CERTIFIED RENEWABLE POLYOLEFINS
FROM SABIC’s TRUCIRCLE™ PORTFOLIO OF CIRCULAR SOLUTIONS
SABIC’s TRUCIRCLE™ portfolio and services for circular solutions span; design for recyclability, mechanically recycled products, certified circular products from feedstock recycling of used plastics, certified renewables products from bio-based feedstock and closed loop initiatives to recycle plastic back into high quality applications and help prevent valuable used plastics from becoming waste. Our TRUCIRCLE solutions are aiming to help companies around the world to drive the change needed to become a circular global society.
PRODUCTS FROM BIO-BASED FEEDSTOCK

SABIC offers certified renewable polyethylene (PE) and polypropylene (PP) materials produced from bio-based feedstock that is not in direct competition with the human food chain. These products can have a lower carbon footprint in comparison to fossil alternatives, supporting:

- Up to 80% reduction of fossil depletion
- Up to 4 kilograms reduction of greenhouse gas (GHG) footprint

BIO-BASED FEEDSTOCK USED BY SABIC:

- REPLACING FOSSIL BASED FEEDSTOCK
- SECOND GENERATION RENEWABLE
- ANIMAL-FREE FEEDSTOCK
- PALM OIL-FREE FEEDSTOCK
- DERIVED FROM FORESTRY RESIDUE
CERTIFIED RENEWABLE PRODUCTS

SABIC’s TRUCIRCLE™ portfolio and services include certified renewable polymers are based on second-generation, animal-free, bio-based feedstock such as tall oil waste from wood pulping process. SABIC’s certified renewable polymers have been accredited through the International Sustainability and Carbon Certification (ISCC PLUS).

SABIC’s renewable polyethylene (PE) and polypropylene (PP) materials use bio-based feedstock which is not in direct competition with the human food chain and can help to mitigate the impact of climate change.

RENEWABLE FEEDSTOCKS

The use of renewable feedstock can reduce the need for fossil resources, potentially reducing the depletion of fossil resources by up to 80%. The sources of the feedstock are selected to avoid direct competition with human food chain and feed production, so-called second generation sources. SABIC uses feedstock coming from plant sources and excludes animal sources.

The sustainability characteristics of the renewable feedstock as well as the routing of the feedstock through the supply chain to end products are aspects of the certification scheme.

CO₂ REDUCTION

Certified renewable materials have a much lower carbon footprint compared to fossil based alternatives e.g. naphtha. By conducting an internal cradle-to-gate lifecycle analysis of its renewable polyolefins, SABIC found that throughout the production process – from sourcing of raw feedstock to final production – each ton of renewable PE and PP resins captures up to four tons of carbon dioxide compared to fossil-based polyolefins. The carbon contained in the feedstock was harvested from the atmosphere in recent years, and is thereby having a short term effect on the carbon balance of the atmosphere.

NO COMPROMISE ON QUALITY

SABIC’s certified renewable materials are made to the same high specifications and properties as virgin products, and are an easy drop-in solution to current production processes. A broad range of PE and PP grades are available as certified renewable grades.

FOSSIL DEPLETION – RELATIVE IMPACTS

![Fossil Depletion Relative Impacts Graph]

- **Fossil Based Feedstock**
- **Renewable Feedstock**

**POLYOLEFINS GHG COMPARISON**

<table>
<thead>
<tr>
<th>Material</th>
<th>Fossil</th>
<th>Renewable</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE</td>
<td>-2.10</td>
<td>-0.20</td>
</tr>
<tr>
<td>LDPE</td>
<td>-1.91</td>
<td>-0.20</td>
</tr>
<tr>
<td>LLDPE</td>
<td>-2.20</td>
<td>-2.20</td>
</tr>
<tr>
<td>PP</td>
<td>-2.20</td>
<td>-2.20</td>
</tr>
</tbody>
</table>

*Average Reduced Carbon Footprint: 4.0*
LCA CONSIDERATIONS

Based on the results of a cradle-to-gate study on SABIC’s certified renewable polymers, carbon footprint reduction was found to be approx. 4 kilograms of CO₂ per kilogram of PE or PP resin in comparison to fossil feedstock based alternatives.

VERIFIED BY ISO CRITICAL REVIEW

The LCA was conducted by the SABIC’s experts and was subsequently reviewed and approved by a panel of third party experts.

APPLICABILITY

The information in this document applies to the certified renewable PE and PP grades sold by SABIC. Several of SABIC’s sites are certified, allowing for a physically linked chain of custody in many markets.

REFERENCES

1) ISCC PLUS certification system
2) Cradle to Gate (kg CO2 eq / kg of polyolefin) ReCiPe 2016 Midpoint (H) V1.03 / World 2010H
3) The effects of the use of biogenic carbon were quantified using the PAS 2050 standard.
4) The LCA study was carried out in conformance with ISO 14040/44 standard, applies CFF (Circular Footprint Formula) methodological framework developed by the EU PEF initiative for EOL allocation of burdens and credits. The study has passed ISO Critical review process that was carried out in conformance with ISO 14071.

MASS BALANCE

CHAIN OF CUSTODY

SABIC’s certified circular and renewable polymers are based on a mass balance approach. To secure the chain of custody the value chain parties require an International Sustainability & Carbon Certification (ISCC PLUS) certification. This widely recognized international sustainability certification scheme verifies that the mass balance accounting follows predefined and transparent rules. In addition, it provides traceability along the supply chain, from the feedstock to the final product.

Alternative feedstock might not be physically traceable throughout the production processes when used together with non-renewable feedstock. Application of Mass Balance to attribute the alternative feedstock to an end-product in a transparent and auditible way.
VALUE OFFER OF CERTIFIED RENEWABLES PRODUCTS

- Replacing fossil based feedstock with bio-based feedstock
- 2nd generation renewable feedstock, not in direct competition with the human food chain
- Feedstock source has a lower carbon footprint compared to fossil alternative
- No compromise on product packaging safety
- Identical product specifications to our current PE and PP portfolio
- No modifications to production processes down-stream, hence no investments are required anywhere in the value chain
- Recyclable

**EACH KG OF RENEWABLE PE/PP CAPTURES UP TO 4 KG OF CO\textsubscript{2} FROM THE ATMOSPHERE WITH FOSSIL DEPLETION REDUCTION POTENTIAL BY UP TO 80%**

Arla’s organic milk goods in SIG Combibloc carton packages using SABIC’s certified renewable PP/PE.
SABIC’s close collaboration with SIG Combibloc packaging company has resulted in SIGNATURE PACK carton packages coated with plastic made from SABIC’s certified renewable PE that is manufactured from plant based feedstock, following a mass balance approach. This material is an easy drop-in solution to current production processes, while complying with food safety regulations. It is used for CoolBest® juice cartons by brand owner RIEDEL, and Candia organic milk cartons from French dairy company SODIAAL. Both applications feature SABIC’s renewable PP polymers for their caps and closures.

Orkla, a leading Nordic supplier of branded consumer goods to the grocery, out of home, specialized retail, pharmacy and bakery sectors, has launched its first chips packaging using certified renewable PP polymer from SABIC’s TRUCIRCLE™ portfolio. The sustainable material is derived from tall oil, a residual product from the Nordic forestry industry, and is converted into a Biaxially Oriented polypropylene (BOPP) film by IRPLAST. The product supports up to 50 percent reduction of CO2 emissions vs. conventional flexible packaging from traditional fossil feedstock.

SABIC’s certified renewable PP helped Hpm™ Hammarplast Medical AB to create its new ECO+ medicine measure cups and ear speculums from bio-based feedstock. PP from our TRUCIRCLE™ portfolio requires up to 80% less fossil hydrocarbon resources based on detailed LCA study done by SABIC. It may also be recyclable and can address certain health and food safety industry standards in Europe without affecting the quality of highly transparent medicine measures. Certified renewable PP material is supplied by the SABIC’s authorized distributor Nordic Polymers.

Reusable Nature Line Cutlery made from UPM Formi EcoAce, using certified wood and certified renewable PP polymer from SABIC’s TRUCIRCLE™ portfolio that are linked to wood based feedstock from UPM Biofuels production. This second generation bio based feedstock from forestry residue streams does not compete with the food production chain. The bio naphtha feedstock, certified renewable polymers and EcoAce compound are fully certified under the ISSC Plus-mass balance certification scheme.
CONTACT US

SABIC Headquarters
PO Box 5101
Riyadh 11422
Saudi Arabia
T +966 (0) 11 225 8000
F +966 (0) 11 225 9000
E info@sabic.com

EUROPE
SABIC Europe Head Office
PO Box 5151
6130 PD Sittard
The Netherlands
T +31 (46) 722 2222
F +31 (46) 722 0000
E info@sabic.com

ASIA PACIFIC
SABIC Asia Pacific Head Office
One Temasek Avenue
#06-01 Millenia Tower
Singapore 039192
T +65 6557 2555
F +65 6531 8101
E info@sabic.com

SABIC (Shanghai) Trading Co. Ltd.
2550, Xiupu Road Pudong
Shanghai 201319
China
T +86 21 2037 8188
F +86 21 2037 8288

UNITED STATES
SABIC Americas Head Office
Suite 100
2500 City West Boulevard
Houston, TX 77042
USA
T +1 713 532 4999
F +1 713 532 4994 E
E info@sabicamericas.com

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. SABIC and brands marked with ™ are trademarks of SABIC or its subsidiaries or affiliates.

© 2022 Saudi Basic Industries Corporation (SABIC). All Rights Reserved.
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.