

Compostable Biopolymer Films

September 2023



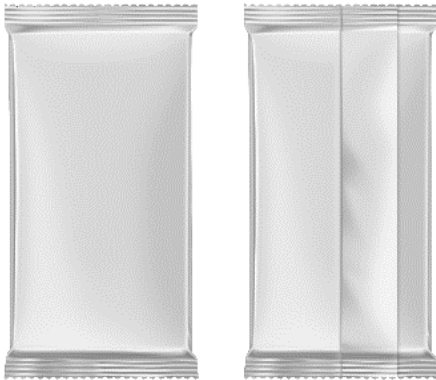
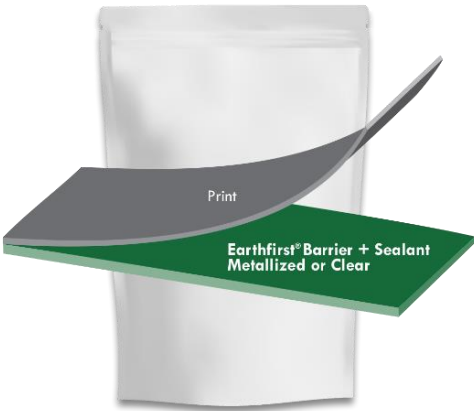
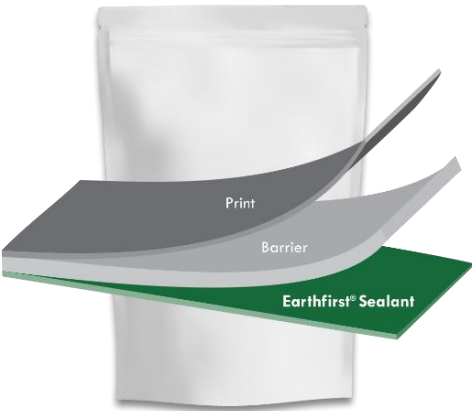
Earthfirst® Biopolymer Films

Sealant

Barrier Sealant

Print Web

Flow Wrap



Shrink Decoration



Earthfirst® biopolymer films are ideal for specific packaging



Pouches | Frac Pack | Stick Pack | Bar Wrap | Stand Up Pouch

Improved Origin of Life (OOL)

- Annually renewable plant-based material

Positive Environmental Impact

- Naturally lower carbon footprint (GHG)
- Packaging source reduction – up to 50%

Positive End of Life (EOL)

- Industrial compostable
- Home compostable

Performance

- Seals through contamination
- Low seal initiation temperature
- Layer elimination for barrier sealant films 3-to-2
- Up to 50% in operational cost savings along the packaging value chain

Earthfirst[®] biopolymer films are ideal for specific packaging



Shrink Sleeve Decoration | Promotional Banding | Tamper Evidence

Improved Origin of Life (OOL)

- Annually renewable plant-based material

Positive Environmental Impact

- Naturally lower carbon footprint (GHG) – PVC alternative

Positive End of Life (EOL)

- Removing packaging allows containers to be recycled and sleeves to travel with all other collected decoration to MRFs intended EOL
- EN 13432 certified for Industrial Compostability

Performance

- Highest shrink at the lowest temperature
- Stable in storage up to 38°C

MARKET SUCCESS

Earthfirst® Sealant Film

Agathia Al Ain

Agthia, a middle eastern food and beverage company, uses fully plant-based packaging for its Al Ain brand water bottles. Earthfirst® film serves as the decoration label for their compostable water bottles.

Earthfirst® Label Contributes to a Closed Loop End of Life Packaging Solution

- Earthfirst® label and all other parts of the water bottles are made from plant-based, compostable materials and have a closed loop cycle with origin materials
- “It does not contain any petroleum... and when composted, it returns to the environment... within 80 days”¹

Earthfirst® Film Has Excellent Label Characteristics and Meets Brand Packaging Requirements

- Earthfirst® Film is a printable, transparent label with good stiffness and can be glued onto the bottle



Earthfirst® Film Has Excellent Label Characteristics and Meets Brand Packaging Requirements (continued)

- Importantly, Earthfirst® Film is made from PLA and aligns with Agthia’s packaging requirement to use the same material for all packaging parts

Earthfirst® Films Can Improve Brand Image to Sustainably Minded Consumers

- Consumers are looking for more sustainable packaging and factoring this into their purchasing decisions¹
- Bio-based Earthfirst® Film contributes to the “plant bottle”, a simple reference for customers to remember
- A simple reference is likely to leave a positive brand association in the consumer’s mind

Label Structure

Previous: Paper

Current: 30µ | 120g Earthfirst® Non Barrier Sealant Film

¹ “First-of-its-kind”: Agthia produces Middle East’s first plant-based packaging, FoodNavigator-Asia, March 2020

MARKET SUCCESS

Earthfirst® Sealant Film

Trink Meer Tee

Trink Meer Tee is a Germany-based business-to-business brand, providing their tea to hotels, cafes, and restaurants. For consumers, teas are available through an online shop.

Environmentally Friendly + Performance

Trink Meer Tee was looking for a more environmentally friendly material for their individual tea packages. Paper and Earthfirst® sealant combined to create the needed touch and feel of a newly graphically designed bio-based package. Also, good sealing properties were important for minimizing product waste during the packaging process.



Organic Product + Natural Packaging

Earthfirst® films are plant-based, bioplastic alternatives to fossil fuel industry options. For Trink Meer Tee, avoiding traditional plastic materials is important. Trink Meer Tee wanted to connect their 100% certified organic and outstanding quality tea to natural packaging options. Their target market is drawn to a premium, high-quality product reflected in design, and sustainability. They actively searched for plant-based and environmentally friendly packaging options. To fulfill these market needs, they decided on Earthfirst® PLA sealant film.

Package Structure

Previous Package: 70µ Paper | 40µ LLDPE sealant film
New Package: 70µ Paper | **9µ Earthfirst® PLA sealant film**

MARKET SUCCESS

Earthfirst® Window Film

Bio-Based Bread Bags

A European-based, multinational grocery retailer launched a more sustainable bread bag appealing to regional consumer preferences. Consumer voices translated into market demand for more sustainable packaging. In this case, a PLA window film replaces a fossil-based film, creating a compostable bag.

High Performance Film Keeps Products Fresher for a Longer Time

- Earthfirst® PLA Window Film has an excellent moisture vapor transmission rate translating to great breathability, allowing moisture to gradually release
- In central and southern European countries, bread bought daily is likely to stay fresh longer with Earthfirst® PLA window film incorporated into the paper-based bags

Sound of Sustainable Packaging as Part of the Consumer Experience

- Due to inherent film properties, consumers may notice an audible difference in these new bread bags. This difference is a positive signal of more sustainable packaging and emphasizes the freshness of the desirable, crispy bread to consumers
- Substituting biosourced Earthfirst® PLA Window Film for fossil-based film translates into substantial greenhouse gas (GHG) and fossil fuel offsets for a lower packaging carbon footprint



Sound of Sustainable Packaging as Part of the Consumer Experience (continued)

- 20µ Earthfirst® PLA Window Film replacing 20µ BOPP in 5 million bread bags translates to an approximate reduction of 11.8 billion kg/CO₂, or the equivalent of:
 - GHG savings of 1.5 million households using electricity for one year
 - Fossil fuel savings of 8.6 billion liters of gasoline burned

Compostable Bread Bag Acts as a Vehicle to Divert Food Waste from Landfill

- Incorporating Earthfirst® PLA Window Film that is industrial compostable to EN 13432 makes the entire bread bag bio-based and aligns the retailer's brand with natural, plant-based packaging
- Importantly, the bread bag can be reused as a vehicle to capture and divert food waste from landfill when composted.

Package Structure

Previous Window Film: 20µ BOPP (perforated)

New Window Film: **20µ Earthfirst® PLA**

MARKET SUCCESS

Earthfirst® 3002 Film

Bioplastics Magazine Mailing Envelope

3002 Film serves as the global mailing envelope for Bioplastics Magazine

Semi Opaque Film is an Ideal Graphics Base

- The film is a great graphics base for printing and has an opaqueness level that allows magazine print to be visible through the envelope
- Film is receptive to all print technologies including Gravure, Flexographic, Rotary Offset and Digital



3002 Film Optimizes Envelope Integrity

- Soft, strong and extensible 3002 bio-based film inherently has excellent heat seals with a low seal initiation temperature
- Reliable heat seals add to envelope integrity and magazine protection during global distribution

Mailing Envelope Structure

50µ 3002 Film

MARKET SUCCESS

Earthfirst® Flow Wrap Film

Froggy

Driven by a conviction for more environmentally friendly packaging, Earthfirst® film is the flow wrap packaging for Froggy's product lines. GreenTree Group, owners of the Polish brand, Froggy, manufactures bio-based, single-use utensils and serving ware.

Earthfirst® Flow Wrap Aligns Natural Packaging with Natural Products

- Using Earthfirst® Flow Wrap allows Froggy to achieve their objective of "products made of 100% compostable and biodegradable raw materials"¹
- Earthfirst® film is made from annually renewable, plant-based sources and is industrial compostable to EN 13432



Earthfirst® Film Makes a More Positive Packaging Carbon Footprint

- High purity, Earthfirst® packaging film is greater than 90% new carbon
- From the start, Froggy chose Earthfirst® to disconnect from fossil-based packaging



Package Structure

Flow Wrap Film: 30µ Earthfirst®

¹ Froggy Product Website, December 2020

MARKET SUCCESS

Earthfirst® Sealant Film

NUMI Tea

Timed with a brand refresh, NUMI introduced a new plant-based package for their individually wrapped tea. This new pouch incorporates an annually renewable, bio-based barrier sealant film instead of a fossil fuel-based film. Every layer of packaging is now plant-based. Tea packages passed ASTM D6868 biodegradation testing for disintegration and ecotoxicity.

Positive Environmental Impact

- Substituting bio-sourced Earthfirst® for fossil fuel film translates into greenhouse gas (GHG) and fossil fuel offsets, contributing to a lower packaging carbon footprint.
- 20µ metalized Earthfirst® film replacing 18µ metalized BOPP film for 5 million tea pouches translates to an approximate reduction of 1,290,000,000 kg /CO₂, or the equivalent of:
 - GHG savings of 33,000,000 tree seedlings being grown for 10 years
 - Fossil fuel savings of electricity consumed by 16,900,000 residents of Western Europe per month

Calculation is specific to one phase of the polymer life cycle: cradle-to-pellet polymer production and is not a complete life cycle assessment (LCA)



Packing Material - Plant-Based Overwrap

Original Structure



- 100% recycled paper
- 18µ Metalized BOPP

New Structure



- 100% FSC certified paper
- Earthfirst® 20µ Metalized

Earthfirst® Biopolymer Shrink Sleeve Value

1. **High Performance** – highest shrink at the lowest temperature compared to all other shrink films
2. **Sustainability** – *compostable to EN 13432. Non-petroleum material made from annually renewable sources*
3. **Stability** – *ambient storage up to 38°C unlike all other shrink films*



MARKET SUCCESS

Earthfirst® TDO Decoration Film



Wander Beyond Brewing

Wander Beyond Brewing, a spirited microbrewery known for inventive brews with the best natural ingredients searched for decoration labels to match their natural brand.

More Natural + Sustainable Package

- Earthfirst® TDO decoration sleeves replace petroleum-based PETg, naturally decoupling the package from fossil-based options
- Earthfirst® TDO shrink sleeve is made from plant-based sources and is industrial compostable to ASTM D6400/ EN 13432
- Sustainable decoration sleeves reduce label decoration's environmental footprint
 - For example, 45µ Earthfirst® TDO decoration labels replacing 1 million 50µ PETg saves 67,200 kg/CO₂, or the equivalent of:
 - Greenhouse gas savings of 15 passenger cars not driven in one year
 - Fossil fuel savings of 135 years powering a single 100 watt light bulb

Sustainable Decoration Enhances Brand Equity

- Wander Beyond Brewing mirrored their natural microbrew ingredients with a plant-based decoration sleeve
- This intentional alignment tangibly communicates their brand values and naturally enhances their brand equity

Favorable Operational Feedback

- Technically, Earthfirst® TDO labels have the highest shrink at the lowest temperature of all decoration sleeve materials
- Earthfirst® TDO decoration sleeves perform well for supply chain partners from printing/converting to sleeving - 'easy to use'

TDO Decoration

Previous Shrink Decoration Sleeve: 50µ PETg
New Shrink Decoration Sleeve: **45µ Earthfirst® TDO**

MARKET SUCCESS

Earthfirst® TDO Decoration Film

Genuine Coconut

With Earthfirst® Shrink Sleeve, Genuine Coconut created a new packaging solution for increasing brand equity and achieving their compostable packaging commitment. Along the way, they found a shrink sleeve film which contributes to the integrity of their organic coconuts at retail.

Earthfirst® Shrink Decoration Optimizes Brand Exposure

- Earthfirst® Shrink Decoration securely wraps the coconut, adding a 360° billboard for customer communication and highlights easy open instructions

Bio-based Shrink Decoration Achieves Sustainable Packaging Goal

- Earthfirst® Shrink Sleeve film is made from annually renewable, plant-based materials
- The industrial compostable film helps Genuine Coconut achieve their goal to use 100% compostable materials¹, directly connecting natural packaging with their natural product

¹ Genuine Coconut's Website | Packaging Page, December 2020



Earthfirst® Shrink Sleeve Enhances Product Integrity

- Earthfirst® Shrink Decoration wraps the coconuts while protecting them “from handling and exterior contamination”, as well as, preventing the coconut water from souring early¹
- Additional product protection from Earthfirst® Shrink Decoration helps assure product integrity remains intact while this growing business ships globally

¹ Genuine Coconut's Website | Packaging Page, December 2020

Package Structure

Shrink Decoration: 45µ Earthfirst® Shrink Decoration

Consumer Voice | Sustainability

A graphic for the 57% statistic. It features a large, bold "57%" in a light blue color. The background of the graphic is dark blue with a pattern of thin, light blue wavy lines that create a sense of depth and movement. Below the percentage, there is white text and a source attribution at the bottom.

57%

of consumers say they're willing to change their purchasing behavior "to help reduce negative environmental impact"

- National Retail Federation

A graphic for the 68% statistic. It features a large, bold "68%" in a light blue color. The background of the graphic is dark blue with a pattern of thin, light blue wavy lines that create a sense of depth and movement. Below the percentage, there is white text and a source attribution at the bottom.

68%

of highly empowered consumers plan to step up efforts to identify brands that reduce environmental impact

- Forbes

Mailing Envelopes



Performance

- High Elasticity + Puncture Resistance
- Strong Side Seals
- High Temperature Resistance
- Machines at High Speeds



Sustainability

- 30% Bio Material
- Certifying for Bio Content
- Process of Applying for USDA BioPreferred Certification



Function

- Matte Face + Opaque Black Reverse (inside envelope for security)
- Soft, Extensible Film
- Printable
- Side Sealable
- Two Sided Tape and/or Hot Melt Can Be Used For Closure



End of Life

- Home Compostable
- Film Produced with TUV OK compost HOME Certified Materials
- In Process of Applying for TUV OK compost HOME certification



Retail Bags



Performance

- High Elasticity + Puncture Resistance
- Strong Side Seals
- High Temperature Resistance
- Machines at High Speeds



Sustainability

- 30% Bio Material
- Certifying for Bio Content
- Process of Applying for USDA BioPreferred Certification



Function

- Retail Bag
- Matte Face + Glossy Reverse
- Soft, Extensible Film
- Printable
- Side Sealable



End of Life

- Home Compostable
- Film Produced with TUV OK compost HOME Certified Materials
- In Process of Applying for TUV OK compost HOME certification



Inserts + Tags



Performance

- Easily Die Cuts
- Home Compostable
- Performs Like Synthetic Paper



Sustainability

- 30% Bio Material
- Certifying for Bio Content
- Process of Applying for USDA BioPreferred Certification



Function

- Inserts | Tags
- Matte Face + Matte Reverse
- Soft, Extensible Film
- Printable



End of Life

- Home Compostable
- Film Produced with TUV OK compost HOME Certified Materials
- In Process of Applying for TUV OK compost HOME certification



Q&A | Next Steps

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