I'm green™

SUSTAINABLE SOLUTION FOR A CIRCULAR ECONOMY

Braskem

Building a CIRCULAR FUTURE

A new way of thinking about poduction and consumption, this is how Braskem can support the transition to a Circular Economy. The evolution of the I'm green™ sustainable portfolio, which now has products from renewable and recycled sources, is helping partners achieve their sustainability goals and close the loop.

I'm green™ represents a revolution in sustainable sourcing, the result of our commitment and investment into innovation and research to find the best life-cycle solutions that combine bio-based resources and post-consumer waste, bringing benefits to the planet and the society.

I'm green™
BIO-BASED

I'm made from

SUGAR-CANE

I'M RENEWABLE

- I'm HDPE, LDPE, LLDPE, EVA and PE WAX
- I'm blow-molded, injection molded, extruded
- I may be in **contact with food**
- I'm **capturing CO_2** from the environment
- I'm tackling **climate change**

I'm green™
RECYCLED

I'm made of

RECOVERED PLASTIC

I'M RECYCLED

- I'm rHDPE, rLPDE and rPP
- I'm blow-molded, injection molded, extruded
- I'm **closing the loop**
- I'm being recovered avoiding waste
- I'm tackling **climate change**

I'm green™
BIO-BASED & RECYCLED

I'm creating a positive

IMPACT ON ENVIRONMENT

I'M BIO-BASED & RECYCLED

- I'm rHDPE, rLDPE and PP
- I'm blow-molded, injection molded and extruded
- I'm **closing the loop**
- I can be a **carbon neutral solution**
- I'm a combination of **recycled & bio-based**
- I'm tackling **climate change**

Merely exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS or contact Braskem for specific regulatory information.

I'm green™ PORTFOLIO EVOLUTION

2002

Braskem

CREATION OF BRASKEM

Announcement of the public commitment that identifies Braskem's principles and values, including its contribution to economic and social growth and its operation following principles of sustainable development.

2007

BIO-BASED ETHYLENE

Production of the first sample of renewable ethylene made from sugarcane ethanol.

2010

INAUGURATION OF THE BIO-BASED ETHYLENE PLANT

Southern Brazil

Braskem becomes the market leader and pioneer in the production of biopolymers on an industrial scale by inaugurating the renewable ethylene industrial unit.

I'm green™ BIO-BASED

Launch of the I'm green™ to identify Braskem's bio-based products.

2014

FAST COMPANY

Braskem is nominated as one of the 50 most innovative companies in the world by Fast Company magazine. The only Brazilian company to be listed and recognized for its research on bio-based products, such as I'm green™.

FAST COMPANY THE WORLD'S 50 MOST INNOVATIVE COMPANIES 2014

2015

I'm green™ RECYCLED

Launch of the first post-consumer recycled resins.

REVERSE LOGISTICS FOR PP PLASTIC CUPS PROGRAM

The program seeks to guide and encourage companies in Brazil to adopt better logistics procedures for the proper destination of plastic cups after their use, cooperating with the entire value chain to promote plastic reuse and recycling. The cups are collected, recycled and transformed into new products, such as caps for cosmetic packaging and houseware.

2018

BIO-BASED EVA

The new resin is made from sugarcane, and is used in the footwear, automotive, transportation, among other sectors.

EXTENSION OF THE RECYCLED RESIN PORTFOLIO

Expansion of the recycled resin portfolio.

RECYCLED SOLVENT

Braskem develops a recycled hydrocarbon solvent, Hexane RC, which can be used in the adhesive, rubber and other segments.

RENEWABLE SOLVENT

Braskem develops an oxygenated solvent from renewable sources, HE-70s, for the paint, adhesive and personal care segments, among others still under development.

2019

ALLIANCE TO END PLASTIC WASTE

(AEPW - Industry commitment and engagement)

- Braskem becomes a founding member of the Alliance to End Plastic Waste, an organization that aims to develop solutions to eliminate plastic waste in the environment.
- $1.5 billion has been destined for the next 5 years and will finance projects worldwide. Focus will be to improve waste management infrastructure in Asia and technological development in Europe.
- More than 45 global companies in the entire value chain contribute: plastic producers and processors, brand owners and recyclers.

2020

10 YEARS

The tenth anniversary of the launch of Braskem's| I'm green™ portfolio.

2021

PRODUCTION EXPANSION

Production capacity expansion of the renewable ethylene industrial unit.

PE WAX

Launch of I'm green™ bio-based polyethylene wax.

OUR PATH IN THE DEVELOPMENT OF BIO-BASED AND RECYCLED PRODUCTS CONTINUES.

JOIN THIS JOURNEY!

OUR RESINS MADE **FROM SUGARCANE**

With the I'm green™ bio-based portfolio, that is made of responsibly-sourced, sugarcane ethanol, Braskem's partners can offer their customers a range of unique products that contribute significantly to the reduction of greenhouse gas emissions along the chain.

Bio-based products are drop-in solutions that can replace their conventional version without the need to invest in new plastic processing machinery.

I'm green™
BIO-BASED

Recyclable
Use the same recycling chains developed for conventional resins

Drop-in solutions
Replace conventional resin with no investment in new plastic conversion machinery

CO_2 capture
Sugarcane captures CO_2 from the atmosphere, helping to slow down climate change

Renewable source
Made from sugarcane, a renewable raw material

LIFE CYCLE ANALYSIS

To deal with the growing demand from society for more sustainable solutions and the pressing concerns of citizens about climate change, "Life Cycle Thinking" is one of the major challenges for industries and governments when creating products and proposing new regulations.
In order to better understand the impacts associated with the production of I'm green™ bio-based polyethylene, Braskem conducts LCA, Water Footprint and Land Use studies for the product.

PE
I'm green™ bio-based

Applications

I'm green™ bio-based polyethylene can be used in rigid and flexible applications already available in the market, as well as in foamed plastics.

The support of Braskem's technical teams during the development process, increases the chances of a fast approval while maximizing the renewable content in the final products.

Main applications

I'm green™ bio-based polyethylene is the renewable alternative to fossil polyethylene, a thermoplastic resin widely used in packaging in the consumer goods sectors, such as food, beverages, hygiene and cleaning products, as well as toys, trash cans and plastic bags.

The I'm green™ bio-based polyethylene portfolio offers approximately 25 grades in the HDPE, LLDPE and LDPE families that cover a wide range of applications. In most grades the renewable carbon content ranges from 80% to 100%, which can be certified by measuring the biogenic carbon content, according to the ASTM D6866 standard.

There are labs that carry out carbon dating analysis and certifying bodies in Europe, USA and Asia. The certifying bodies in Europe, USA and Asia offer labels for the renewable content of a material or product based on the standard.

At the end of its life, I'm green™ bio-based polyethylene can be recycled in the same way as conventional polyethylene.

Merely illustrative exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS (Regulatory Information Sheet) or contact Braskem for specific regulatory information.

PE I'm green™ bio-based

Injection molding

Typical Properties		Melt Index (190 °C/2.16 kg)	Density	Minimum C14 content
ASTM method		D 1238	D 792	D 6866
Units		g/10 min	g/cm³	%
HDPE	SHA7260	20	0.955	94
		Buckets and bowls, lids, toys, thin-walled parts, houseware and cosmetic packaging.		
	SHC7260	7.2	0.959	94
		Industrial containers, safety helmets, toilet seats, houseware, toys, lids, pallets, crater for beverage bottle, crater for fish and vegetables and cosmetic packaging.		
	SGE7252NS	2.0	0.952	96
		Beverage bottle caps.		
LDPE	SPB208	22	0.923 [a]	95
		Masterbatches, injection of parts with a large flat area such as snap lids.		
	SPB608	30	0.915 [a]	95
		Masterbatches, injection of parts with a large flat area such as snap lids.		

Test specimens prepared from compression molding, according to ASTM D 4703.. a) Value obtained by the ASTM D1505 method.

Tubes extrusion & blow molding

Typical Properties		Melt Index (190 °C/2.16 kg)	Density	Minimum C14 content
ASTM method		D 1238	D 792	D 6866
Units		g/10 min	g/cm³	%
HDPE	SGF4950	0.36	0.956	96
		Bottles for hygiene and cleaning products, bottles for beverages, compression molded caps and cosmetic packaging.		
	SGF4960	0.34	0.961	96
		Bottles for food and beverages, bottles for dairy products, rigid containers for cosmetics and lubricant oils and caps & closures molded by compression.		
	SGF4950HS	0.21	0.951	95
		Canisters from 2 to 20L for chemical products, bottles for concentrated detergent, bottles for food, tanks for wind shild and air ducts.		
LDPE	SEB853	2.70	0.923 [a]	96
		Tubes for food and cosmetics.		
	STN7006	0.60	0.924	95
		Tubes for food and cosmetics.		
	SBF0323HC	0.32	0.923 [a]	95
		Tubes for food and cosmetics.		

Test specimens prepared from compression molding, according to ASTM D 4703. a) Value obtained by the ASTM D1505 method.

Extrusion coating

Typical Properties		Melt Index (190 °C/2.16 kg)	Density	Minimum C14 content	Additives
ASTM method		D 1238	D 792	D 6866	-
Units		g/10 min	g/cm³	%	-
LDPE	SBC818	8.30	0.918	95	-
		Low neck-in applications, good film stability, good adhesion to porous substrates, carton packs for food & beverages.			

Test specimens prepared from compression molding, according to ASTM D 4703.

Merely illustrative exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS (Regulatory Information Sheet) or contact Braskem for specific regulatory information.

Fiber Extrusion

Typical Properties		Fluidity Index (190 °C/2.16 kg)	Density	Thermal Deflection Temperature (0.45 MPa)	Minimum C14 content
ASTM method		D 1238	D 792	D 648	D 6866
Units		g/10 min	g/cm³	°C	%
HDPE	SHA7260	20	0.955	67	94
		Two-component non-woven fabric and fibers in general.			
	SHE150	1.0	0.948	76	94
		Raschel, protection and shadow nets and strings.			

Test specimens prepared from compression molding, according to ASTM D 4703. a) Tests performed on samples of 3 mm.

Cast and Tubular films

Typical Properties		Melt Index (190 °C/2.16 kg)	Density	Minimum C14 content	Additives
ASTM method		D 1238	D 792	D 6866	-
Units		g/10 min	g/cm³	%	-
HDPE	SGM9450F	-	0.952	96	AF
		Retail bags, promotional bags, produce bags and frozen food packaging.			
	SHE150	1.0	0.948	94	AF
		Cereal packaging and blends with LLDPE and LDPE.			
LLDPE	SLL118	1.0	0.916 [a]	87	-
		Stretch films, blends with LDPE and HDPE and general use packaging. Other applications: blends for irrigation pipes, industrial sacks, liners and cosmetic packaging.			
	SLL118/21	1.0	0.918 [a]	87	AB, D
		Automatic packaging (FFS) and blends with LDPE and HDPE.			
	SLH118	1.0	0.916 [a]	84	-
		Stretch films, blends with LDPE and HDPE and general use packaging. Other applications: blends for irrigation pipes and cosmetic packaging.			
	SLH218	2.3	0.916 [a]	84	-
		Stretch films, blends with LDPE and HDPE and general use packaging. Other applications: blends for irrigation pipes, insulation of low and medium XLPE wires and cables.			
	SLH0820/30AF	0.80	0.92 [a]	84	AB, AF
		Industrial sacks and blends with LDPE and HDPE.			
LDPE	SBF0323HC	0.32	0.923 [a]	95	-
		Industrial sacks, agricultural films, co-extruded and heat-shrinkable films for palletizing and cosmetic packaging.			
	STN7006	0.60	0.924	95	-
		High transparency films for food products packaging by coextrusion such as: cheese, meat, sausages, sliced ham, etc.; flat films for tablecloth, curtains and laminated fabric, flexible bottles for solids, liquids or paste products for hygiene and cleaning and cosmetic packaging.			
	STS7006	0.60	0.925	95	AB, D
		High clarity films for coextrusion food product packaging, such as: cheese, meat, sausages, sliced ham, etc.			
	SEB853	2.7	0.923 [a]	95	-
		Typical applications of blown film including diaper films and other general uses in addition to blends with LLDPE and HDPE.			
	SEB853/72	2.7	0.923 [a]	95	AB, D
		Lamination film and general use, automatic packaging of solid products (FFS), automatic packaging for various products and high transparency for tissue paper.			
	SPB681	3.8	0.922 [a]	95	-
		Extrusion of blow and flat films, injection molding, blends with LDPE and HDPE and cosmetic packaging.			
	SPB681/59	3.8	0.922 [a]	95	AB, D
		Lamination films and general uses and automatic packaging for solid products.			

Test specimens prepared from compression molding, according to ASTM D 4703.. Additives: AB = anti-blocking, S = sliding, FA = flow aid. a) Value obtained by the ASTM D1505 method.

Merely illustrative exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS (Regulatory Information Sheet) or contact Braskem for specific regulatory information.

EVA
I'm green™ bio-based

I'm green™ bio-based EVA, made from sugarcane, is the sustainable alternative for several segments that use EVA in their products.

Bio-based content ranges from **45% to 80%**, based on the ASTM D6866 standard.

At the end-of-life, I'm green™ bio-based EVA can be **recycled/reused** in the same way as conventional EVA.

Applications

I'm green™ bio-based EVA is ideal for applications such as: shoes, adhesives, toys, wires & cables, tatami mats and foams in general.

The support of Braskem's technical teams during the development process, increases the chances of a fast approval while maximizing the renewable content in the final products.

Main applications

Shoes

Tatami mats

Sport items

Brassiere

Ball

Toys and educational games

Merely exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS or contact Braskem for specific regulatory information.

Foamed Products

Typical Properties		Fluidity Index (190 °C/2.16 kg)	Vinyl acetate content	Minimum C14 content
ASTM method		D 1238	Braskem	D6866
Units		g/10 min	%	%
EVA	SVT2180	2.1	19	80
		Polymer used as a base for manufacturing foamed and reticulated plates and soles (unisole midsole) for shoes, toys, sporting items, etc. The resin can be processed by injection molding or compression.		

Test specimens prepared from compression molding, according to ASTM D 4703.

Braskem Evance

Typical Properties		Fluidity Index (190 °C/2.16 kg)	Vinyl acetate content	Minimum C14 content
ASTM method		D 1238	Braskem	D6866
Units		g/10 min	%	%
EVA	Evance SVT2145R	2.1	14	45
		Semi-amorphous thermoplastic resin with medium Vinyl Acetate content, easily crosslinkable and good compatibility with different thermoplastics, inorganic fillers and pigments. It has an excellent soft touch, good grip, good resistance to abrasion and resilience.		

Test specimens prepared from compression molding, according to ASTM D 4703.

Merely illustrative exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS (Regulatory Information Sheet) or contact Braskem for specific regulatory information.

PE WAX
I'm green™ bio-based

I'm green™ bio-based polyethylene wax is a product that offers lower carbon footprint as it comes from sugar cane. It's a sustainable solution that complements Braskem's portfolio offer for multiple markets.

Applications

I'm green™ bio-based polyethylene wax is ideal for use in applications such as: adhesives, cosmetics, paints and compounds.

Main applications

Adhesives

Cosmetics

Paints and compounds

PE Wax

Family	Grade	Dropping point	Solidification point	Melting point	Needle penetration (25°C)	Dyn. viscosity (140°C)	Density (23°C)	Acid value	Saponification value	Yellowness index	Flashpoint – Clevel.	Flashpoint – Pensky M.
Units		°C	°C	°C	10-1mm	mPas	g/cm³	$mg_{(KOH)}/g$	$mg_{(KOH)}/g$	-	°C	°C
PE	GWAX 50E	108	94	105	4	138	0.88	< 1	< 2	4	> 250	> 220

Merely illustrative exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS (Regulatory Information Sheet) or contact Braskem for specific regulatory information.

OUR SOLUTIONS WITH **RECYCLED CONTENT**

I'm green™ RECYCLED

The portfolio of resins with recycled content is a Braskem innovation reflecting our commitment to bring the Circular Economy from concept to reality. The goal is to promote businesses and initiatives to create value for post-consumer plastic waste and the recycling chain, through partnerships with customers, recyclers, cooperatives and brand owners.

Main applications

Lids

Home appliances

Furniture

Packaging

Merely illustrative exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS (Regulatory Information Sheet) or contact Braskem for specific regulatory information.

RIGID

About 34.7% of the global plastic market is made up of rigid packaging and technical parts. These products have incorporated the concept of Circular Economy, both in the packaging proposal and in the manufacturing process. Braskem develops post-consumer resin solutions to combine sustainability with the high technical requirements of each application. The I'm green™ recycled portfolio was developed to meet sustainable projects that demand quality, traceability and, above all, compliance.

PE - Polyethylene

Family	Commerce	Grade	MFI (190 °C / 2.16 kg)	Density	Color	Process-ability	Rigidity	Drop test	Chemical resistance	Weldability	Tear resistance
Units			g/10 min	g/cm³							
HDPE		DA054B	0.30	0.955	Black	●●	●●●	●●●	●●	-	-
		DA055A	0.35	0.955	White	●●	●●	●●	●●	-	-
		DA065A	0.20	0.960	White	●●	●●●	●●●	●●●	-	-
		DA065B	0.20	0.960	Black	●●	●●●	●●●	●●●	-	-
		RPR 3A1 NL	0.38	0.955	Natural	●●●	●●●	●●●	●●●	-	-
		RPR 5A1 WE	0.40	0.955	Natural	●●●	●●	●●	●●●	-	-

PP - Polypropylene

Family	Commerce	Grade	MFI (230 °C / 2.16 kg)	Color	Process-ability	Rigidity	Drop test	Dimensional stability
Units			g/10 min					
PP Heco/ Copo		DP237C	9	Black	●	●●	●●●	●
		DP237F	9	White	●	●●	●●●	●
PP Copo		DP237A	24	Black	●●●	●	●●	●
		DP237D	24	White	●●●	●	●●	●
PP Homo		DP229A	9	Black	●●	●●●	●	●●
		DP237B	11	Black	●●	●●●	●	●●
		DP237E	11	White	●●	●●●	●	●●
		RPH 4J7 WE	7	White	●●	●●●	●	●●
		RPH 9H2 BK	6,5	Black	-	-	-	-

● Good ●● Great ●●● Excellent

FLEXIBLE

Flexible packaging represents 65.3% of the global plastic sector. The transition to a Circular Economy, which is currently being consolidated in the world, is bringing a new concept of packaging development and brand communication with consumers.

This transformation comprises the understanding of new packaging materials and concepts and is extended to the correct handling and proper disposal, that will allow the materials to remain in the value chain and stay away from landfill.

Main applications

Bags

Toilet paper packaging

Sacks

Pad packaging

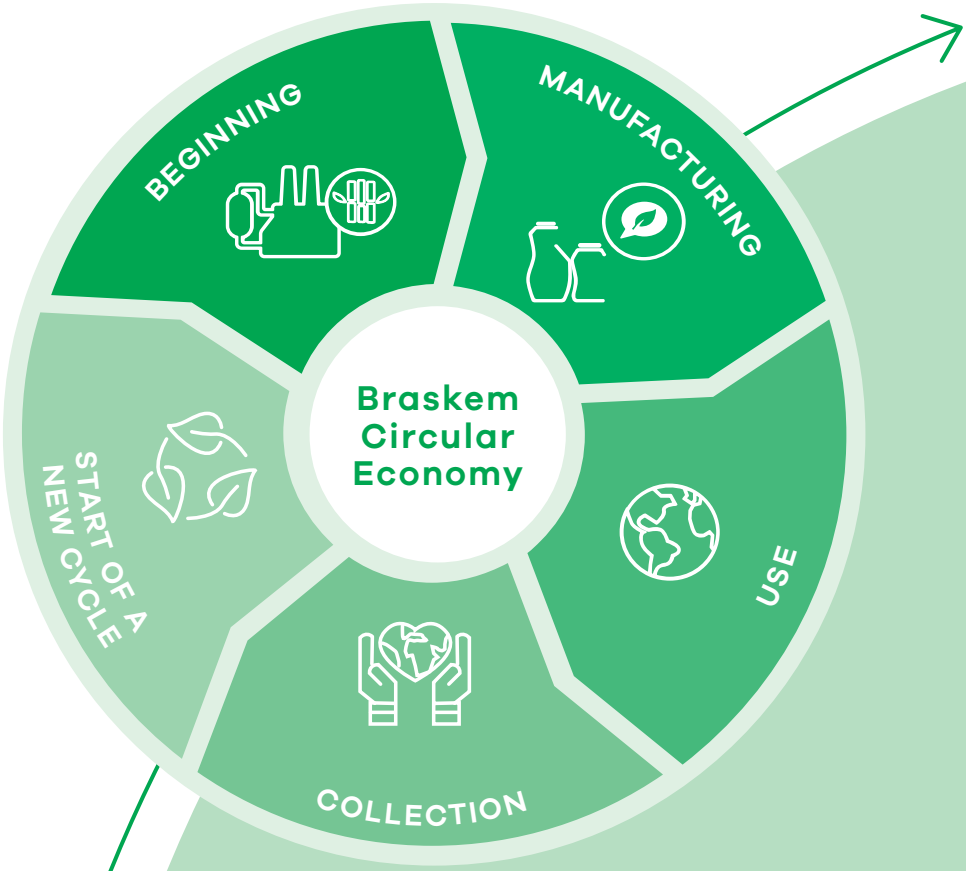
Trash bags

Merely illustrative exemplary applications. The possibility of using this product for a specific purpose may change according to the country and should be analyzed by the interested party. Braskem does not guarantee the possibility of using the product with other materials for the desired application. Please check the RIS (Regulatory Information Sheet) or contact Braskem for specific regulatory information.

PE - Polyethylene

Family	Commerce	Grade	MFI (190 °C / 2.16 kg)	Density	Color	Processability	Rigidity	Drop test	Chemical resistance	Weldability	Tear resistance
Units			g/10 min	g/cm³							
LDPE		RPL 4C5 WE	0.90	0.925	White	●●	●●●	●●	-	●●●	●●
		RPL 4C2 BL	1.50	0.925	Translucent	●●	●●●	●●	-	●●●	●●
		RPL 5A1 NL	0.60	0.921	Natural	●●●	-	-	-	●●●	●●
		RPL 5C1 NL	1.85	0.921	Natural	●●●	-	-	-	●●●	●●

● Good ●● Great ●●● Excellent



Braskem: **global presence**

With a global vision of the future, focused on people, Braskem strives every day to improve people's lives by creating sustainable solutions through chemicals and plastics.

Braskem is the largest producer of thermoplastic resins in the Americas and the main producer of biopolymers in the world.

Our products are exported to, approximately, 100 countries and we have 40 industrial units, located in Brazil, the United States, Germany and Mexico, the latter in partnership with the Mexican company Idesa.

For more information, please visit www.braskem.com.

+20 MM TONS/YEAR
production of thermoplastic resins and other chemicals

Export to customers in about **100** COUNTRIES

8,000
team members

40 industrial units:
28 plants in Brazil
6 plants in the USA
2 plants in Germany
4 plants in Mexico

09 | 2021

Braskem