsible for making its own determination as to the suitability of Seller s materials, products, services or recommendations for the user s particular use through appropriate end use and other testing and analysis. Nothing in any document or oral statement shall be deemed to alter or waive any provision of Seller s Standard Conditions of Sale or this Disclaimer, unless it is specifically agreed to in a writing signed by Seller. Statements by Seller concerning a possible use of any material, product, service or design do not, are not intended to, and should not be construed to grant any license under any patent or other intellectual property right of Seller or as a recommendation for the use of any material, product, service or design in a manner that infringes any patent or other intellectual property right.

Any brands, products or services of other companies referenced in this document are the trademarks, service marks and/or trade names of their respective holders.


THANK YOU

BACK UP

HOW TO MAKE A 10% GLASS FILLED PC/PBT SUSTAINABLE:



6F002XiQ (iQ)
CO_2 footprint reduction 13%

6F002W (ISSC+)
CO_2 footprint reduction 30%

6F002XiQW (iQ & ISSC+)
CO_2 footprint reduction 44%

6F002 30% PCR PC
CO_2 footprint reduction 21%

6F002XPiQ 30% PCR (PCR GF & iQ & mech Recl)
CO_2 footprint reduction 38%

6F002XiQ 30%PCR PC (iQ & Mech Recl)
CO_2 footprint reduction 35%

6F002XPiQ (iQ PBT & PCR GF)
CO_2 footprint reduction 17%

6F002PW (ISSC+ & PCR GF)
CO_2 footprint reduction 32%

6F002XPiQW (PCR GF & iQ & ISSC+
CO_2 footprint reduction 48%

Potential benefits:

- Provide drop-in solutions for the incumbent applications and virgin-like properties
- Reduce the energy and carbon footprint versus the fossil oil-based solutions

Multiple options available

- ISSC+, iQ PBT, PCR PC and GF
- Additional modification of impact, flow also possible

- Multiple options available but we need to get direction of customers needs

)*Estimated Data, subject to critical review and full LCA analysis acc IPCC 2013 GWP 100a V1.03

SPECIALTY MATERIALS WITH LESS CARBON FOOTPRINT

13 CLIMATE ACTION

NET-ZERO CARBON

Unique offerings,
lower carbon footprint[1]

MECHANICAL RECYCLING

COMPOUNDED RESINS
LNP™ COMPOUNDS & NORYL™ RESINS

UP TO 60% CO_2 REDUCTION

- PCR content up to 80%
- Closed loop opportunities
- Hybrid solution; mix with virgin material

CHEMICAL RECYCLING

COMPOUNDS WITH VIRGIN FEEDSTOCK-EQUIVALENT PROPERTIES
LNP™ ELCRIN™ iQ PORTFOLIO

UP TO 41%[2] CO_2 REDUCTION

- Green content up to 100%
- Patented depolymerization process

RENEWABLES

BIO-BASED COMPOUNDS & RESINS
ISCC+ CERTIFIED RENEWABLE PC and PEI BASED ULTEM™ & LNP™ PRODUCTS

UP TO 61% CO_2 REDUCTION

- Feedstock not competitive with the human food chain
- Mass balance mechanism
- Virgin equivalent properties

1Lower carbon footprint in comparison to same materials containing 100% crude oil feedstock.
2Based on preliminary data from ELCRIN iQ PBT 3rd generation development

GLOSSARY OF TERMS

- **Circular economy (CE):** A circular economy is a system aimed at gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system (*Ellen MacArthur Foundation)*
- **Closed loop recycling:** The process of utilizing a recycled product in manufacturing of a similar product or the remanufacturing of the same product (*SABIC web*)
- **Cradle-to-Gate:** This is an assessment of a partial product life cycle from resource extraction (cradle) to the factory gate (i.e., before it is transported to the consumer). The use phase and disposal phase of the product are omitted in this case *(Wikipedia)*
- **Cradle-to-Grave:** Cradle-to-grave is the full Life Cycle Assessment from resource extraction ('cradle') to use phase and disposal phase ('grave') *(Wikipedia)*
- **Gate-to-Gate:** Gate-to-gate is a partial LCA looking at only one value-added process in the entire production chain *(Wikipedia)*
- **Greenwashing:** Greenwashing is the act/practice of making an unsubstantiated or misleading claim about the environmental benefits of a product, service, technology or company practice (*Understanding and Preventing Greenwash: A Business Guide; from BSR, 2009)*
- **Life cycle assessment (LCA):** Methodology for assessing environmental impacts associated with all the stages of the life-cycle of a commercial product, process, or service (*Wikipedia)*
- **Mass balance methodology:** Mass-balance (or systems-allocation) accounting is a method of tracking credits for the input of Recycled or Renewable feedstock into a manufacturing process and assigning it to a specific output product, despite physical mixing and dilution with conventional feedstock. The purpose is to enable better sourcing while utilizing more efficient large volume production processes (*detailed explanation will be provided in later training)*
- **Post consumer recycle (PCR)**: Material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product that can no longer be used for its intended purpose. This includes returns of materials from the distribution chain. (Source: ISO 14021:1999)
- **Pre-consumer material**: Material diverted from the waste stream during the manufacturing process. Excluded is the reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it. (Source: ISO 14021:1999)
- **Post industrial recycle (PIR)**: Same as pre-consumer; however this term is being phased out
- **Renewable feedstocks:** Bio-based material which is managed in a way that enables continuous production without depleting the earth's resources
- **Sustainability:** Focus on meeting the needs of the present without compromising the ability of future generations to meet their needs (*UN Brundtland commission*)
- **Social Responsibility (SR):** Social responsibility means that businesses, in addition to maximizing shareholder value, must act in a manner that benefits society