Braskem I’m green™
“making people’s lives better today and for generations to come”
Martin Clemesha
21/02/2020
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

**INDUSTRIAL UNITS:**
- 29 in Brazil
- 6 in USA
- 4 in Mexico
- 2 in Germany

**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.
Recognition
I’M GREEN™
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
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
Favorable aspects for the development of biopolymers
Intense solar radiation and climate diversification

Pioneer in research and development of biofuels

The largest watershed in the world
Land Use
From sugarcane to I’m green™ Polyethylene

1 hectare of land

77 tons of Sugarcane

6700 liters of Ethanol\(^{(1)}\)

3 tons of Green Ethylene\(^{(2)}\)

3 tons of I’m green Polyethylene\(^{(2)}\)

\(^{(1)}\) NIPE/UNICAMP/UNICA

\(^{(2)}\) Braskem’s project data

<2.0% of Brazilian ethanol production

0.02% of Brazilian arable land

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LAND USAGE

Significant potential for sustainable growth

Total Area
851.48
Millions of hectares

Protected/Native
496 (58%)

Arable Land
329.94 (39%)

Pasture
158.75 (48%)

Agriculture
51.7 (16%)

Sugar Cane
8.14 (2.4%)

Available
111.34 (33%)

Other
25.92 (3%)

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

- 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

Amazon Forest

2.000 km

2.500 km

87% National production
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
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
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
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

TM registered in European Union, Brazil, Japan, Argentina, Mexico and United States
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.

In 2011 Nomacorc 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

- Nomacorc successfully launched the world’s first zero carbon footprint closure by end of 2013.
- >300 press articles and 400% growth over last year
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 CO$_2$ 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.

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;
I’m green™
We are partners with
Bio-based EVA

- Resistance
- Comfort
- Lightness
- Flexibility

An innovative and sustainable solution for the following markets: footwear, flexible packaging, foam and automotive
<table>
<thead>
<tr>
<th>Product</th>
<th>MFI (g/10')</th>
<th>VA (%)</th>
<th>Density (g/cm³)</th>
<th>C14 Content (%) ASTM D6866</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVT0780</td>
<td>0.7</td>
<td>18</td>
<td>0.940</td>
<td>Min 76</td>
<td>Agricultural Film, Food packaging, Geomembrane, Laminating Film Sealant Layer, Stretch Film</td>
</tr>
<tr>
<td>SVT0585</td>
<td>0.5</td>
<td>13.5</td>
<td>0.935</td>
<td>Min 79</td>
<td>Coextrusion, Cooled and frozen food packaging, Food packaging, High transparency films with high mechanical resistance, Thermal films to cover agricultural greenhouse</td>
</tr>
<tr>
<td>SVT2090</td>
<td>2.0</td>
<td>8.5</td>
<td>0.931</td>
<td>Min 83</td>
<td>Cooled and frozen food packaging, Food packaging, Shrink film</td>
</tr>
<tr>
<td>SVT2180</td>
<td>2.1</td>
<td>19</td>
<td>0.940</td>
<td>Min 75</td>
<td>Expanded and reticulated plates for use in the footwear industry.</td>
</tr>
<tr>
<td>Evance™ SVT2145R</td>
<td>2.1</td>
<td>14</td>
<td>0.913</td>
<td>Min 40</td>
<td>Expanded and reticulated plates for use in the footwear industry, toys, furniture.</td>
</tr>
</tbody>
</table>
Foam Applications

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

Greenshous es film, package films, stretch film, etc.
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.
WORLDWIDE LEADERSHIP IN RENEWABLE CHEMISTRY

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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