

Lifecycle Thinking for a Low-Carbon Future



I'm 
green™
BIO-BASED

LIKE TRADITIONAL PLASTIC
BUT MADE FROM PLANTS

Braskem 

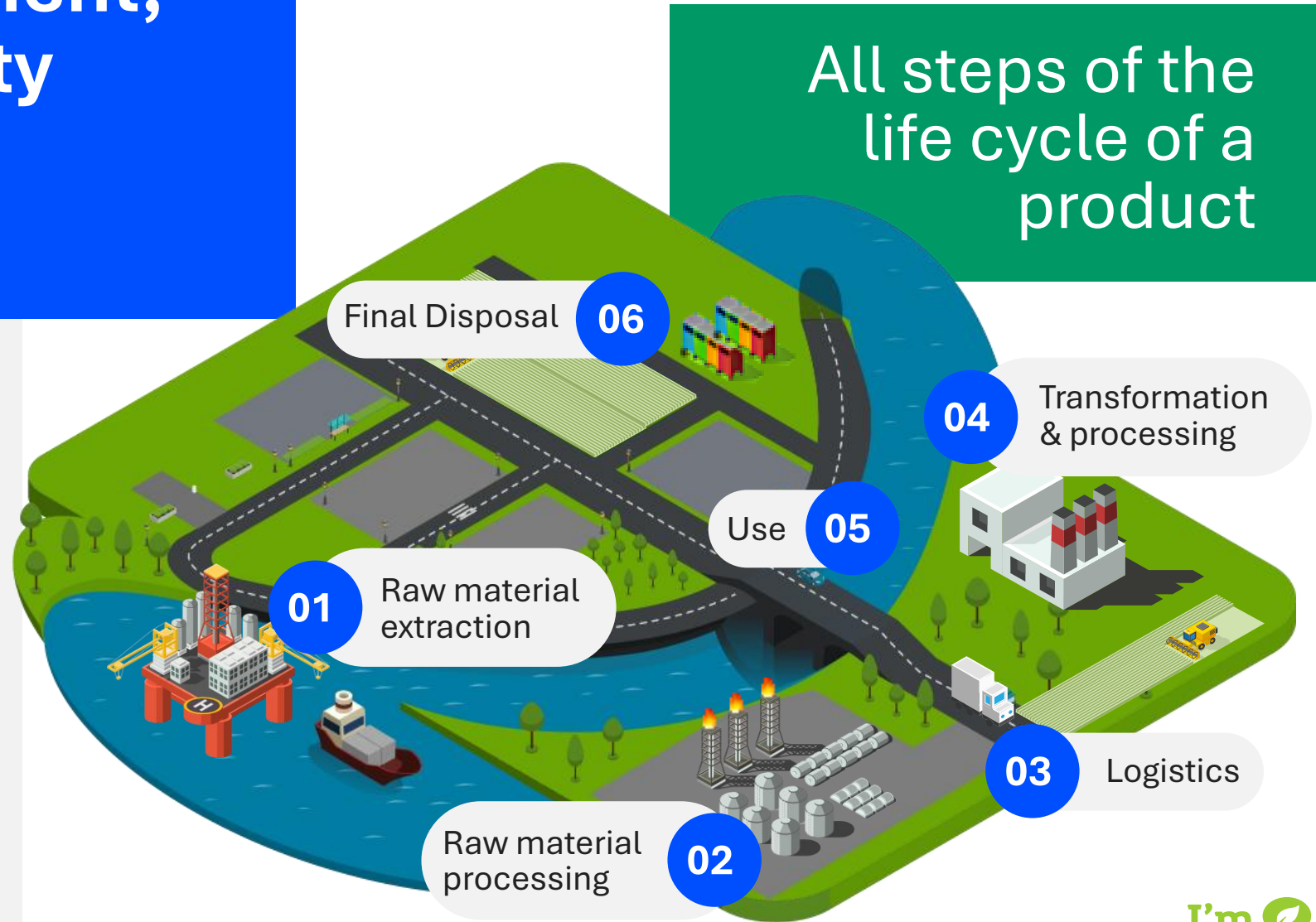


Life Cycle Assessment, where sustainability meets informed decision-making.

Understanding the full story of our products — from raw materials to end use.

Our LCA (life cycle assessment) follows global standards, it drives transparency and reveals the real environmental impacts beyond carbon.

With these insights, we make science-based decisions that inspire innovation and advance sustainable development.



Reducing greenhouse gas emissions is one of today's greatest challenges — and smarter material solutions play a key role.

I'm green™ bio-based EVA, PE, and PE WAX are made from sustainably sourced sugarcane and combine performance with lower environmental impact.

The independent **Life Cycle Assessments** confirm the benefits, **offering verified carbon data and insights** to support customers' sustainability goals.

Discover how renewable materials can help build a more sustainable future.

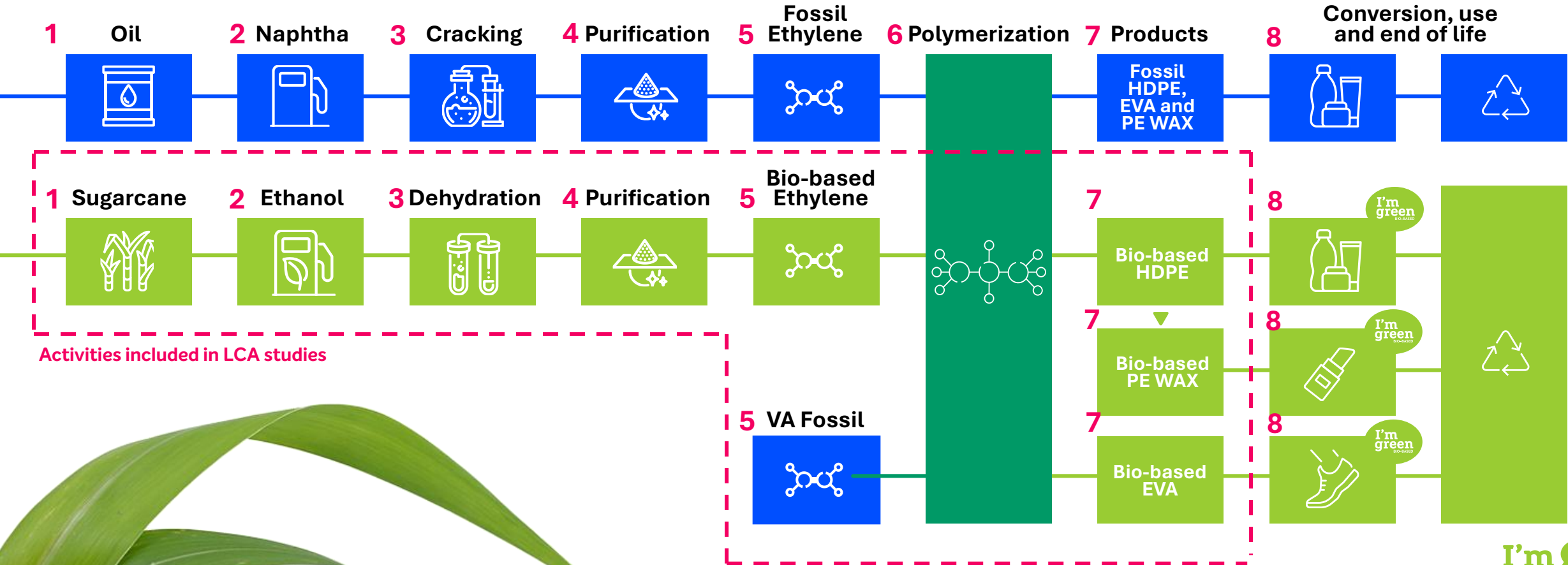
Explore the next pages.



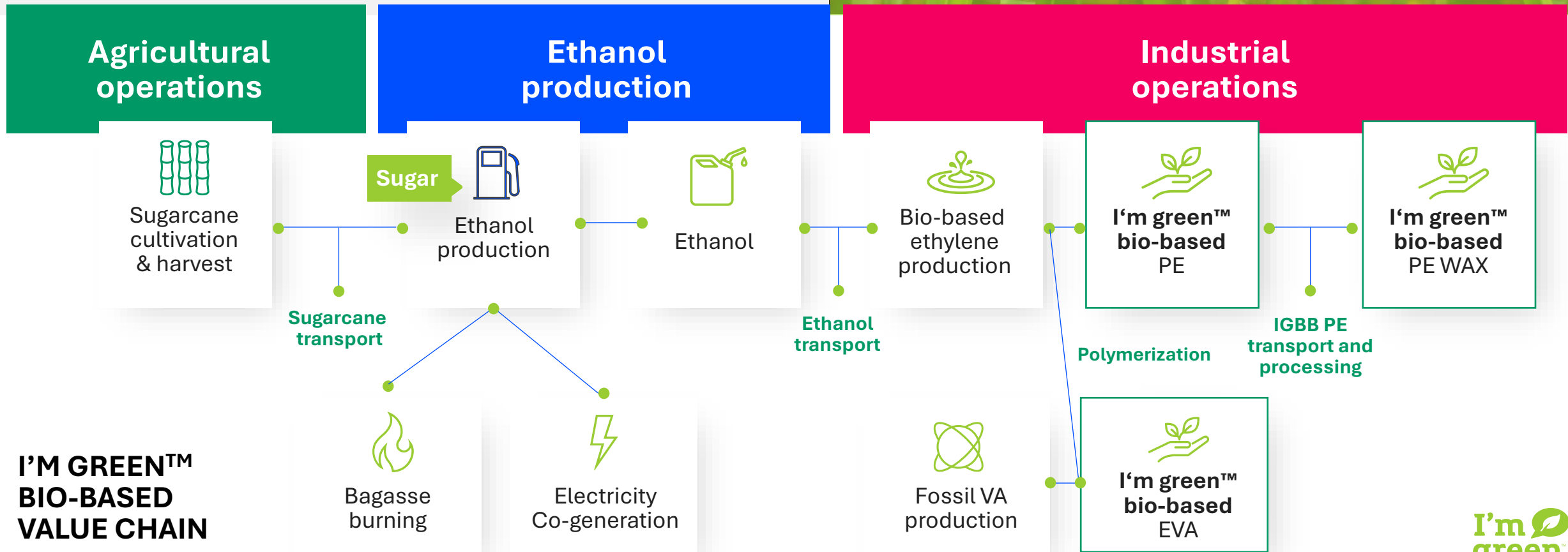


Before exploring the LCA results for **I'm green™ bio-based EVA, PE, and PE WAX**, it's key to understand the production process.

The process is the same as for fossil-based plastics — only the raw material changes, replacing fossil-fuel with sustainably sourced renewable fuel. **This means bio-based products offer the same quality and performance, with a lower environmental impact.**



The **lifecycle stages of bio-based** HDPE considered in this study encompass all activities from raw materials extraction and processing, including transport to Braskem's plants, and the transformation processes (industrial activities). This extends up to the point when the product is ready for sale at the company's gate (also referred to as cradle-to-gate).



I'M GREEN™ BIO-BASED VALUE CHAIN

Notably, the transformation, use, and end-of-life stages were not considered in this analysis.

Methodology

LIFE CYCLE IMPACT ASSESSMENT (LCIA) METHOD

17 environmental impact categories

are evaluated in this LCA study following the EF 3.1 method. The categories cover a wide range of impacts that can have **global or local effects**, for the ecosystem and for human health

All results are calculated per kilogram of product, from cradle to factory gate.

The assessment covers the full value chain:

- **Sugarcane cultivation:** growing, harvesting, fertilizers, pesticides, and transport
- **Ethanol production:** mill operations and transport
- **Braskem's operations:** industrial processes

Using the Environmental Footprint 3.1 methodology, the study assessed 17 impact categories, including climate change (IPCC 2021, GWP 100a), following international standards and guidelines.

	Impact category	Unit
	Climate Change	kg CO2 eq
	Ozone depletion	kg CFC-11 eq
	Land use	Dimensionless (pt)
	Water scarcity	m ³ water eq.
	Water use	m ³
	Use of mineral resources	kg Sb eq
	Use of fossil resources	MJ
	Particulate matter	Disease incidence
	Ionizing radiation	kBq U235 eq
	Photochemical Ozone formation	kg NMVOC eq
	Acidification	mol H+ eq
	Eutrophication – terrestrial	mol N eq
	Eutrophication – freshwater	kg P eq
	Eutrophication – marine	kg N eq
	Human toxicity – cancer	CTUh
	Human toxicity – non-cancer	
	Ecotoxicity – freshwater	CTUe

Methodology

BIOGENIC CARBON CONTENT

In bio-based materials, carbon comes from renewable sources like sugarcane. As the plant grows, it captures CO₂ from the atmosphere — carbon that becomes part of the product itself, helping lower its overall footprint.

The CO₂ absorbed during photosynthesis was calculated based on the carbon content of ethylene (C₂H₄), resulting in **3.14 kg CO₂ /kg of bio-based ethylene**

Consequently, the amount of 'CO₂ uptake' in each bio-based product is proportional to the amount of bio-based ethylene consumed in its production. This **theoretical approach avoids inaccuracies in the carbon balance**



Biogenic Carbon content in I'm green™ bio-based products

HDPE / LDPE: **-3.14 kgCO₂ /kg**

LLDPE: **- 2.73 kgCO₂ /kg**

EVA⁽¹⁾: **- 2.51 kgCO₂ /kg**

PE WAX⁽²⁾: **- 3.46 kgCO₂ /kg**

The amount of CO₂ uptake calculated for bio-based products can be considered as **fixation or removal** because, at the end-of-life, plastics have very low degradation rates and waste incineration is not a standard end-of-life scenario

The carbon uptake is guaranteed until Braskem's gate where the boundaries of the LCA study is set because **no transformation, degradation or incineration happens until this lifecycle stage**

- (1) Considering EVA SVT2180 as reference value
(2) Considering GWAX50E as reference value

Carbon Footprint

critically reviewed by a renowned third parties (KPMG or ERM), ensuring consistency in methodology, modelling and assumptions.

HDPE



-2,12⁽¹⁾ kgCO₂e/kg

Bio-based HDPE
Carbon Removal
from atmosphere



+3,10⁽²⁾ kgCO₂e/kg

Fossil-based HDPE

Each kg of fossil-based PE replaced by the I'm green™ bio-based PE **avoids the emission** of approx. **5 kg of CO₂e**

PE WAX



-1,88⁽³⁾ kgCO₂e/kg

Bio-based PE WAX
Carbon Removal
from atmosphere



+2,84⁽⁴⁾ kgCO₂e/kg

Fossil-based PE WAX

Each kg of fossil-based PE WAX replaced by the I'm green™ bio-based PE WAX **avoids the emission** of approx. **4,7 kg of CO₂e**

EVA



-1,08⁽⁵⁾ kgCO₂e/kg

Bio-based EVA
Carbon Removal
from atmosphere



+3,38⁽⁶⁾ kgCO₂e/kg

Fossil-based EVA

Each kg of fossil-based EVA replaced by the I'm green™ bio-based EVA **avoids the emission** of approx. **4,5 kg of CO₂e**

(1) LCA Study conducted by ACV Brasil/2023 (from cradle to Braskem factory gate); Adhering to ISO 14040/44, and ISO 14071 standards

(2) Ecoinvent v 3.10 – Global average HDPE

(3) LCA Study conducted by EnCiclo/2025 (from cradle to Braskem factory gate); Adhering to ISO 14040/44, and ISO 14071 standards

(4) Carbon footprint calculated based on fossil PE (European average - ecoinvent v3.10).

(5) LCA Study conducted by ACV Brasil/2025 (from cradle to Braskem factory gate); Adhering to ISO 14040/44, and ISO 14071 standards

(6) Ecoinvent v 3.11 – RoW average

Change your carbon footprint – not the climate

**Choose plant-based plastic.
The small change with a big impact.**



