25 Years of ecoflex®: BASF's Journey in Shaping the Present and Future of Circular and Sustainable Plastics

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Copenhagen, 11/04/2024

BASF is shaping the transformation towards climate neutrality via two approaches:

Our contribution to a climate-neutral future

Carbon Management

Our target: **Net zero emissions** by **2050**.
By **2030**, we want to **reduce** greenhouse gas emissions by **25%** compared with 2018.*

Circular Economy

We aim to double our circular sales to reach **€17 billion** by **2030** by using recycled-based and renewable-based feedstocks.

* Scope 1 and Scope 2 (excluding the sale of energy to third parties, including offsetting)

Closing the loop: one of the main concepts to achieve a Circular Economy at BASF

We aim at **doubling** our **circular sales to reach €17 billion** by 2030

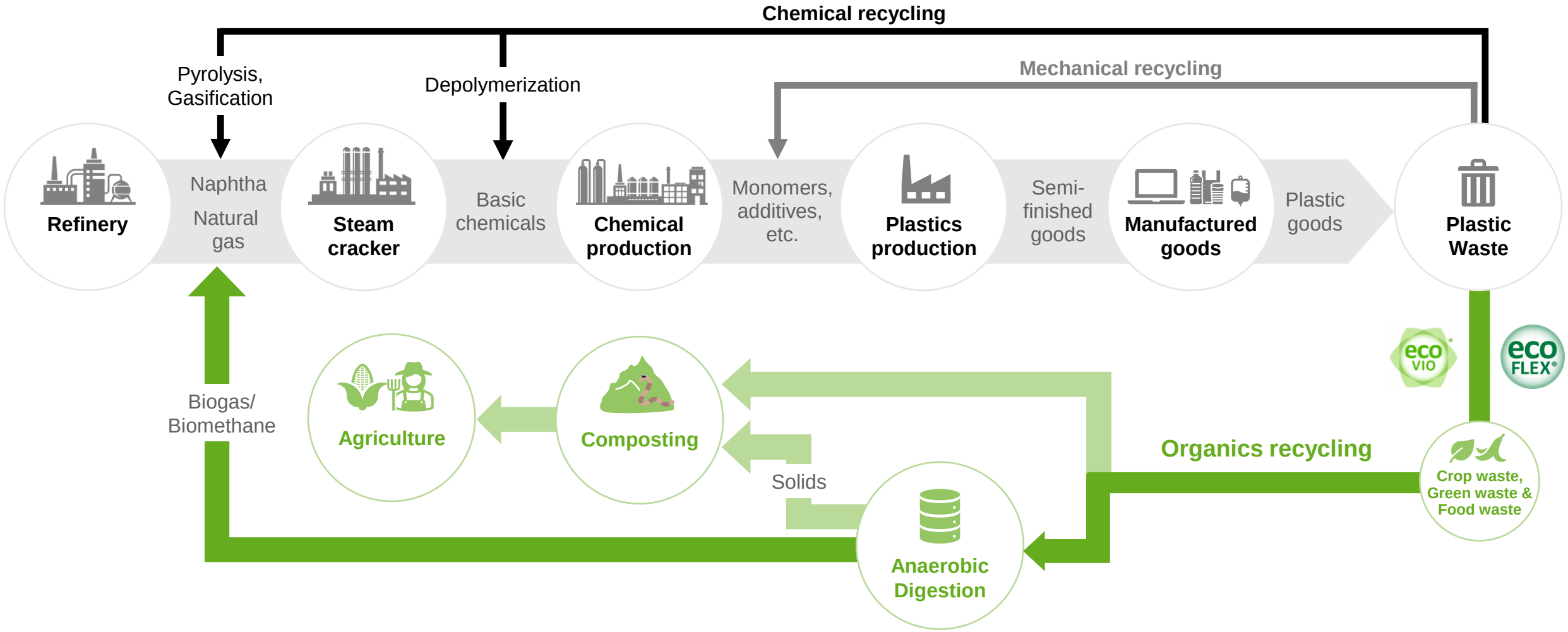
Close the loop

Products that enable the closing of the recycling loop and/or are based on recycled or renewable feedstocks

- Renewable-based feedstocks
- Recycled-based feedstocks
- Enable recyclability and/or biodegradability

Biopolymer portfolio at BASF

one of the solutions in closing the recycling loop for plastics



Pioneering on biopolymers development since over 30 years

1993

- Start of R&D activities on biodegradable polymers
- Dozens of patents originated since then

1998

- Market launch of ecoflex® the first commercially available PBAT biopolymer

2009

- Start of 1st world scale PBAT plant in Germany
- Market launch of ecovio® product line

2022

- Capacities in Asia Pacific for ecoflex® and ecovio®
- Extension of ecovio® offering for Paper Pack.

Biodegradability Research

ecoflex®: a versatile and reliable base resin

Our Value Propositions

- Consistent quality
- Reliable supply*
- Short lead times
- Competitive price
- Designed for Processability
- Low CO_2 Footprint
- Bio-based feedstock
- FDA Approval
- Made in EU**
- Composting certifications

Further value propositions are to be added to ecoflex®

*) BASF is the only PBAT supplier with production in Asia and the EU: lower dependency on supply chain disruptors and geopolitical conflicts
**) EU Forced Labor Ban and Supply Chain Due Diligence Acts

OK Biodegradable Soil certification of ecoflex® F Blend C1200

SOIL OK bio-degradable TÜV AUSTRIA SOIL

TÜV AUSTRIA

CERTIFICATE FOR AWARDING AND USE OF THE 'OK BIODEGRADABLE SOIL' CONFORMITY MARK

TA8032307828

Issued by TÜV AUSTRIA GMBH

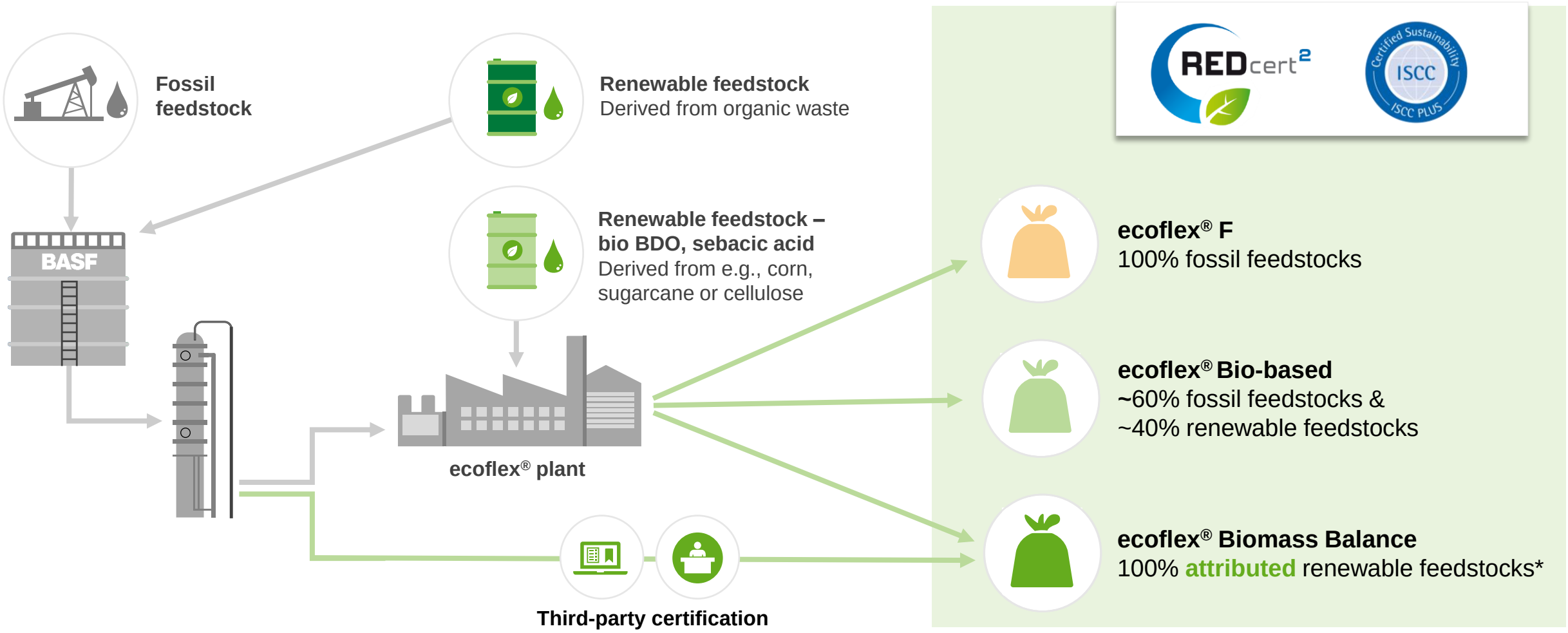
Product(s):

Domain	Products Biodegradable in SOIL
Group	Raw Material
Family	Bio material
Type	In form of Resin or Granulates
Trade mark	ecoflex® F Blend C1200
Description / Particularities	Colour: white

Licensee:

BASF SE
G-PMF/SB - D219
67056 Ludwigshafen
Germany

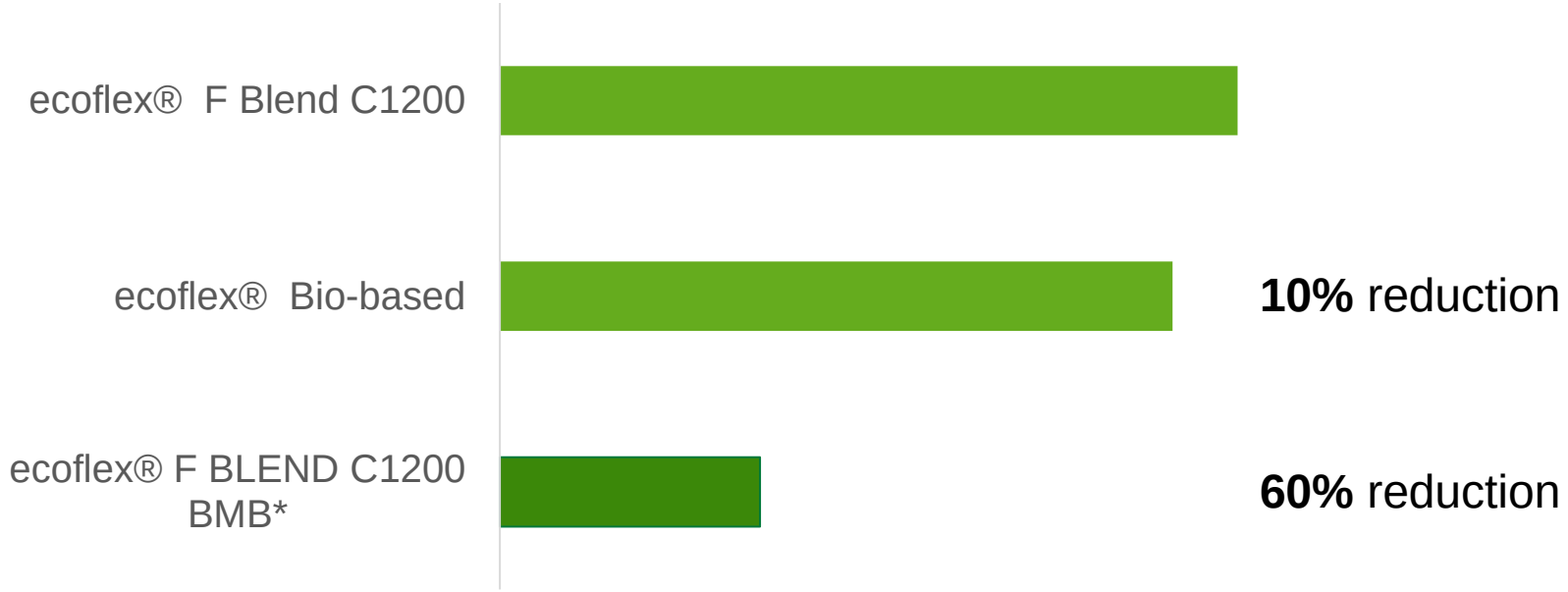
Three feedstock options give BASF the ability to maximize value to our customers



* https://www.basf.com/global/en/who-we-are/sustainability/we-drive-sustainable-solutions/circular-economy/mass-balance-approach/biomass-balance.html

ecoflex® addressing carbon footprint needs in the market

Product Carbon Footprint** (kg CO_2eq/kg)



Efficient steering of alternative raw materials allows us to optimize value to our customer based on feedstock availability, price and CO_2 footprint

* via a mass balance approach, https://www.basf.com/global/en/who-we-are/sustainability/we-drive-sustainable-solutions/circular-economy/mass-balance-approach/biomass-balance.html

** Product Carbon Footprint (PCF) according to ISO 14067:2018, which is based on ISO 14040:2006 and 14044:2006 for life cycle assessment. Additionally, the calculation is aligned with the GHG Protocol Product Standard (WRI & WBCSD, 2011) and the Together for Sustainability PCF Guideline3.

Benefits of ecoflex® F Blend C1200 BMB
Biomass Balance

- Offers the same material properties as ecoflex® F Blend C1200 but contributes to **saving fossil resources**
- 100% of fossil feedstock is replaced with renewable feedstock from organic waste and residuals at the beginning of the value chain and attributed to the ecoflex® via a mass balance approach
- **60% lower** Product Carbon Footprint compared to ecoflex® F Blend C1200
- Third party certified (ISCC+ and REDCert[2] certificates)

ecoflex®: a versatile and reliable base resin

Our Value Propositions

- Consistent quality
- Reliable supply[1)]
- Short lead times
- Competitive price
- Designed for Processability
- Low CO_2 Footprint: *Biomass balance option*
- Bio-based feedstock
- FDA Approval
- Made in EU[2)]
- Composting certifications: *Industrial, Home Compostability and Soil Biodegradability*

*) BASF is the only PBAT supplier with production in Asia and the EU: lower dependency on supply chain disruptors and geopolitical conflicts
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ecovio® portfolio is powered by ecoflex®

25 YEARS
ecoFLEX®
PIONEERED BY BASF!

Agriculture

Packaging

Consumer (i.e. Bags)

ecovio® extrusion coating grades
typical applications

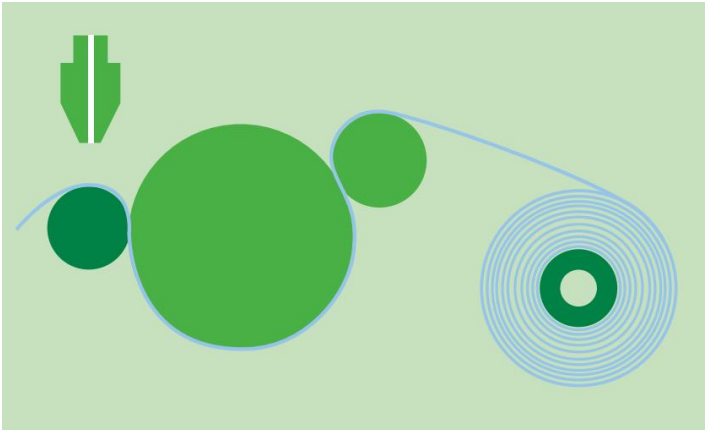
Cups and bowls for hot or cold content

Wrappers, boxes, trays for dry, solid, liquid or fatty content

ecovio® extrusion coating grades
key technical benefits & processability

Key Technical Benefits

- Excellent barrier properties against liquids, fats, grease, and mineral oil
- Suitable for food contact (also when microwaved)
- Temperature stability at boiling water
- Excellent adhesion to many types of paper/ paperboard



Processability

- Stable at high coating line speed (> 300 m/min)
- No adhesion to chill roll
- Possible to achieve typical coating weights (12 - 30 g/m^2, depending on application and equipment)
- Good printability
- Good sealing properties
- Low failure rate in further packaging converting (cup making, thermoforming, etc.)

ecovio®: extrusion coating grades
classified “recyclable” in standard repulping process

- Pilot scale repulping trials were performed on one-side ecovio® coated paperboard at Centre Technique de l’Industrie des Papiers (CTP)
  - ecovio® extrusion coating was classified repulpable and performed comparably to PE coated paperboard
- One-sided paper and paperboard ecovio® coated samples “recyclable” according to PTS-RH 021:2019 – Category II

Sample code		One-sided ecovio® extrusion coated on **paper**	One-sided ecovio® extrusion coated on **board**
Disinte-gratability	Non-paper constituents[1]		
	Total reject[2]	13.2 %	13.1 %
	Recyclable percentage[3]	86.8 %	86.9 %
Sheet formation	Adhesive impurities	None.	Present but not damaging.
	Optical Inhomogeneities	None.	None.
OVERALL RATING Recyclability		**Recyclable.**	**Recyclable.**

ecovio® 70 PS14H6: extrusion coating grade
bio-based & certified compostable

- 60 - 80% bio-based carbon content
  - Certifiable with a TÜV three-star certificate
  - Further possibilities to increase the use of renewable feedstock via Biomass Balance approach

- Certified industrial & home compostable

European Standard
EN 13432

European Standard
EN 13432,
Australian Standard
AS 4736

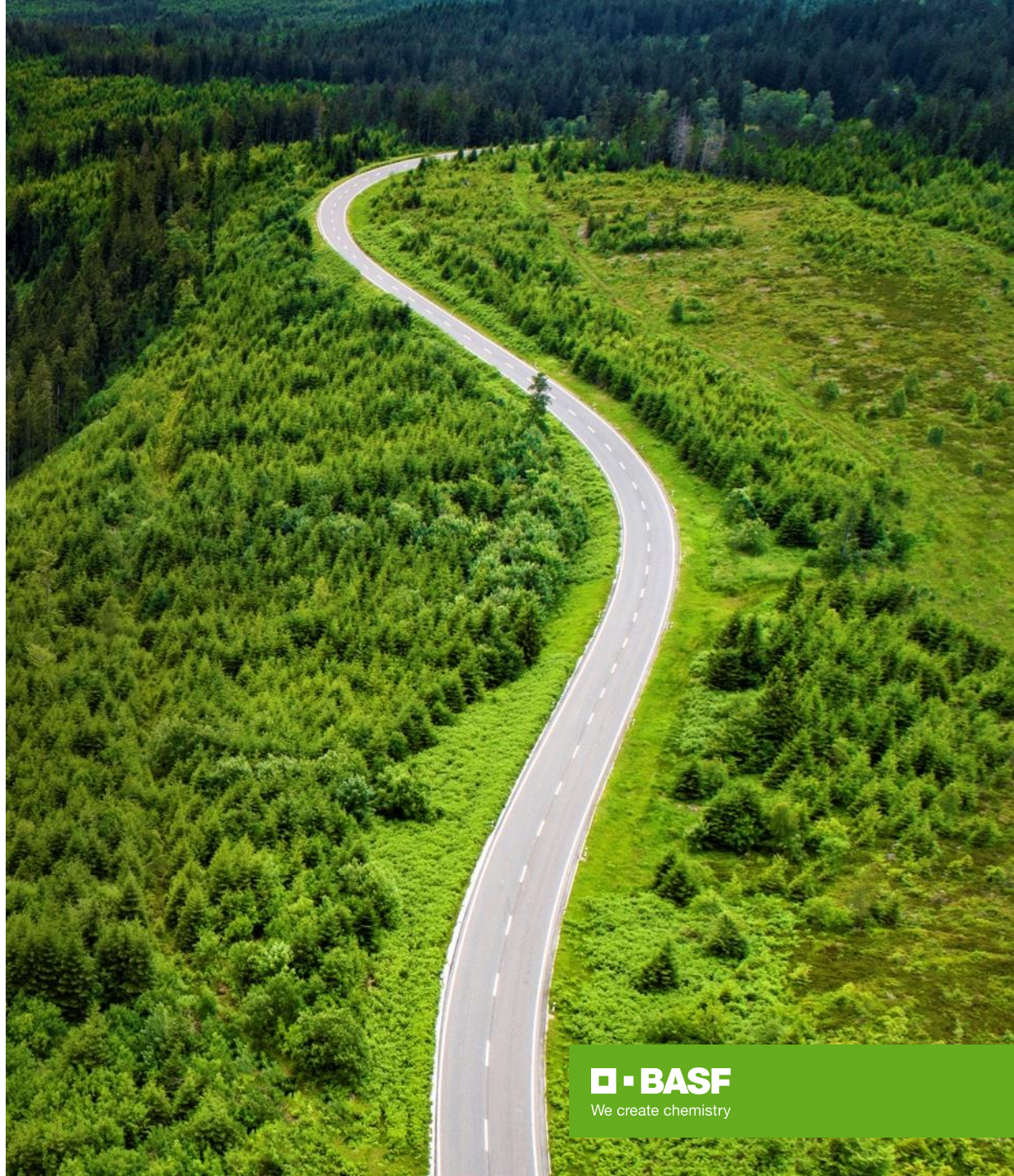
American Standard
ASTM D6400,
ASTM D6868

Japanese Standard
GreenPla

BASF We create chemistry
ecovio

25 Years of ecoflex®: Journey in Shaping the Present and Future of Circular and Sustainable Plastics

- 25 years commercial ecoflex® track record
- The ecoflex® offering is further expanded with soil biodegrability certification and 100% attributed renewable feedstock through biomass balance approach
- Certified ecovio® paper extrusion coating grades broadens the end-of-life options for natural fiber-based packaging



We create chemistry