The Future of Bioplastics

Scaling Lower-Carbon Solutions Through PLA Innovation and Circular Design

Hao Ding

Future of Bioplastics 2026

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Luminy®
PLA bioplastics

TotalEnergies Corbion

Growing from idea to global operation

In 2015, The Paris Agreement united the world to reduce the effects of climate change.

Two forward-thinking companies joined forces to help meet that goal for the polymer sector. TotalEnergies Corbion was born.

75,000-ton annual production capacity

+100 million kg of CO_2 captured annually*

Advanced recycling of PLA since 2021

Gold EcoVadis Status

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*Based on 2025 statistics

The Challenges We Face

Dependence on fossil-based materials

High Greenhouse Gas Emissions

Regulatory & Social Pressure

Low Recycling Rates

Plastics Waste Accumulation

Persistent Microplastics

It’s time to rethink plastics for a circular future!

What is PLA?

From plants to performance materials

Sugarcane is the starting point for Luminy® PLA. The sugar extracted from the sugarcane is fermented using microorganisms to produce lactic acid. Via polymerization process, PLA is produced.

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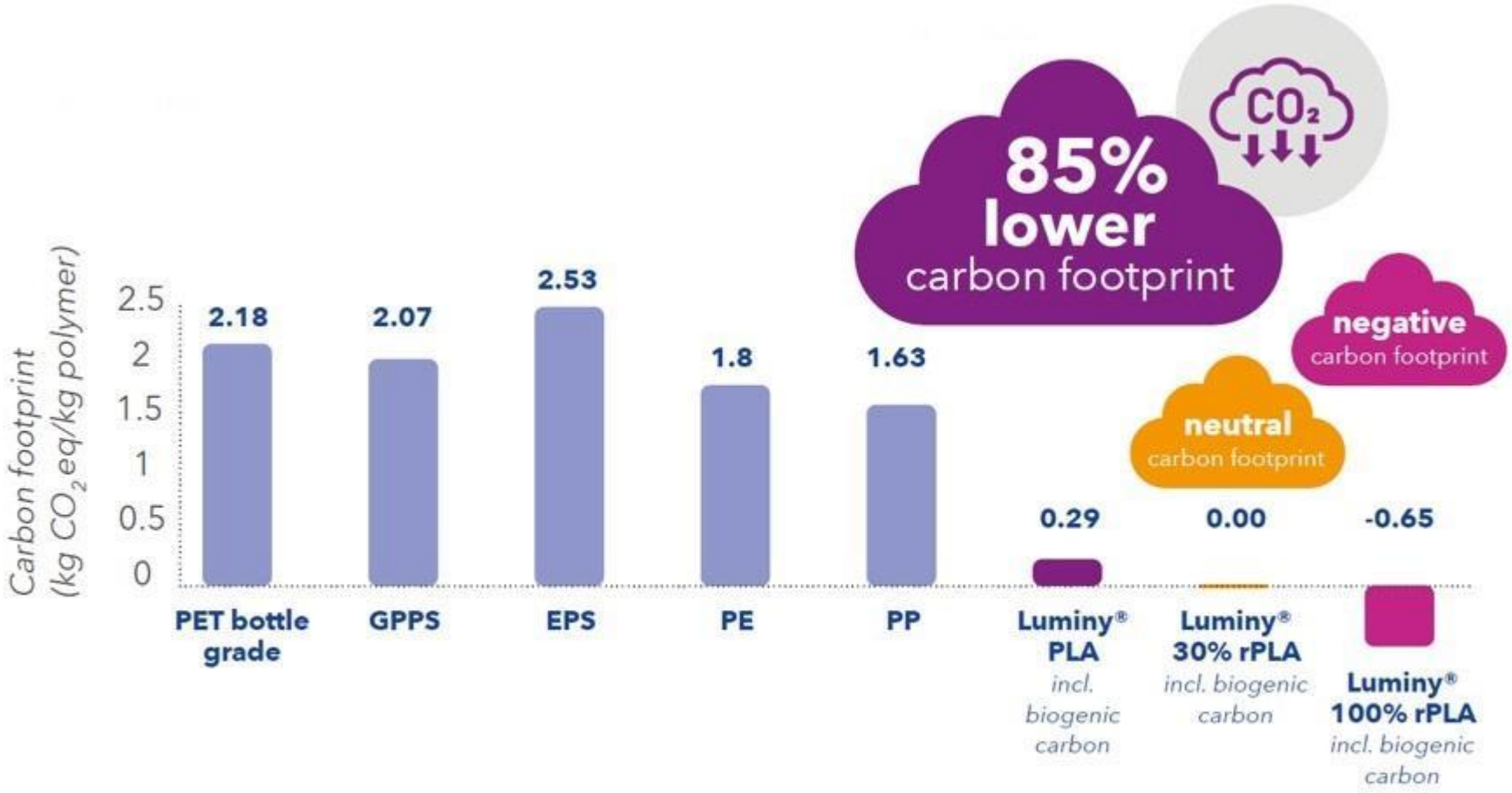
How Luminy® compares

Up to 85% lower carbon footprint vs. conventional plastics



Cradle to Gate Carbon Footprint for various polymers kg CO_2 eq/kg polymer.

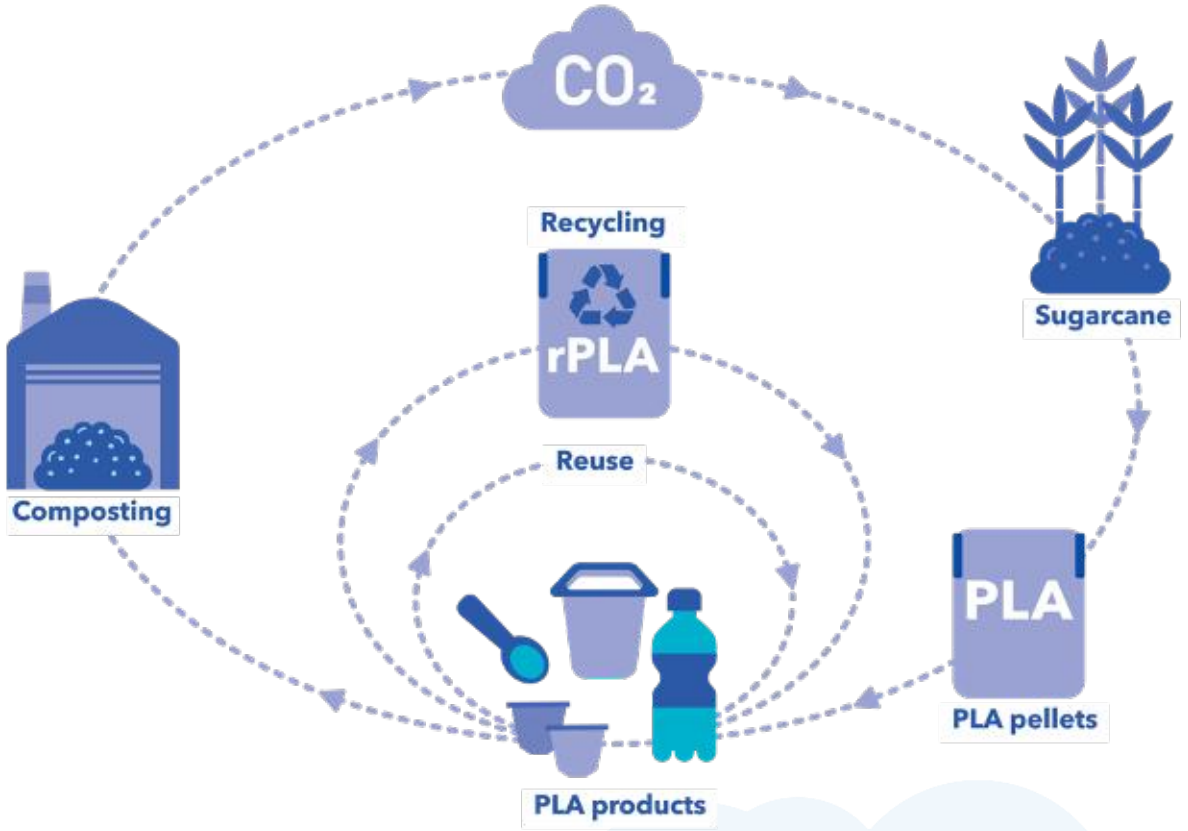
Source: PlasticsEurope and TotalEnergies Corbion Luminy® PLA LCA 2025

Closing the loop

Luminy® PLA offers multiple pathways – not a single end-of-life solution

PLA comes from plants, but there are multiple ways to keep it in the loop:

- Reusing durable products
- Recycling PLA into new items
- Composting it back to the earth



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Choosing the best option

Which end-of-life works best for your application?

For items made with rPLA or virgin PLA that get contaminated with organic waste during use, composting is the best option

Is there a high risk of the item being left in the environment at end-of-life?

Yes → **Design for soil or marine biodegradation**

- Mulch film
- Fishing gear

No ↓

Are the items contaminated with organic waste?

Yes → **Design for composting**

- Tea bags
- Coffee capsules
- Fruit labels
- Contaminated food service ware
- Bags that can be reused for biowaste collection

No ↓

Is there a high risk of the item being disposed of into the organic waste collection?

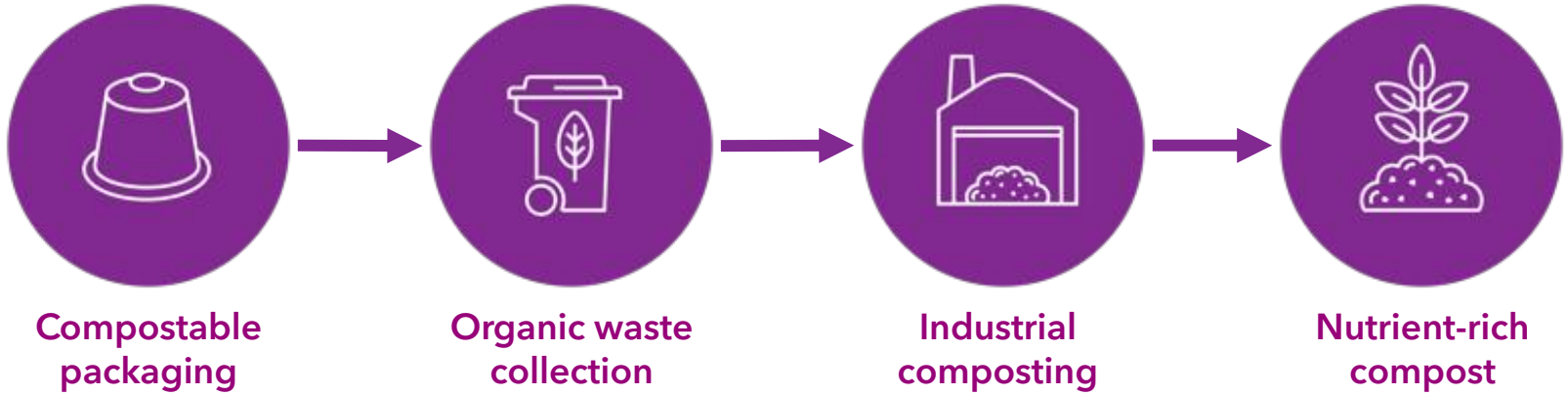
Yes → **Design for composting**

No → **Design for recycling**

- Food trays (in non-closed-loop environments)
- Drink bottles
- Cups
- Cosmetic packaging
- Electronics

Composting Luminy® PLA

Back to earth



Source: WUR study for the Dutch Environmental Ministry, published February 2020.

Recycling Luminy® PLA

How advanced recycling compares

Hydrolysis:
Luminy® PLA Advanced Recycling

- PLA hydrolysis requires water and a temperature of ~100°C resulting in lactic acid
- A PLA hydrolysis reactor is an integrated part of the plant we operate in Thailand
- rPLA retains food contact approval like virgin PLA

Pyrolysis:
Conventional polymers recycling

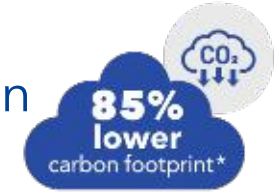
- A pyrolysis unit produces oil at 450°C–700°C, which is blended with naphtha or gas oil and fed into a steam pyrolysis unit at ~850°C
- A pyrolysis unit is typically a "stand-alone" unit requiring $100-200 million of investment

TotalEnergies Corbion offers 20%, 30%, and 100% Luminy® rPLA grades

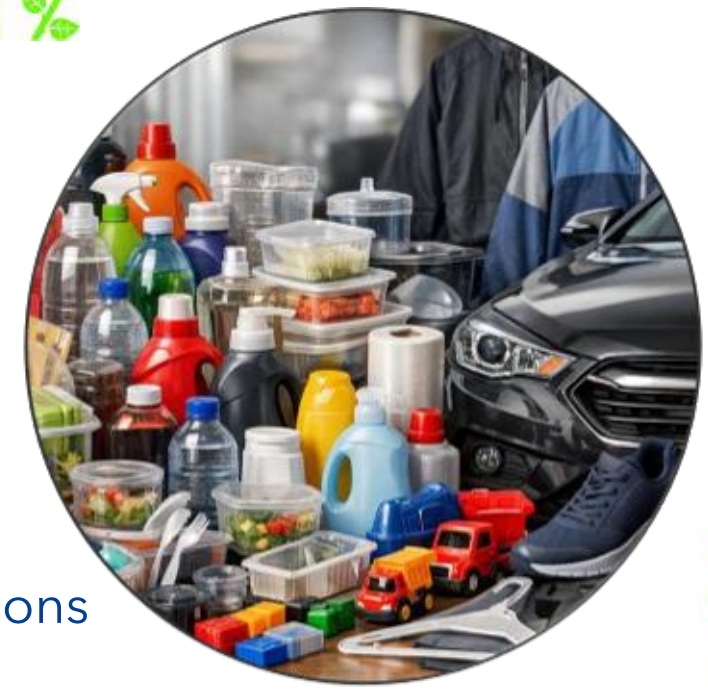
From Challenge to Solution: The Role of PLA

100% Biobased, sustainably sourced

Low carbon footprint

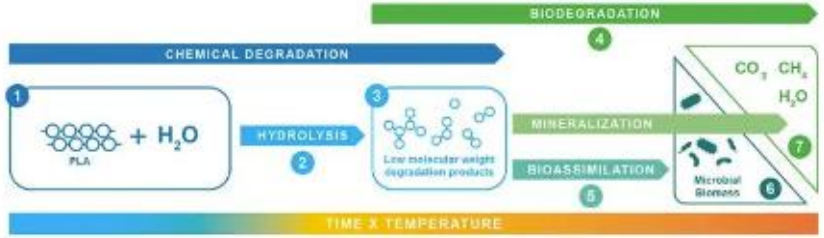


Compliant with standards & regulations



Multiple EOL solutions for circularity

Lower environmental impact without creating persistent microplastics



PLA is not only replacing plastics. It is helping redesign the plastics system.

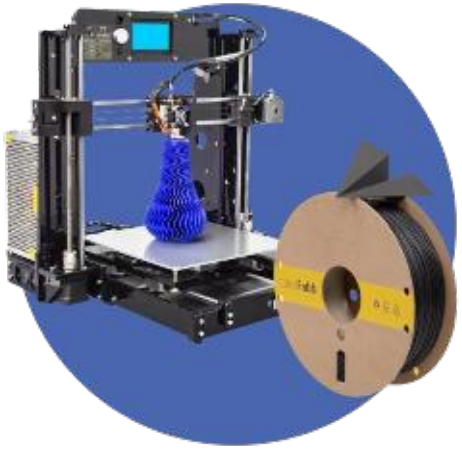
Key Applications

From short-life to durable applications

Food service ware

Flexible packaging

Rigid food packaging



3D printing

Durable goods

Fibers and nonwovens

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Luminy® L040

Ultra high flow PLA designed for meltblown

Proven performance:

- High filtration efficiency achievable, with filament diameters as fine as 1 micrometer
- Stable electrostatic charge retention, even without additives, ensures long- lasting filtration efficiency

Easy-processing

- Easy to process on regular meltblown lines, with only the additions of dryers

Sustainable-by-design

- Reduction of CO2 emissions by using a 100% biobased and recyclable material
- Does not release persistent microplastics
- Possibility to create a mono-material filter, allowing circularity

Luminy® FOAM

Sustainable Alternative for extruded foamed products

Proven performance:

- Achieves similar density and functionality as XPS

Easy-processing

- XPS drop-in: same line, same throughput with minimum line adjustments

Sustainable-by-design

- Reduces the foam part carbon footprint by 70%
- 100% Biobased solution, reducing dependence on fossil resources
- Designed for multiple end-of-life options: industrial compostable and recyclable

Safe for people and planet

- Styrene-free, PFAS-free for improved consumer safety
- Does not release persistent microplastics

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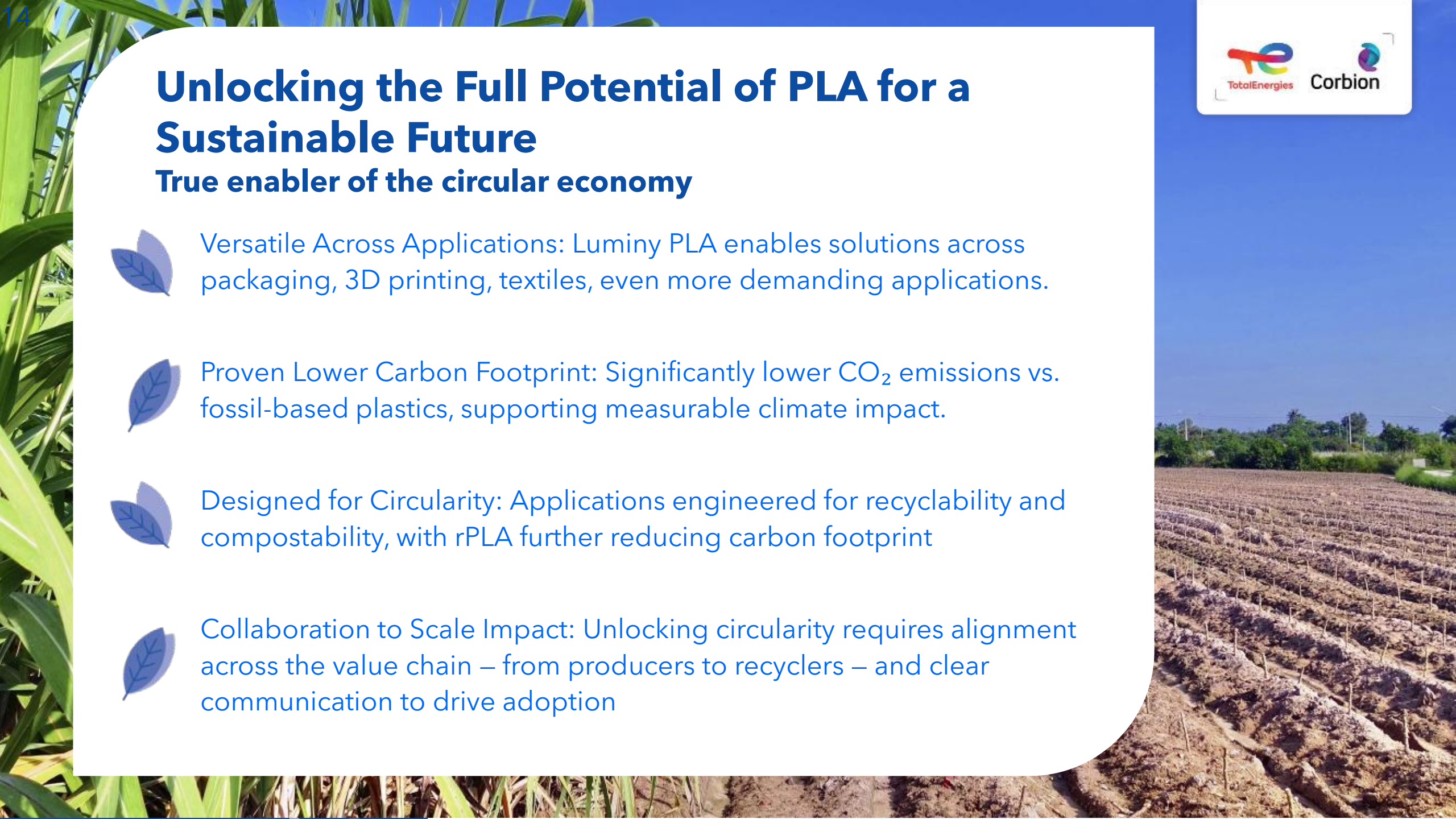
Unlocking the Full Potential of PLA for a Sustainable Future

True enabler of the circular economy

- Versatile Across Applications: Luminy PLA enables solutions across packaging, 3D printing, textiles, even more demanding applications.
- Proven Lower Carbon Footprint: Significantly lower CO_2 emissions vs. fossil-based plastics, supporting measurable climate impact.
- Designed for Circularity: Applications engineered for recyclability and compostability, with rPLA further reducing carbon footprint
- Collaboration to Scale Impact: Unlocking circularity requires alignment across the value chain – from producers to recyclers – and clear communication to drive adoption



Thank You

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