

Braskem I'm green™
“making people's lives better today and for
generations to come”

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Braskem 

Topics:

- ✓ About Braskem
- ✓ I'm green™ introduction
- ✓ Growing a sustainable supply chain
 - ✓ Why Brazil?
 - ✓ Resource efficiency & sustainable practices.
 - ✓ Carbon footprint
 - ✓ Code of conduct and certifications available.
- ✓ Applications
- ✓ Branding & Examples
- ✓ Closing remarks

Braskem *in* **NUMBERS**



41 INDUSTRIAL
UNITS:

29 in Brazil, 6 in USA, 4
in Mexico, 2 in Germany



100 COUNTRIES

Exports to clients in
some 100 countries



PRODUCTION OF OVER

20 MILLION
TONS/YEAR

of thermoplastic resins and other
chemical products



MORE THAN

7.0k

Team Members around the
world



EBITDA OF R\$

12.3 BILLION

in 2017



NET REVENUE OF R\$

49.3 BILLION

in investments in 2017



R\$

167.5 MILLION

in innovation investments in 2017

WE ARE A COMPANY GUIDED BY AND FOCUSED ON **PEOPLE** AND SERVING OUR CLIENTS AND SOCIETY

As such, we believe that our role in the world is to challenge ourselves constantly to create innovative and sustainable solutions that improve people's lives and make the world a better place.

These values are passed on to all Team Members through our Belief and Purpose, which are a source of inspiration that guides our actions.



BELIEF:

PLASTICS AND
CHEMICALS
IMPROVE PEOPLE'S
LIVES



PURPOSE:

IMPROVE PEOPLE'S LIVES
BY CREATING
SUSTAINABLE SOLUTIONS
IN CHEMICALS AND
PLASTICS



Recognition

Índice
Carbono
Eficiente

ICO2



**CDP
A LIST**
2017
CLIMATE

**CDP
A LIST**
2017
WATER

**CDP
A LIST**
2018
SUPPLIER

Índice de
Sustentabilidade
Empresarial

ISE

GLOBAL COMPACT
LEAD

**Dow Jones
Sustainability
Indexes**

2017
CSR Rating
GOLD
ecoVadis

ROBECOSAM
We are Sustainability Investing.

I'M GREEN™

**I'm
green**

TM

POLYETHYLENE GREEN

I'm
green

TM

Made from sugarcane,
is the first polyethylene of
renewable origin to be produced
on an industrial scale in the
world:

Investment:

US\$ 290MM

Portfolio:

LDPE, LLDPE, HDPE & EVA

Markets:

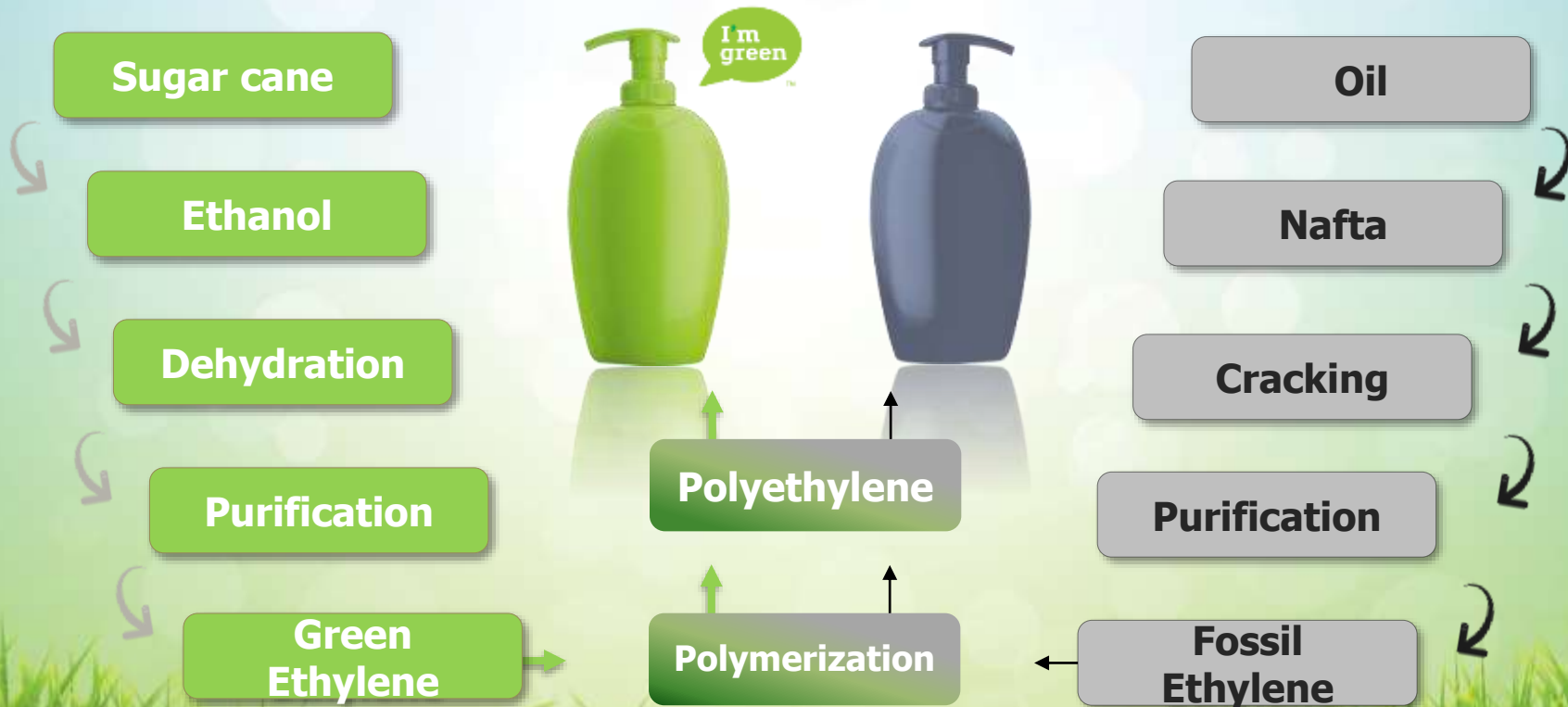
Global

Synergy

By having similar physical and
chemical properties, Green PE
can be polymerized in the
same plants as the traditional
PE

Process

The production route for green polyethylene and the fossil polyethylene are exactly the same, therefore the green polymer has got the same characteristics, quality and properties than the fossil equivalent.



"Growing" a Sustainable supply chain

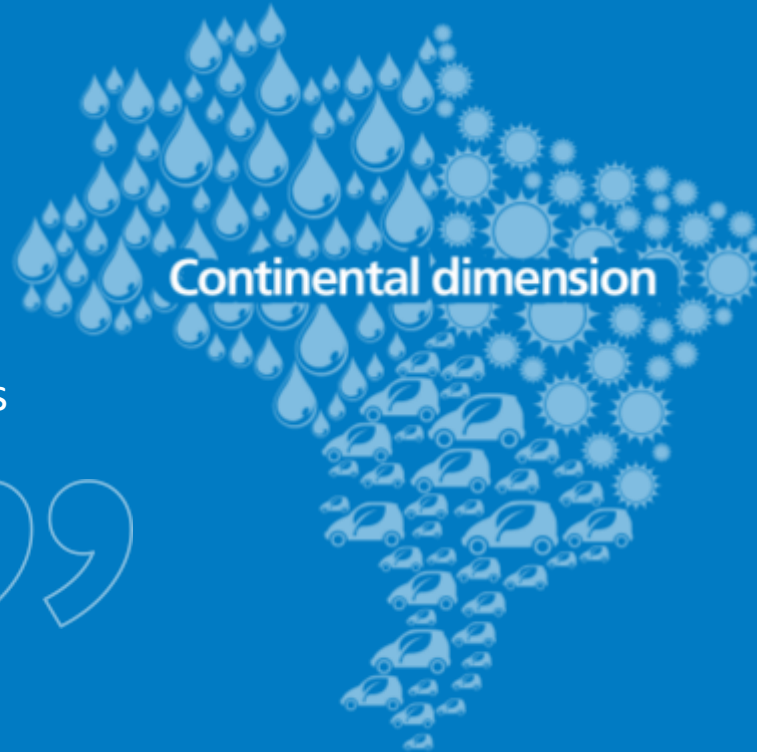
**I'm
green**

TM

“

Favorable aspects for the
development of biopolymers

”



“

The largest
watershed
in the world

”



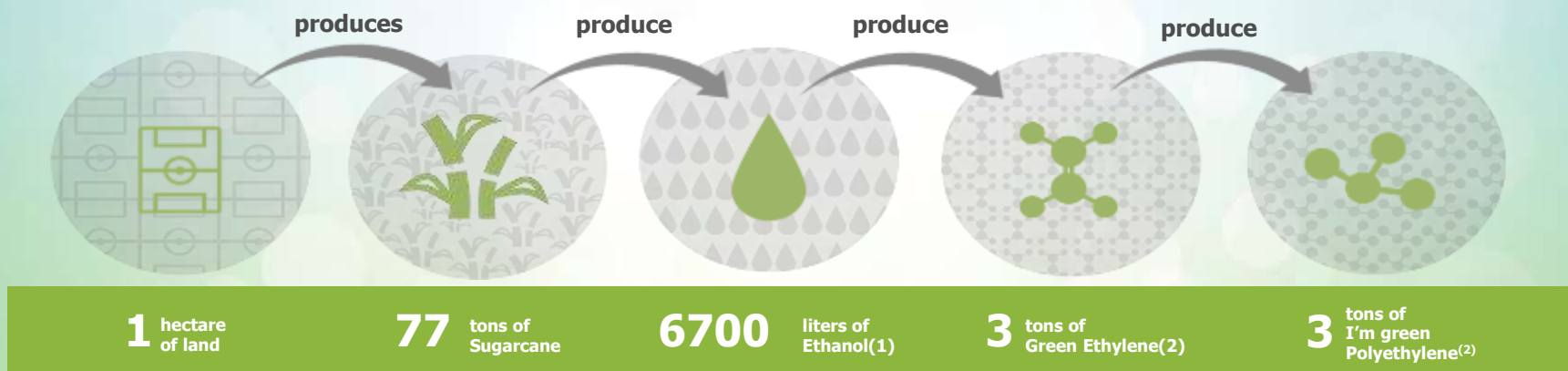
Intense
solar radiation
and climate
diversification

Pioneer in
research and
development
of biofuels



Land Use

From sugarcane to I'm green™ Polyethylene

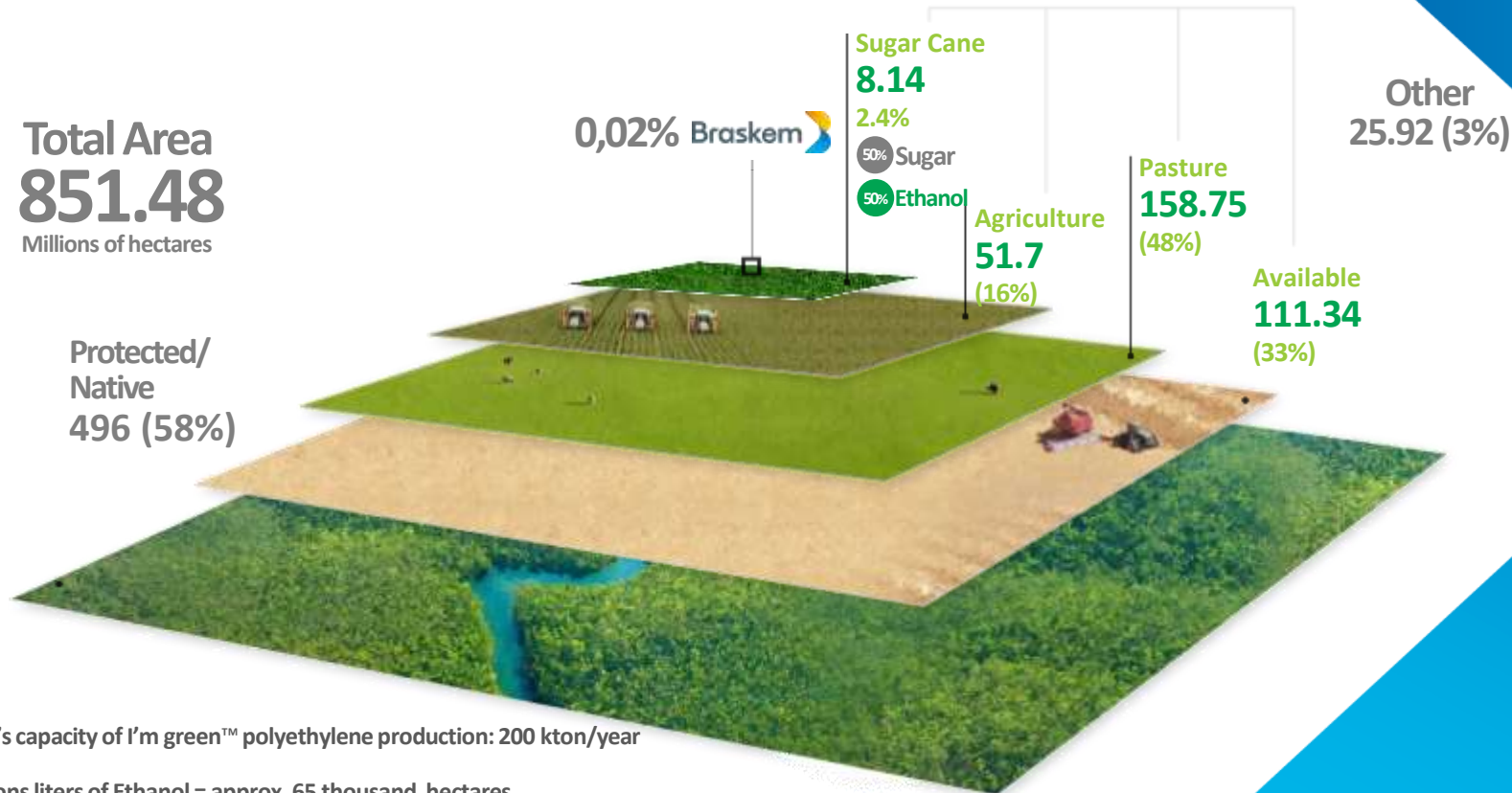


<2,0% of Brazilian ethanol production **Braskem** 0,02% of Brazilian arable land

(1) NIPE/UNICAMP/UNICA
(2) Braskem's project data

LAND USAGE

Significant potential for sustainable growth

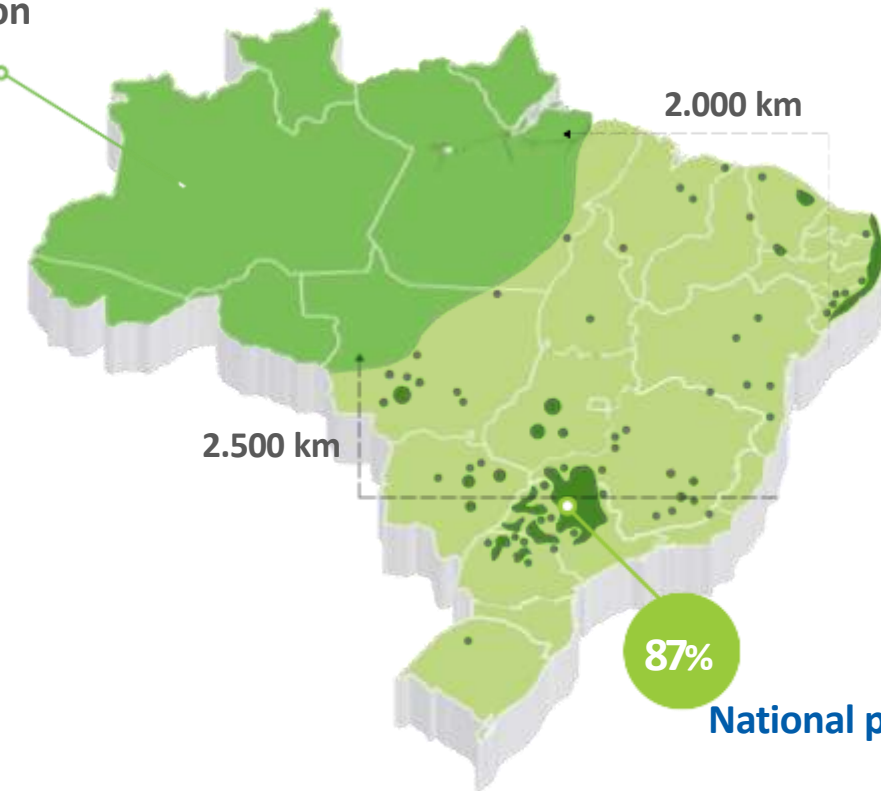


Braskem's capacity of I'm green™ polyethylene production: 200 kton/year

460 millions liters of Ethanol = approx. 65 thousand hectares

BRAZILIAN AGROECOLOGICAL ZONING PROGRAMME

Amazon
Forest



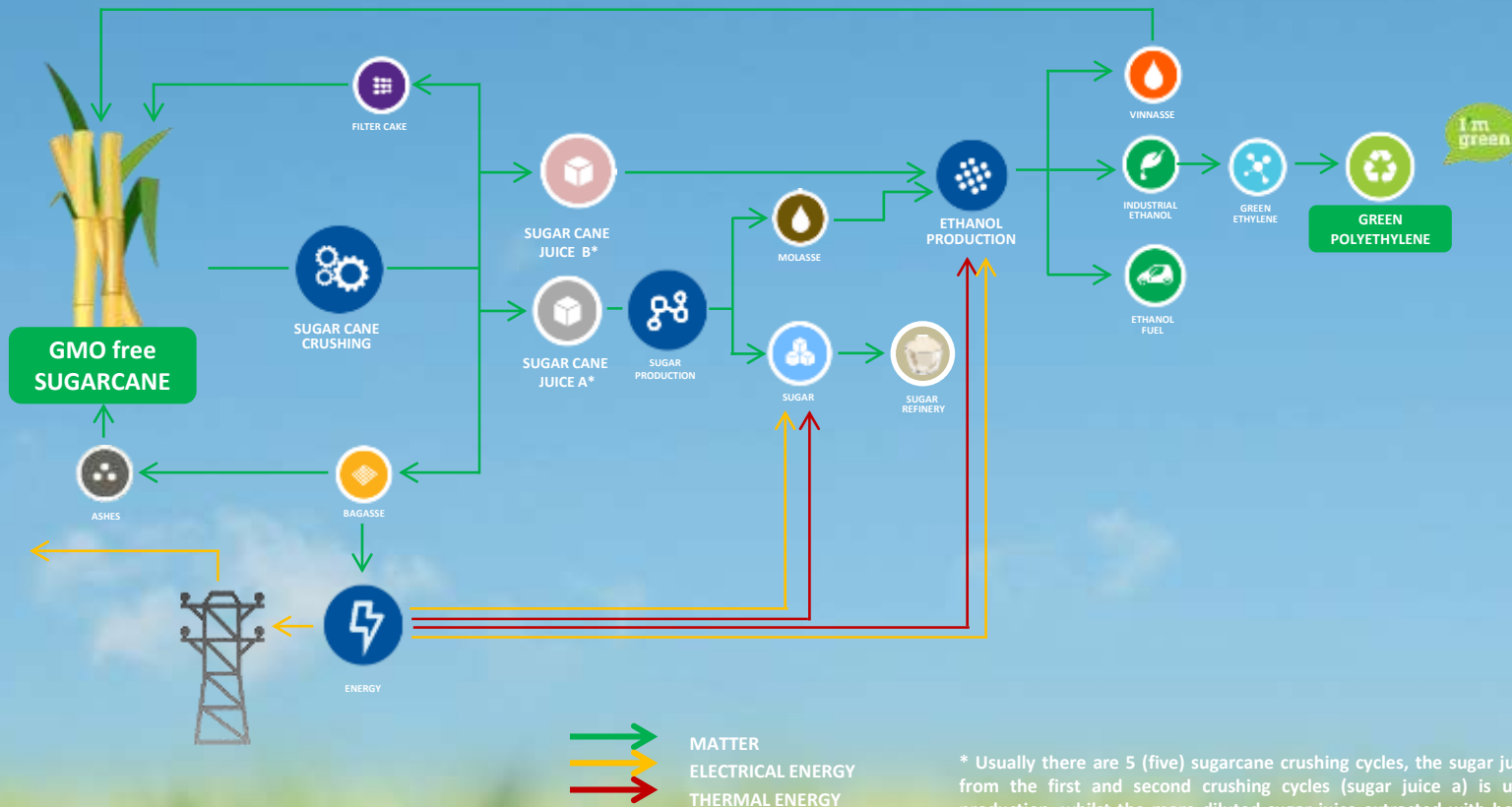
- Soil and weather condition = productivity
(no expansion to Amazon and Pantanal)
- Areas for sugarcane expansion:
 - Areas with proper conditions for mechanical harvesting
 - Degraded pasture land
 - Regions with lower need for water usage in production
- Respect for food security

LCA study

- ACV Brasil
- Standard ISO 14044
- Primary data from Braskem connected to ecoinvent v3.1
- Data from the year 2015
- Cradle to factory gate

I'm Green™ Polyethylene

Efficient use of resources



* Usually there are 5 (five) sugarcane crushing cycles, the sugar juice extracted from the first and second crushing cycles (sugar juice a) is used in sugar production, whilst the more diluted sugar juice extracted with hot water from the last 3 (three) crushing cycles (sugar juice b) is mixed to the molasses and used in ethanol production.

LCA Study

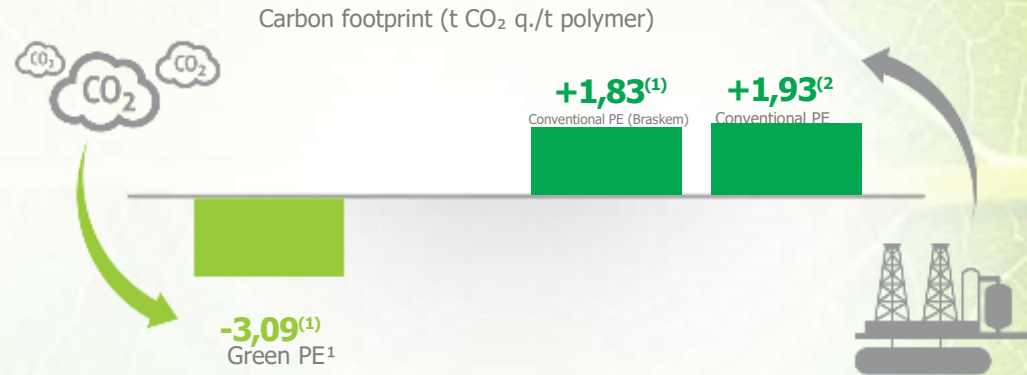
**1mt Green PE
captures 3.09mt CO₂.eq**

*Source: ACV Brasil/2017 (from cradle to
Braskem's gate)*

With an annual output of
200k / t
Green PE I'm green™,
Braskem is able to reduce the
emission of 984kt of CO₂ into
the atmosphere every year.

This economy is equivalent to
6.5 days without cars
circulating in the city of São
Paulo.

Carbon footprint comparison



(1) LCA Study conducted by ACV Brasil/2017 (from cradle to Braskem factory gate)

(2) Plastics Europe

Ethanol responsible sourcing framework

Code of conduct based on the following Pillars:

- 1. Cane burning;
- 2. Biodiversity;
- 3. Good environmental practices;
- 4. Human and labor rights;
- 5. Product life cycle analysis.



Externally audited – Control Union

2016: Responsible Ethanol Sourcing framework

- Upon request: Bonsucro certified ethanol
- ISCC+ Certification for the whole chain (all the way to Antwerp).

Stakeholder support:



Applications

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I'm green™

Portfolio



Applications



Manufacturing Technology

Injection molding

Blow molding and
Tubing

Fiber extrusion

Blow and cast film extrusion

LDPE

HDPE

LLDPE

Rigid and flexible applications

BRANDING

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I'm green™

Value Proposition



I'm green™ is the seal that identifies Braskem's Green Polyethylene made from renewable source.

The use of the seal helps consumers identify truly sustainable product, increasing the perceived value of the Green PE products.

To ensure clear and safe communication, developed signatures are available and in order to capture the maximum value, there is some flexibility towards customers needs.

For communication materials



For product application





Success cases



Partnership

In 2011 Nomaticorc started to develop Green PE based wine closures in partnership with Braskem and in April of 2013 the product was first announced at Intervitis Interfructa in Stuttgart.

Motivations

"Not only are we able to serve wineries seeking a more reliable and sustainable packaging solution, but we can reduce our overall corporate carbon footprint while taking an important first step towards our goal of minimizing the use of fossil-based energy and materials across our entire range of products."

Results

- Nomaticorc successfully launched the world's first zero carbon footprint closure by end of 2013.
- >300 press articles and 400% growth over last year



Success cases

Partnership

The partnership between Braskem and Pilecco Nobre, a major bio rice producer in Southern Brazil, began in 2013. PN are pioneers in the rice industry;

Motivations

Some sustainable credentials include;

- Underground drip irrigation for rice.
- S10 diesel trucks with controlled max. speed
- Utilise renewable energy.
- Moved to Green PE to further improve their commitment to sustainability.

Results

Remarkable CO₂ reduction was achieved.

Recognized by Walmart's end-to-end sustainability program.

By using the I'm green™ logo, millions of consumers will have the possibility to identify the use of biobased PE in the packaging.

I'm green™

We are partners with

JoinThePipe

Braskem



Bio-based EVA





Bio-based EVA



An innovative and sustainable solution for the following markets:
footwear, flexible packaging, foam and automotive

Portfolio

Product	MFI (g/10')	VA (%)	Density (g/cm ³)	C14 Content (%) ASTM D6866	Main Application
SVT0780	0,7	18	0,940	Min 76	Agricultural Film, Food packaging, Geomembra ne, Laminating Film Sealant Layer, Stretch Film
SVT0585	0,5	13,5	0,935	Min 79	Coextrusion, Cooled and frozen food packaging , Food packaging, High transparency films with high mechanical resistance, Thermal films to co ver agricultural greenhouse
SVT2090	2,0	8,5	0,931	Min 83	Cooled and frozen food packaging, Food packa ging, Shrink film
SVT2180	2.1	19	0.940 <i>COMFORT</i>	Min 75	Expanded and reticulated plates for use in the footwear industry.
Evance™ SVT2145R	2.1	14	0.913	Min 40	Expanded and reticulated plates for use in the footwear industry, toys, furniture.

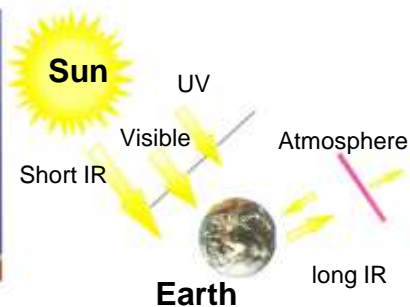
► Foam Applications



Flip flop, mat, midsole/outsole, toys, paperboard



Film Applications



Greenhouses film, package films, stretch film, etc.

Renewables

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Where Braskem's **RENEWABLE CHEMISTRY** is born?

Braskem has more than 30 researchers dedicated exclusively to the research of new technologies and products.

One of the most important centers of this work is the Research Center for Renewable Chemicals, considered the cradle of the most relevant discoveries of the company.

Research Center for Renewable Chemicals

- **Where it is:** Campinas, 99 kilometers from São Paulo.
- **Investment:** R\$ 30 millions.
- **Researchers:** 20 in biotechnology and more than 10 chemical engineers dedicated to the development of processes.
- **Differentials:** has the largest and most advanced automation robot (High Throughput Screening-HTS) in the country, as well as other state-of-the-art equipment focused on biotechnology research.



Petrochemical Value Chain



RAW MATERIAL

Natural Gas

Natural Processing

Methane

Ethane

Propane

Butane

Oil

Oil Refinery

GLP

Naphtha

Kerosene

Diesel

Parafin

CRACKING

CHEMICALS

Ethylene

Ethylene Oxide

Propylene

Propylene Oxide

Acid Acrylic

Butene

Isobutylene

Butadiene

Isoprene

Hexene

Cyclohexene

Toluene

Toluene Diamine

Benzene

Xilene

P-xilene

Ethylene Glycol

Propylene Glycol

Adipic Acid

Caprolactam

Toluene Piisocianate

Terephalic Acid

POLYMERS

Polyester

Polyethylene

Anti-Freeze

SAP

Polipropylene

Polisobuthylene

Polybutadiene

Polyisoprene

Nylon 65

Nylon 6

Polyurethane

Polyester

WORLDWIDE LEADERSHIP IN RENEWABLE CHEMISTRY



Braskem
HALDOR TOPSOE



DEMO PLANT STARTS UP IN 2019, IN DENMARK

Closing remarks

The value proposition of our I'm green™ PE

- Renewable (in **one** year)
- Recyclable (also as a **biofuel**)
- Low carbon footprint (**LCA**)
- Responsibly sourced (**chain of custody** certification is possible)
- **Innovative**
- Adds **value** to brands and products!

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