

CERTIFIED RENEWABLE POLYOLEFINS

FROM SABIC'S TRUCIRCLE™ PORTFOLIO OF CIRCULAR SOLUTIONS



TRUCIRCLE™ PORTFOLIO AND SERVICES

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

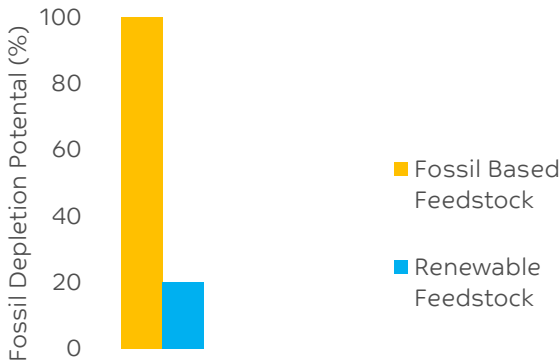
SABIC's TRUCIRCLE™ portfolio and services include certified renewable polymers based on second-generation, animal-free, bio-based feedstock such as tall oil waste from wood pulping process. SABIC's certified renewable polymers have been accredited through the International Sustainability and Carbon Certification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

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

FOSSIL DEPLETION – RELATIVE IMPACTS ²⁾



RENEWABLE FEEDSTOCKS

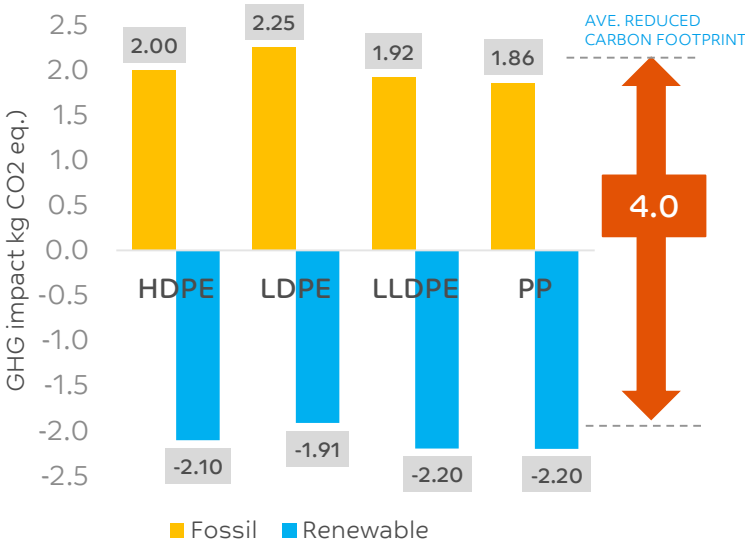
The use of renewable feedstock can reduce the need for fossil resources, potentially reducing the depletion of fossil resources by up to 80%. The sources of the feedstock are selected to avoid direct competition with human food chain and feed production, so-called second generation sources. SABIC uses 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 scheme¹⁾.

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.

POLYOLEFINS GHG COMPARISON ^{2,3)}



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.

APPLICABILITY

The information in this document applies to the certified renewable PE and PP grades sold by SABIC. Several of SABIC's sites are certified¹⁾, allowing for a physically linked chain of custody in many markets.

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 experts⁴⁾.

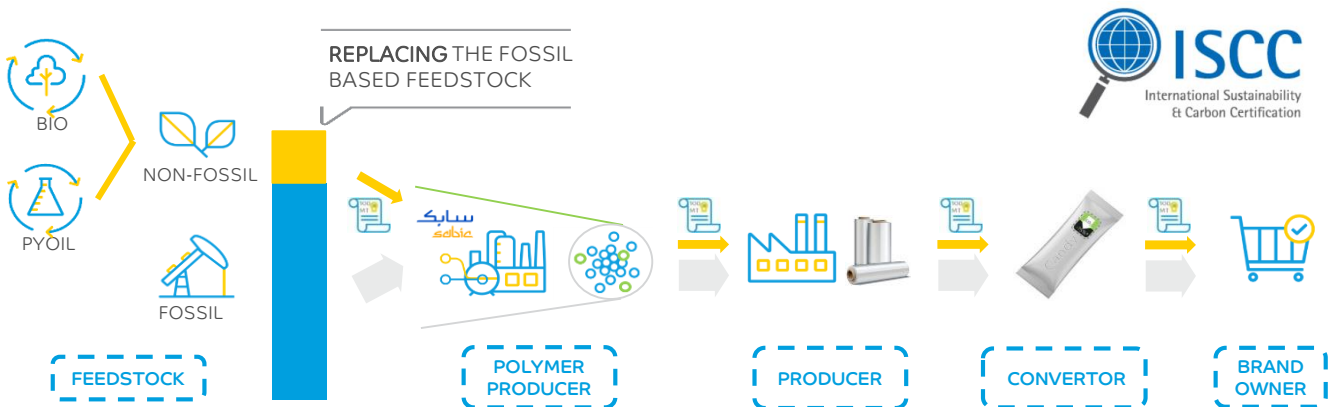
REFERENCES

- 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 auditable 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 downstream, hence no investments are required anywhere in the value chain
- Recyclable

EACH KG OF RENEWABLE PE/PP CAPTURES **UP TO 4 KG OF CO₂** 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.

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