



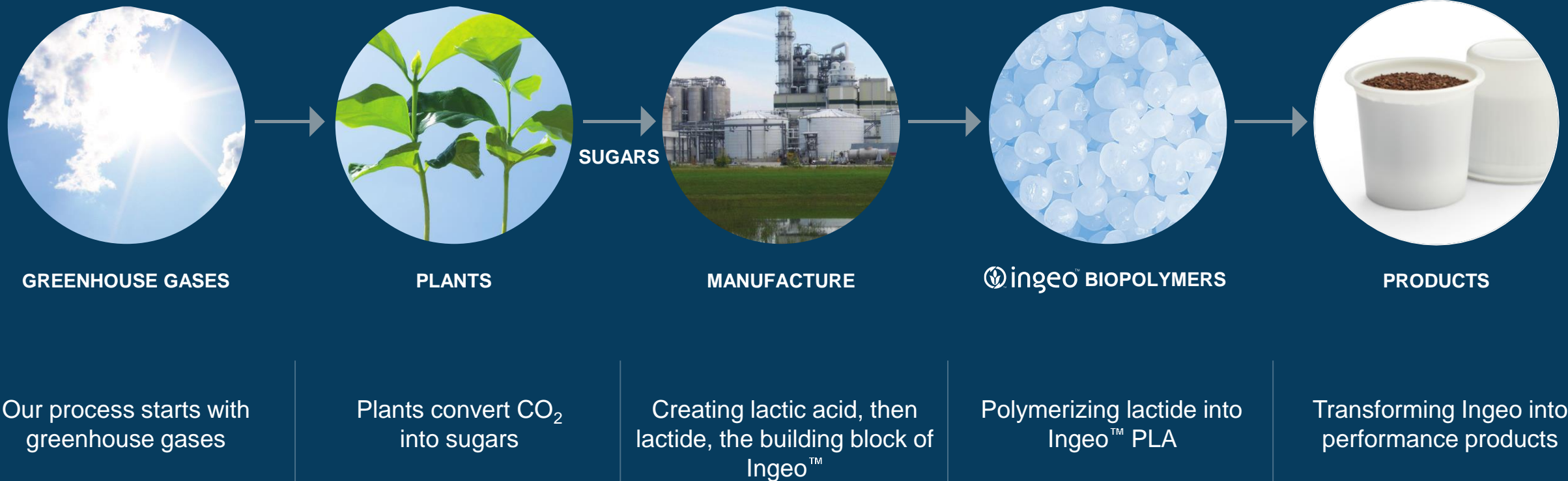
NatureWorks & CJ Biomaterials

May 8, 2024



Nature builds things from CO₂, and so do we

Ingeo polylactic acid is a biobased thermoplastic derived from renewable resources that can be transformed into packaging and products via traditional plastics and fibers manufacturing processes.





BLAIR, NEBRASKA FACILITY

- 150,000 MT nameplate capacity
- Excellent safety record
- Polymer plant online in 2002
- 650 acres - ~1 sq. mile – 263 ha.

Under construction: New Fully Integrated Ingeo Manufacturing Plant in Thailand



- 75,000 tons per year nameplate capacity
- Dedicated Ingeo manufacturing with integrated lactic acid, lactide, and polymer manufacturing sites
- Located in Nakhon Sawan Province, Thailand
- Will produce the full portfolio of Ingeo grades
- Feedstock (sugar cane) will be sourced within a 50km radius
- Energy co-generation from onsite utilities supplier
- On track to complete construction with full production anticipated in 2025



New partnership expanded our product development capabilities beginning to deliver a wider spectrum of mechanical properties and degradation rates



- May 2022
CJ BIO and NatureWorks Working Towards a Master Collaboration Agreement to Commercialize Novel Biopolymer Solutions
- November 2022
CJ Biomaterials and NatureWorks Sign Master Collaboration Agreement, Solidifying Relationship to Commercialize Novel Biopolymer Solutions
- April 2023
NatureWorks introduces new Ingeo PLA x PHACT PHA solution for improved softness and strength in biobased nonwovens for hygiene applications
- April 2024
CJ Biomaterials introduces two PHACT PHA x Ingeo PLA compounds for compostable film packaging in blown, cast, and machine direction orientation (MDO) film applications



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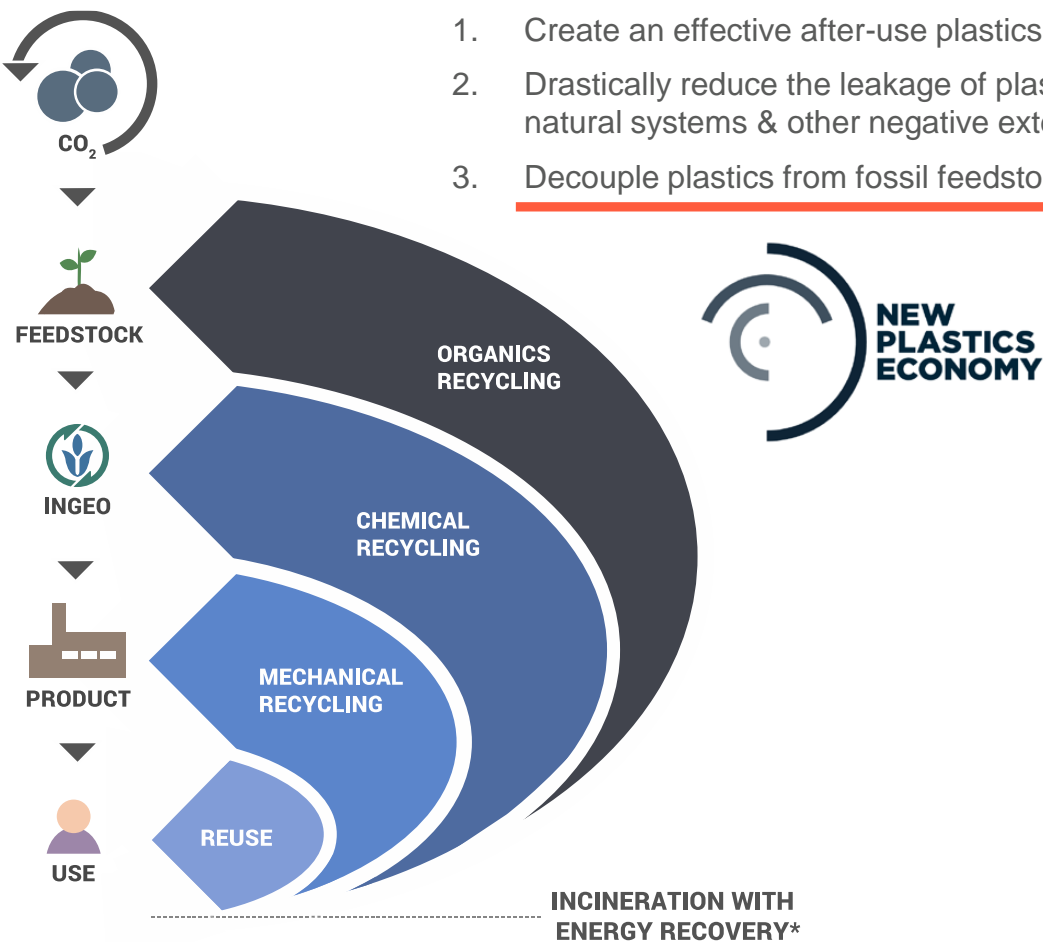


- Bringing together two biobased polymers, PLA and PHA, to jointly develop new biobased products
- Modifying PLA with amorphous PHA leads to improvements in mechanical properties, such as toughness, and ductility, while maintaining clarity.
- New after-use opportunities with tunable degradation timelines

Raw materials made from renewable resources with measurable biogenic content achieve circular economy and carbon reduction objectives

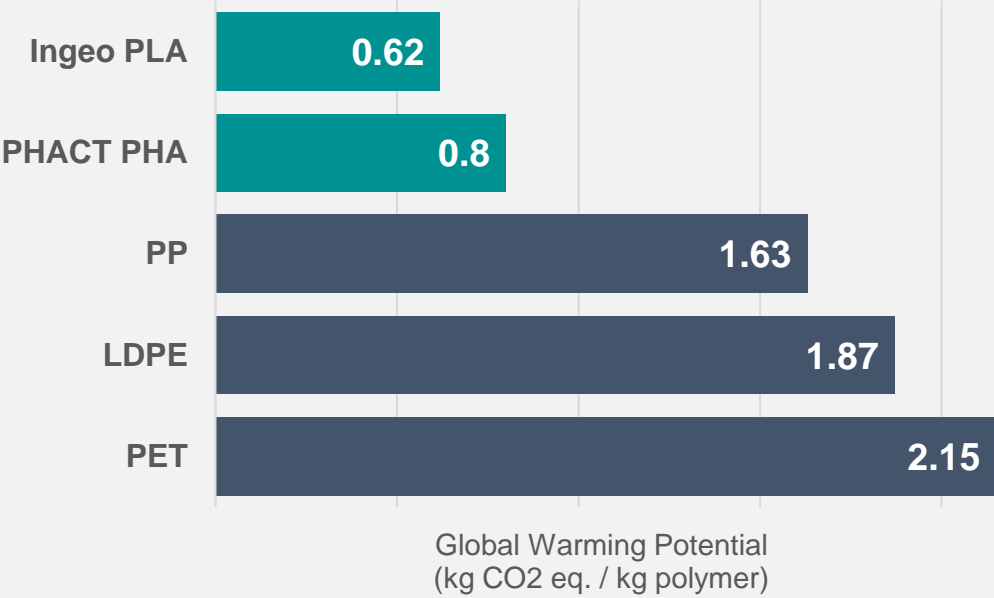
THREE AMBITIONS

- 1. Create an effective after-use plastics economy
- 2. Drastically reduce the leakage of plastics into natural systems & other negative externalities
- 3. Decouple plastics from fossil feedstocks



**only if other options are unavailable*

On average, Ingeo PLA x PHACT PHA can achieve a 62% reduction in carbon footprint

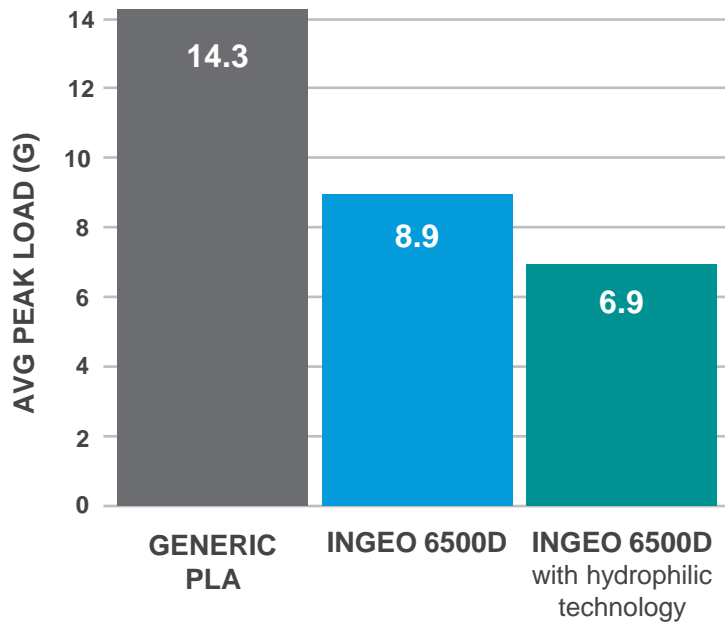


Sources:
[Ingeo Eco-Profile](#)
[CJ Biomaterials Eco-Profile](#)
[Plastics Europe](#)

New nonwovens have increased softness and offer fluid management superior to polypropylene for hygiene applications

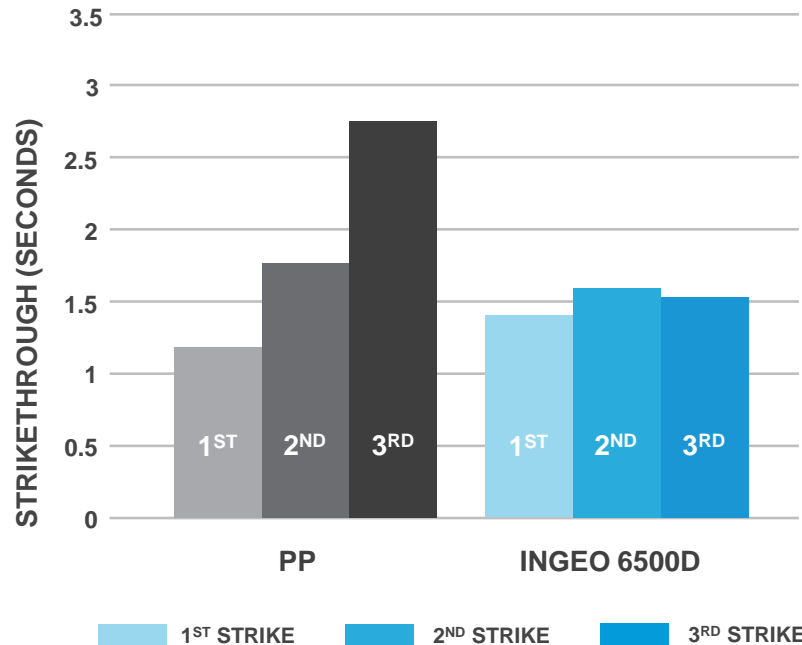
Significant improvement in softness with Ingeo 6500D

Ingeo 6500D can improve the softness of spunbond nonwovens by 40% over nonwovens made with generic PLA.

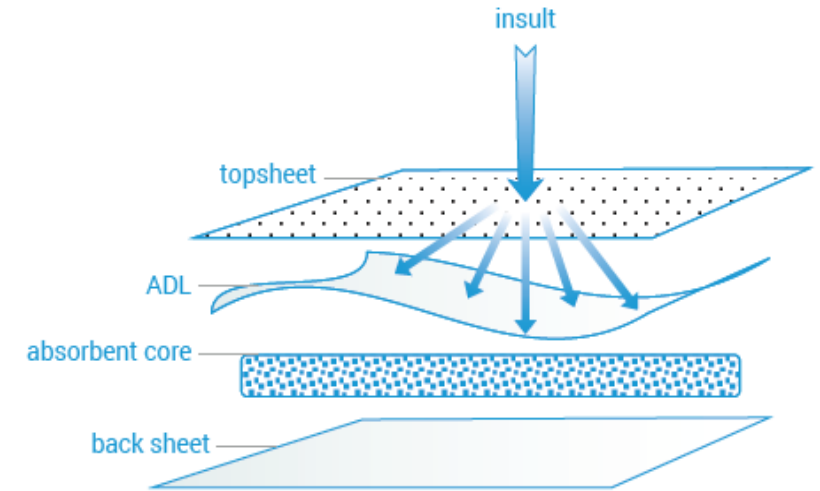


Based on HOM testing with 100 gram weight, 1/4" slot width, and 8x8 sample specimen. Handle-o-meter model number 211-300

Ingeo 6500D solution combined with topical treatment improves fluid management, durability and breathability



Ingeo nonwovens require less finish to achieve wash-off metrics superior to polypropylene



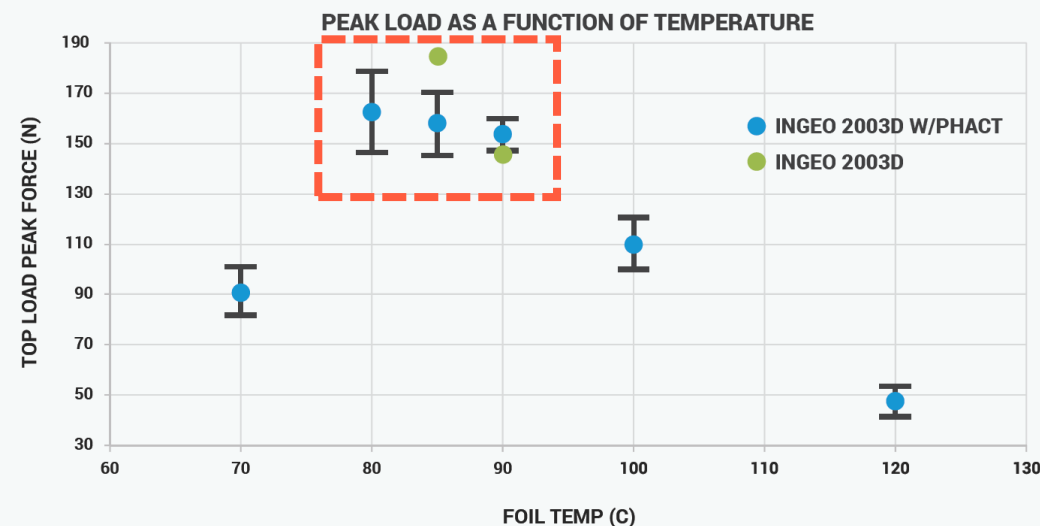
Switching the PP topsheet in a diaper to one made with Ingeo, can maintain absorption efficiency while reducing SAP content by 30%.

Ingeo PLA x PHACT PHA

Increasing impact resistance and accelerating compostability in new compostable, rigid thermoformed food containers

- Increased impact resistance required for automated food packaging lines
- Maintained transparency and clarity
- Maintained biobased content
- Early assessments show that this new material has high potential to meet the compostable criteria in California's SB1335 statute requiring biodegradation within 60 days

Optimized thermoforming window for increasing line speeds



Composting is a way to address food waste, plastic waste, and climate change



- Landfills are the 3rd largest source of methane emissions from human activities both in the USA and globally
- Adding compost to soils improves carbon sequestration & biodiversity
- Compostable food packaging facilitates food waste diversion from landfills/incineration to compost

Comparison of Life Cycle GHG Emissions for U.S. Food Waste Diversion from Landfills



A recent study from the US EPA showed that diverting another 25% of the food waste landfilled in 2019 to compost facilities would reduce the associated GHGs emissions by approximately 30%.

Sources:

http://www.epa.gov/system/files/documents/2022-01/organic_waste_management_january2022.pdf

https://www.epa.gov/system/files/documents/2023-10/food-waste-landfill-methane-10-8-23-final_508-compliant.pdf



Thank you.

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