PLUG AND PLAY

SILICON VALLEY SUMMIT

MAY 19-21 2026

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NEW MATERIALS & PACKAGING EXPO

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OPENING REMARKS

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OPENING REMARKS

Greg Stillman

Director
Plug and Play

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TODAY'S AGENDA

- **Opening Remarks**
- **Fireside Chat** AI x Material Systems: Models and Molecules
- **Startup Presentations**
- **Trend Presentation :** Circularity for Single-Use Plastics
- **Startup Presentations**
- **Closing Remarks**

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PEPSICO ECOSYSTEM ROUNDTABLE: AI X MATERIAL SYSTEMS

Hosts



Erin Rohler

R&D Manager,
External Innovation
Technology Scout

pepsico

Roundtable Moderation



Greg Stillman

Director

Plug and Play

Pitching Startups

one•five®

Unlock today's barriers and tomorrow's growth: The Whole Package

cusp.ai

Pioneering breakthrough materials to accelerate human progress.

Amphora

An AI platform for advanced materials, from first principles to first production.

Polymerize

Redefining Material Innovation - Smarter, Faster & Sustainable.

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OUR FOCUS AREAS:

Food Packaging

bioplastics 4health
back to nature

VARSYA
your new address for everything eco.

NakedPak

Recycling Technology

RETRN BIO

rhea's factory

AIRECO

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FIRESIDE CHAT

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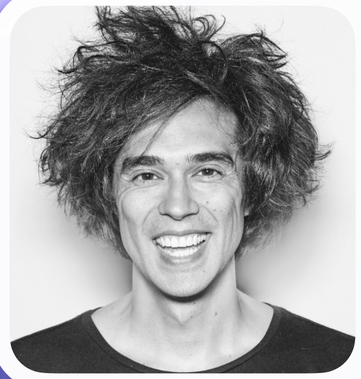
AI X MATERIAL SYSTEMS: MODELS AND MOLECULES



Greg Stillman

Director
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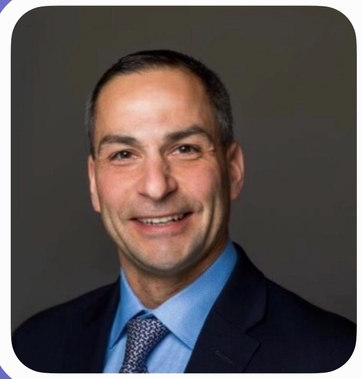

Marty DeGroot

Chief Technology Officer
DuPont

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EMCEE

Alejandro Nieto

Senior Ventures Analyst
Plug and Play

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STARTUP PRESENTATIONS

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STARTUP PRESENTATION

rhea's factory

Rhea's Factory

Profitable Sustainability in Plastic Recycling

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rhea's factory

PROFITABLE SUSTAINABILITY IN PLASTIC RECYCLING

2026

Confidential & Proprietary Rhea’s Factory 2026

T E A M

Scientists, AI engineers, and industry veterans are building Rhea.

FOUNDERS



Arzu Sandıkçı, PhD
Cofounder, CEO

Molecular biologist passionate about planetary good

MIT zymergen



Mert Topçu, MBA
Cofounder, CTO

Engineer and tech expert driven to make meaningful impact

Google



Mac Schlicher
Head of Commercialization

planet earth

ADVISORS



Emmanuel Ladent
Business Strategy & xCEO of Carbios

CARBIOS



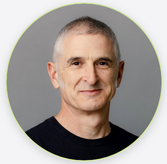
Kevin Schwartz
Business & Operations Strategy

pwc



Amelie Schreiber
AI & Biomolecules Researcher

UCONN



Steven Hosemann
Advisor CFO

Nestlé



Johan van Walsem
Advisor COO

Lygos

rhea's factory

Confidential & Proprietary Rhea's Factory 2026

PROBLEM [MAY 2026]

Three forces are breaking the plastics system all at once.

55%

Oil price swing

in 8 weeks

Source: CNBC, April 2026

1 in 4

US PET recyclers

shut down last year

Source: The Recycling Partnership

$500M

SB 54 producer fees

per year, starting 2027

Source: CalRecycle

The old system can't solve this.

rhea's factory

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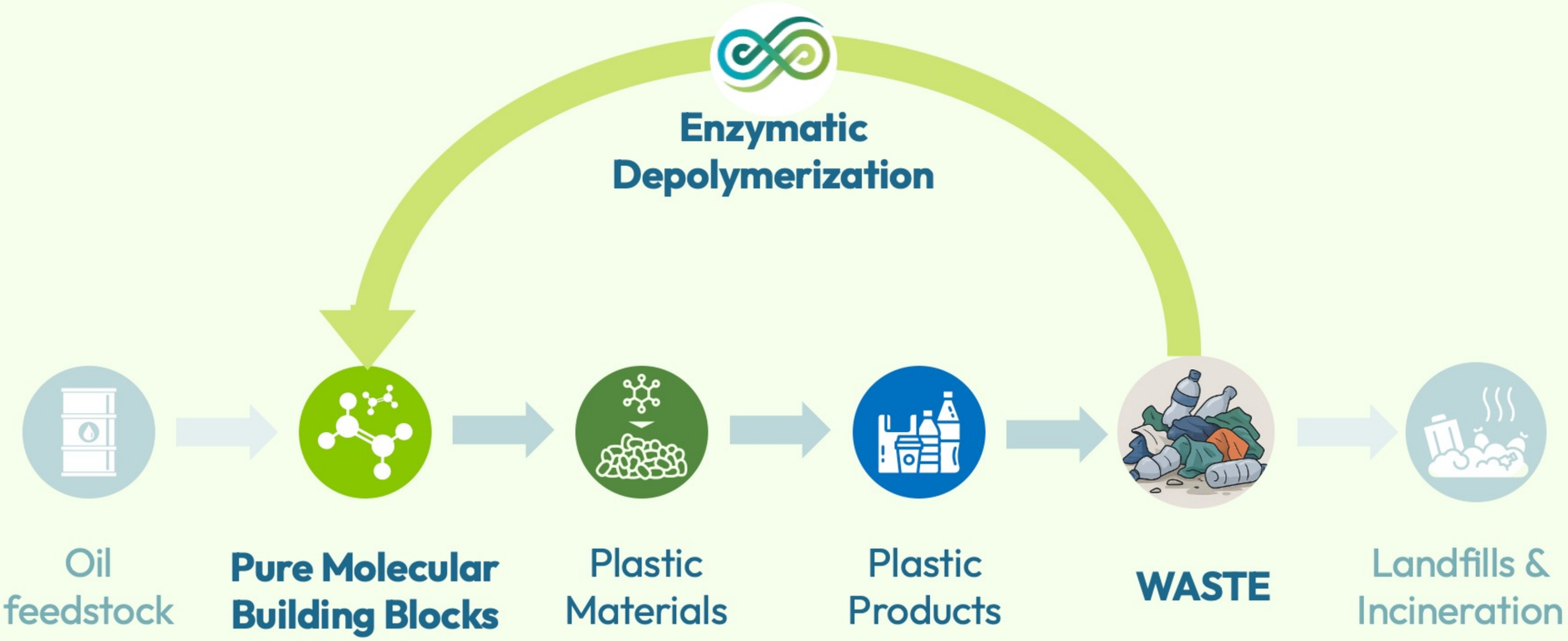
Only enzymes turn mixed waste into virgin plastic at virgin cost.



Confidential & Proprietary Rhea's Factory 2026

UNIT ECONOMICS

Three numbers prove we cracked enzymatic recycling.

99%

Purity

Virgin-quality TPA & EG

NMR-confirmed

34%

Lower cost

vs baseline enzymatic

Proprietary separation process

90%

of PET waste

that today goes to landfill

Thermoforms, textiles, mixed bales

Biology + AI solves what chemistry could not.

rhea's factory

Confidential & Proprietary Rhea's Factory 2026

MARKET

We start with the 90% nobody else can recycle.

TAM **$150B**

Global Virgin PET + Polyester Market

SAM **$30B+**

North America (NA) + Europe (EU) Markets

SOM **$4B+**

Hard-to-Recycle PET Entry Market (NA + EU)

- ✓ Rhea unlocks 90% of PET waste current technology rejects in NA + EU
- ✓ Displaces virgin PET production with cost-competitive recycled monomers from thermoforms and textiles.

Sources: Precedence Research (2024), Grand View Research, GMI, EUR-Lex PPWR Mandates

Confidential & Proprietary Rhea's Factory 2026

Our end-to-end process validated in the lab today.

FEEDSTOCK

RHEA's END-TO-END PROCESS

OUTPUT

PET Waste → Pretreatment → Enzymatic Depolymerization → Downstream Separation → Monomers (TPA & EG) → Recycled PET (rPET)

Flexibility:

(1) thermoforms

(2) mech. recycling waste,

(3) textile (inc. poly-cotton blends, spandex, dyed, etc.)

Proprietary Process:

Extrusion for cleaning & crystallinity reduction.

AI-Designed Enzyme:

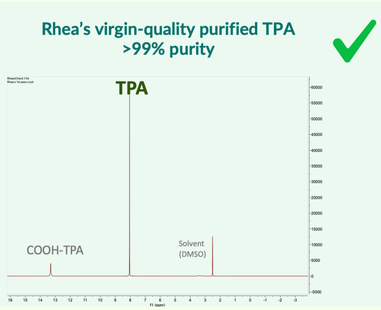
Proprietary AI-designed PETase enzyme (IP filed)

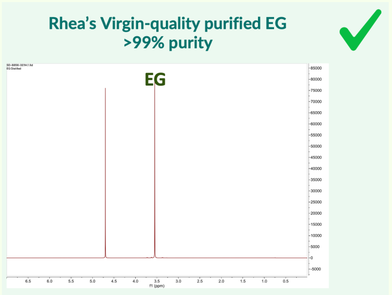
Optimized thermostability, expression, and by product reduction.

Licensed from US DoE:

NLR-licensed separation breakthrough process.

34% lower MSP vs. other process.





COMPETITION

Only enzymes scale where mechanical and chemical can't.

OPTION A

Mechanical

Today's default

- ✗ Requires **perfectly sorted** single-type feedstock
- ✗ **Downcycles** — lower-grade output every cycle
- ○ Cheap only when feedstock is already pure

Can't take 90% of the waste stream.

OPTION B

Chemical

20+ years, no scale

- ○ Some feedstock tolerance — still needs pre-sorting
- ✗ **Very high energy**, heavy solvent use, toxic by-products
- ✗ **Not proven commercially** after two decades

High cost. Hasn't scaled.

RHEA'S FACTORY

Enzymatic

The only path to mixed-waste, virgin-cost recycling

- ✓ Handles **mixed, contaminated waste** — no sorting required
- ✓ **Virgin-quality monomers** at **34% lower cost** than baseline
- ✓ Biocatalysis — **already proven at industrial scale** in detergents, biofuels, pharma

~40% gross margin at virgin-competitive pricing.

rhea's factory

Confidential & Proprietary Rhea's Factory 2026

We build one pilot to prove the unit economics, then license every plant after that.

PHASE 01 · 2026 – 2027

Pilot Plant

A single 5,000 t / year plant in California, built with a colocation partner. Prove the unit economics at scale. De-risk every dollar that comes after.

SCALE
5,000 t / yr

LOCATION
California, USA

GOAL
Validate unit economics

PAYBACK
2.3 years

SCALING the BUSINESS

PHASE 02 · 2028 →

Capital-Light Licensing

Brand owners and converters build their own plants on Rhea's process. We capture royalties + enzyme supply. The model compounds with every new licensee.

MODEL
Royalty + enzyme

SCALE PER PLANT
50,000 t / yr

MARGIN PROFILE
60% gross

CAPEX (RHEA)
Near zero

Confidential & Proprietary Rhea's Factory 2026

FINANCIAL MODEL

We're profitable at pilot and exceptional at scale.

2.3 yrs

Pilot payback

44% gross margin

5,000 metric tons / year

60%

Commercial margins

$80M revenue per plant

50,000 metric tons / year

Capital-light licensing

Royalties + enzyme supply

Every new plant grows revenue

rhea's factory

Confidential & Proprietary Rhea's Factory 2026

THE ASK

Lead the round to recycle virgin plastic from waste.

SEED ROUND OPENS MAY 2026

$4M

Seed round

Opens May 2026

Lead investor sought

5 kT

Pilot plant engineered

Operational 2027

Anchor partner committed

18 mo

Runway to Series A

R&D line + pilot FEED

Tech & commercial de-risked

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rhea's factory

THANK YOU

MAC.SCHLICHER@RHEASFACTORY.COM

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STARTUP PRESENTATION

ENVICORE

EnviCore

EnviCore aims to create sustainable solutions for the mining and construction sectors

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ENVICORE

Low-Carbon Concrete: Building a Sustainable Future

Shahrukh Shamim, CEO
shahrukh.shamim@envicoreinc.com

Problem

The construction industry accounts for over 20% of global CO_2 emissions, with cement as one of its biggest contributors. As the key binder in concrete- the world’s most used material after water- cement drives both infrastructure and emissions.



ENVICORE

Low-Carbon SCMs*

EnviCore turns abundant industrial byproducts into low-carbon, high-performance cement alternatives.

Natural Pozzolan



Metallurgical Slag



Mining Tailings



Fly & Bottom Ash





*Supplementary Cementitious Materials

EnviCore's Leadership Team

Driven by innovation, united for sustainability



Shahrukh Shamim
CEO & Co-Founder



Aseem Pandey
CTO & Co-Founder



Milana Trifkovic
Co-Founder and Sc. Director



Ian Piwek
SVP- Strategy and Bus Dev

Industry and Capital Partners

Heidelberg Materials

CSN
Companhia Siderúrgica Nacional

techstars_

North
CLIMATE TECH

gcca
Global Cement and Concrete Association

THIRD DERIVATIVE™

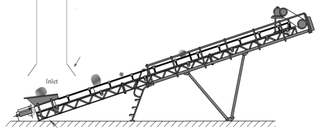
ALBERTA INNOVATES

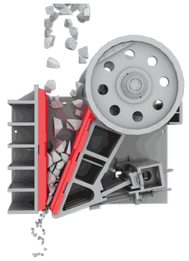
ENVICORE

EnviCore’s Chemical-Assisted Tempering Process

Revolutionizing Cement: Precision Through Chemistry

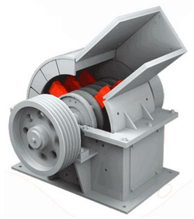
Minerals



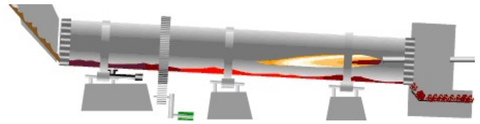


Crushing (Optional)

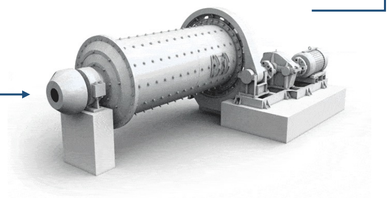
EnviCore’s Chemicals



Drying and Homogenization Stage



Tempering Stage



Final Milling Stage



SCM Storage

EnviCore’s Patent Pending Process



Chemical additives enhance SCM reactivity



Controlled temperatures to optimize raw material activation



Significantly lowers CO_2 emissions



Locally sourced materials, reducing transportation



Complete Dry Process

ENVICORE

Customer Segments

Solutions for Cement Producers and Builders

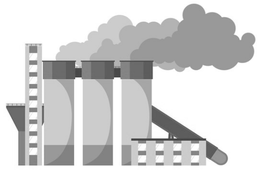


EnviCore's SCM Plant



Ready Mix Concrete and Pre-Cast

For Direct Cement Replacement with EnviCore's SCM in the Concrete Mix



Cement Plant

For Direct Clinker Replacement with EnviCore's SCM in the Blended Cement



Mining Companies

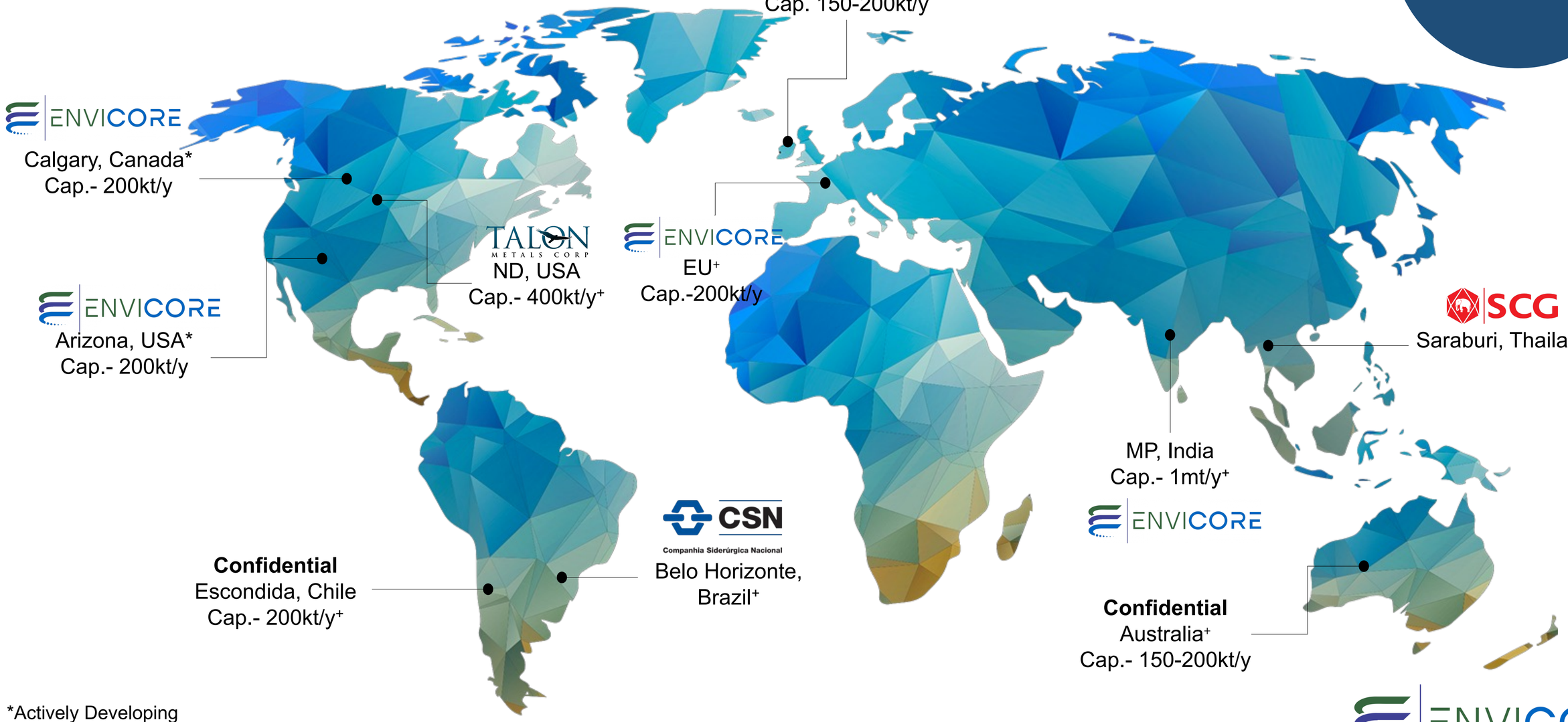
For Accessing Raw Material for SCM Plant

EnviCore's Global Growth

Scaling SCMs, Worldwide

Current Global SCM Market

US$28.1B



*Actively Developing

+Planned for next 7 years

ENVICORE

Pilot Plant in Europe and Asia

Standardized Equipment for Unwavering Consistency and Seamless Scalability



Direct Fired LPG Kiln and Feeder Installed at Pilot Facility in Thailand



Direct Fired Kiln Installed at Pilot Facility in Belgium

ENVICORE

FOAK Plant

EnviCore's Flagship Project in Calgary, Alberta

Canadian National Winner in Outstanding Project Category

Announced at COP-30 Brazil 2025

NET-ZERO INDUSTRIES AWARD

Plant Location – Calgary, Alberta

Target Markets - West Coast Canada

Plant Capacity - 27 TPH (Feedstock)

~ 200,000 TPY SCMs

Plant Footprint - ~15 Acres

Land Available- 60 Acres: For Material Storage, Equipment, Logistics, Office, etc.

Commodity Produced- Clay based SCMs for Partial Cement Replacement

Commissioning - ~Q3-2028



SCMs Plant- 3D Model

ENVICORE

KPIs and Benefits- Revenue Calgary Plant

Measuring Impact, Driving Sustainable Growth

~US$100/T
Avg. Selling Cost

Up To US$13M
Government Grant

~50%
Avg. EBITDA Margin

3-4 Years
Payback Period

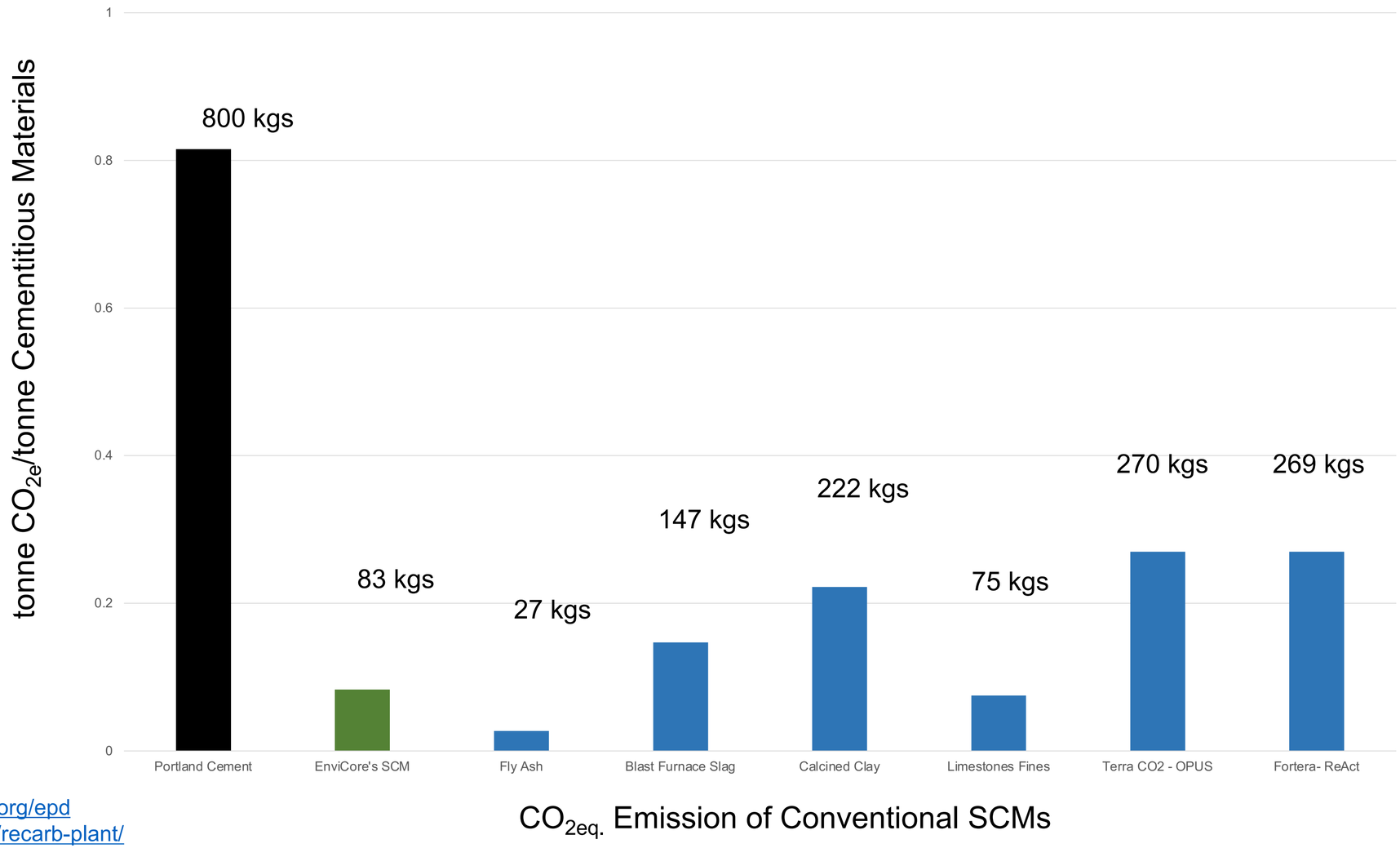
~US$49M
Net Present Value

~29%
Internal Rate of Return

ENVICORE

Emissions

EnviCore Cuts CO_2 Emissions by 86% for Each Tonne of OPC Replaced



https://www.slagcement.org/epd
https://forteraglobal.com/recarb-plant/
https://terraco2.com/construction-solutions/
https://api.environdec.com/api/v1/EPDLibrary/Files/9cc24fef-8cb2-4b7e-698f-08d9b3ca1199/Data

ENVICORE

Ask

Raising Series A to Scale Our First Plant and Drive Global Expansion.

Raising

US$40M (equity) & US$15M (Debt)

For Building Calgary Plant, Expanding Team, and Working Capital

Supplemented by ----------

~19% of Installed CAPEX

NorthX, ERA, IGF

Non-Repayable Grants

https://www.eralberta.ca/technology-funding/continuous-intake-program
https://nrc.canada.ca/en/support-technology-innovation/nrc-irap-support-clean-technology
https://www.opportunitycalgary.com/
https://www.alberta.ca/investment-and-growth-fund

ENVICORE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www.envicoreinc.com

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STARTUP PRESENTATION

Materia Bioworks

Empowering Companies to Launch Sustainable Products with Biomaterials

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Materia Bioworks



Empowering brands to launch sustainable products

faster, smarter & cheaper

The world's ready for sustainable materials – It just doesn't know how

Coca-Cola · Kraft · H&M · L'ORÉAL · pepsi · Unilever · Nestlé · DANONE







The world's ready for sustainable materials – It just doesn't know how





4+ yrs

$5m+

complex



Battle tested founders solving the exact problem we've lived



Has de Alwis

CEO



Kevin Eriksen

CTO



Michael Williamson

Director of Materials Innovation



Raj Manocha

Director of Business Development



Team: 10 Full-time

- Materials informatics
- Computational chemistry
- Data science
- Manufacturing engineering
- Marketing & sales

4 BIODEGRADABLE Products developed with fortune 500s

Previously worked together for 8+ years

HUSKY® amazonrobotics MIT USS

Materia leverages AI/ML to deliver drop-in manufacturing solutions – empowering brands to launch sustainable products 3x faster and 10x cheaper

Materia Bioworks

drop-in solutions for

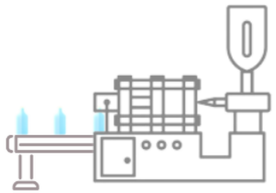
end-to-end product development



Materia leverages AI/ML to deliver drop-in manufacturing solutions – empowering brands to launch sustainable products 3x faster and 10x cheaper



Design & formulation



Manufacturing



Regulatory

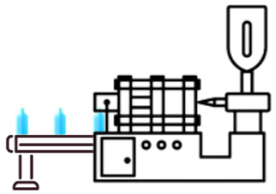
Materia leverages AI/ML to deliver drop-in manufacturing solutions – empowering brands to launch sustainable products 3x faster and 10x cheaper



Bioplastics Marketplace



Design & formulation



Manufacturing

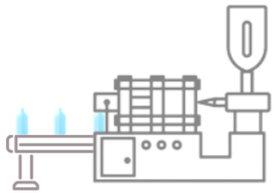


Regulatory

Materia leverages AI/ML to deliver drop-in manufacturing solutions – empowering brands to launch sustainable products 3x faster and 10x cheaper



Design & formulation



Manufacturing



Regulatory

Materia leverages AI/ML to deliver drop-in manufacturing solutions – empowering brands to launch sustainable products 3x faster and 10x cheaper

Materia Bioworks

drop-in solutions

Design & formulation

Manufacturing

Regulatory

Status quo:		With Materia:
~~4+ years~~		**3x faster**
~~$5M+~~		**1/10th of the cost**
~~complex~~		**simple**

Global brands are betting on us – $6M+ in contracts secured in just 8 months

Materia Bioworks Inc. 2026 - Confidential

Global brands are betting on us – $6M+ in contracts secured in just 8 months



Materia Bioworks Inc. 2026 - Confidential

Global brands are betting on us – $6M+ in contracts secured in just 8 months

EU

novo nordisk

Biodegradable pill bottle

1/20 Cost
vs.
$4.2M

1/4 Time
vs.
4 years



100+
SKUs in Pipeline

KVP

Biodegradable pet recovery collar

1/10 Cost
vs.
$3M

1/6 Time to market
vs.
6 years

10+
SKUs in Pipeline

Materia Bioworks Inc. 2026 - Confidential

Global brands are betting on us – $6M+ in contracts secured in just 8 months



A market-ready biodegradable solution under 10 months

Performance and pricing on par with petroleum plastics

Materia Bioworks Inc. 2026 - Confidential

Global brands are betting on us – $6M+ in contracts secured in just 8 months

EU

novo nordisk

Biodegradable pill bottle

1/20 Cost vs. $4.2M

1/4 Time vs. 4 years



100+

SKUs in Pipeline

KVP

Biodegradable pet recovery collar

1/10 Cost vs. $3M

1/6 Time to market vs. 6 years

10+

SKUs in Pipeline

Compostable cosmetics container

1/10 Cost

1/3 Time to market



25+

SKUs in Pipeline

Materia Bioworks Inc. 2026 - Confidential

Sustainability shouldn't cost more – And now it doesn't

From reactive to predictive

Data-driven
No guesswork

De-risking sustainability

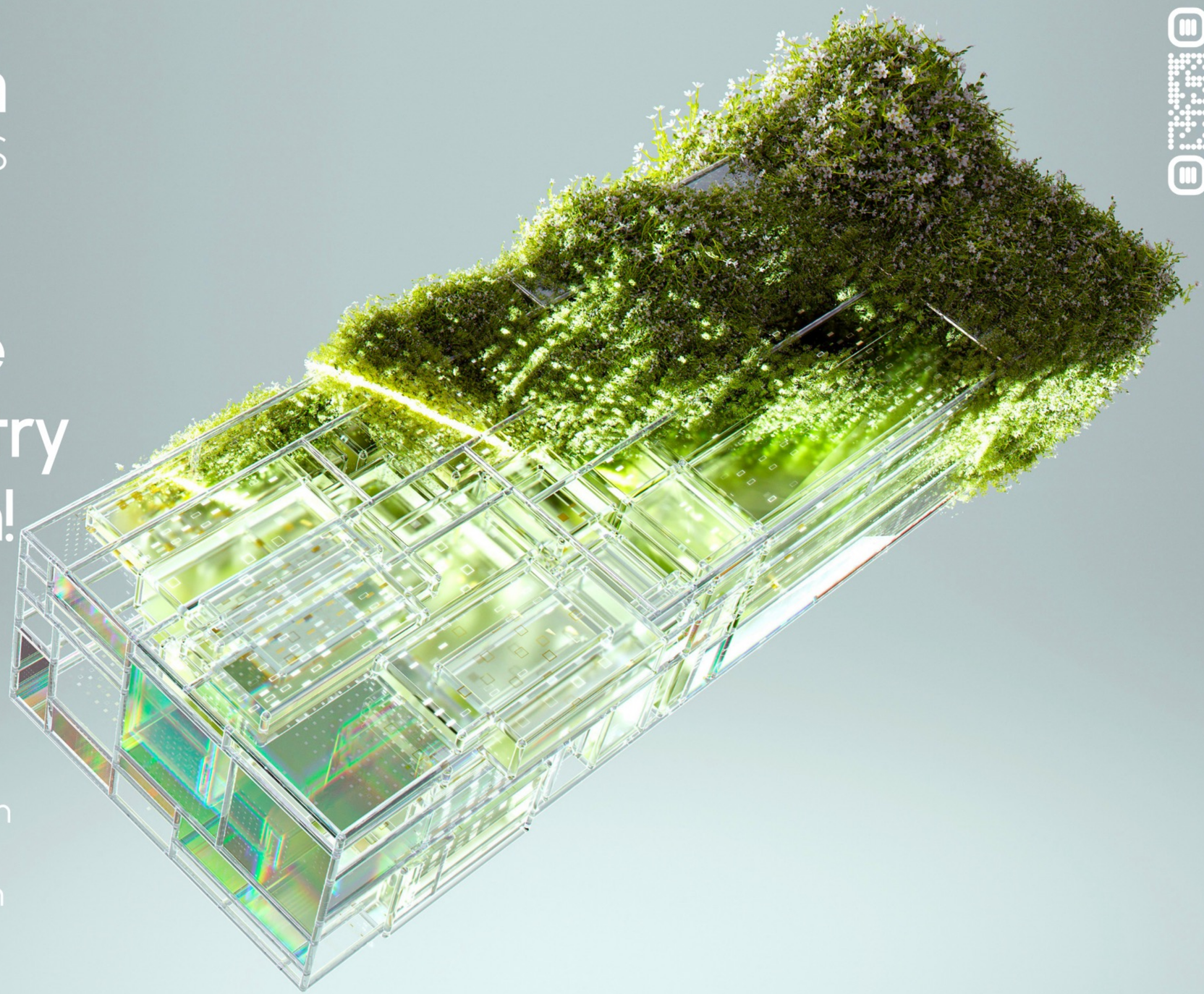
Cheaper & faster
Zero CapEx
Drop-in ready

Empowering the ecosystem

Brands, manufacturers & suppliers unified – under one platform

Materia
Bioworks

Let's turn the plastic industry upside down!



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TRENDS PRESENTATION

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PLUG AND PLAY

NEW MATERIALS & PACKAGING

Single-Use Packaging: From Linear to Circular

A Plug and Play Overview

SILICON VALLEY SUMMIT



Plastics Have Been Ruling for 70 Years



Performance

- **Molecular Control.** Designed at a microscopic level to act like a custom shield.
- **Ordered Structure.** Creates an crystalline structure that completely blocks out oxygen and moisture.
- **Decay Prevention.** Stops the natural spoiling process to guarantee sterility and extend shelf-life.



Efficiency

- **Strength-to-weight.** Provides extreme structural protection using ~3.6x less material mass than glass or metal.
- **Resource thrift.** Requires fewer raw natural resources and significantly less water to produce than glass, metal, or paper.

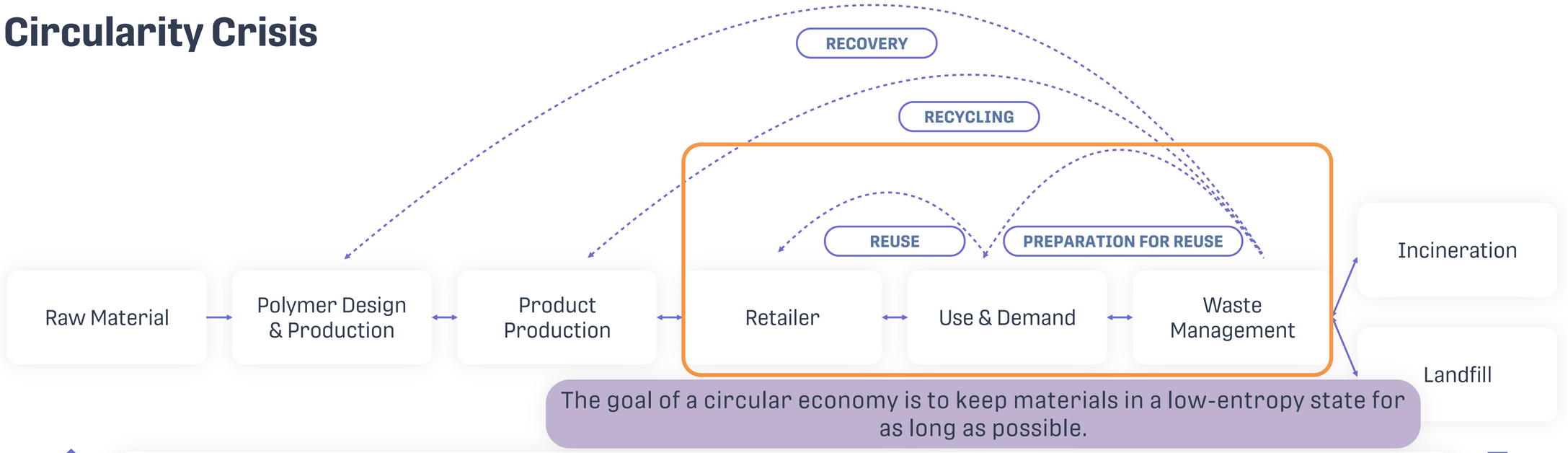


Economics

- **Cost-Effective Scalability.** Inexpensive raw materials and high-speed mass production.
- **Low-Energy Shaping.** Melts at much lower temperatures (150-200 °C) than aluminum (660 °C) or glass (1,500 °C), drastically cutting energy costs.

The exact traits that make plastic so efficient are what turn it into permanent, unmanageable waste.

Circularity Crisis



The goal of a circular economy is to keep materials in a low-entropy state for as long as possible.

Circular Value

Reuse: Using items again for the same purpose without altering their physical or chemical structure.

Recycle: Transforming waste into raw materials to create new products through physical, chemical or biological processing.

Recover: Extracting value from waste that cannot be reused or recycled. This primarily means converting waste into energy.

Entropy Increase

The Polymer Recovery Gap



Polymer Degradation

- **Molecular Weakening.** Melting and recycling tears polymer chains apart, permanently degrading the material.
- **Limited Lifecycle.** Plastic can only be recycled 2 to 3 times before becoming too brittle.
- **Downcycling Inevitable.** Weakened material is ultimately downgraded into low-value items like park benches.



The Sorting Entropy Difficulty

- **Incompatible Polymers.** Visually identical plastics often have different melting points, causing major structural flaws if they are mixed together.
- **Contamination Risk.** Just 1% contamination from food oils or labels can ruin an entire recycling batch, creating toxic gases or structural defects.

Packaging Innovations to Overcome Entropy

The evolution of the packaging industry constantly brings new technologies and applications to light.

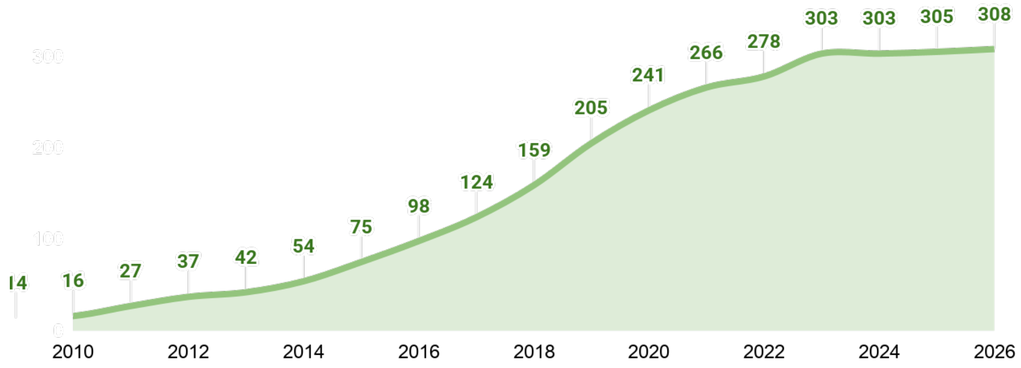
Recent demands for sustainability have lead to advancements in the sourcing, transparency, and disposal of these products.

The following slides will focus on the topics highlighted.



Bio-Based Materials

Cumulative Number of Startups Since 2010



Startup Spotlight

Seaweed/Algae

SWAY

Notpla

OCEANIUM

BLOOM

Mycelium & Fungi

ECOVATIVE DESIGN

Agricultural Waste

grale

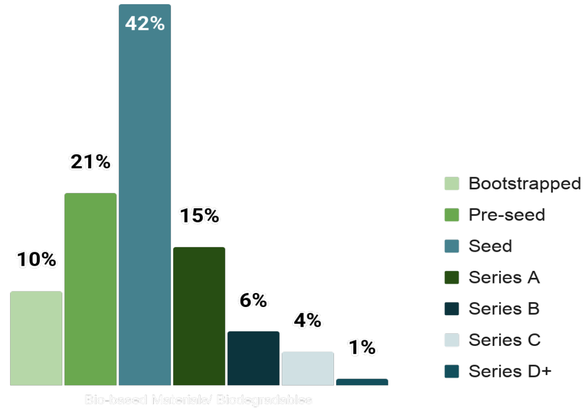
BIOTREM

traceless

KEY INSIGHTS

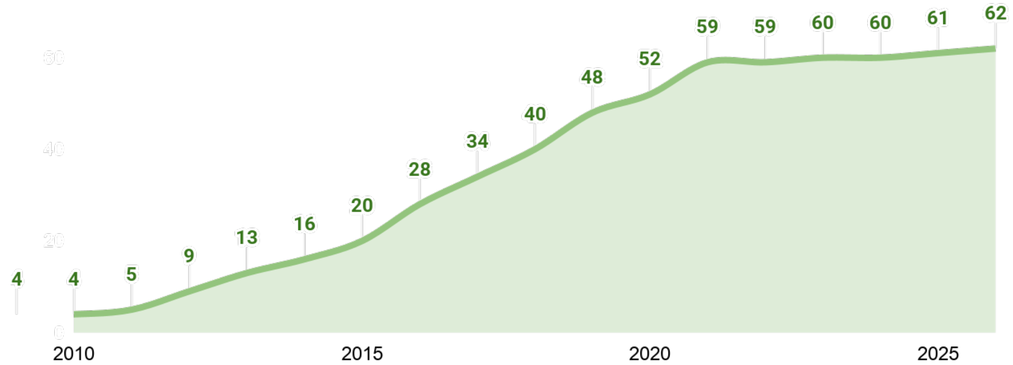
- Bypasses microplastics and toxicity entirely by leaning into biological lifecycles.
- The bio-based materials space is oversaturated
- New materials must match the exact cost and barrier performance of traditional plastics to fully replace them
- Many companies are focusing heavily on additives and coatings to help bio-materials meet plastic standards.
- **$1B+** total amount raised

Financial Stage Breakdown



Alternative Synthesis Sources and Additives

Cumulative Number of Startups Since 2010



Changing the Source

- Exact same molecules from plants: Bio-PE and Bio-PET.
- These processes using alternative sources can capture ~2 tons of CO2 for every ton produced.
- 100% recyclable in the standard streams.

Challenges

- Lacks the massive production scale needed to compete with global petroleum supply chains.
- Risks pulling vital land and water resources away from the global food supply to grow crops for plastic.
- Requires massive capital for biorefineries, resulting in significantly higher prices for brands compared to fossil fuels.

Startup Spotlight

NatureWorks

ORIGIN

RWDC INDUSTRIES

danimer scientific

NEWLIGHT

PAQUES biomaterials

Alternative Synthesis Sources and Additives

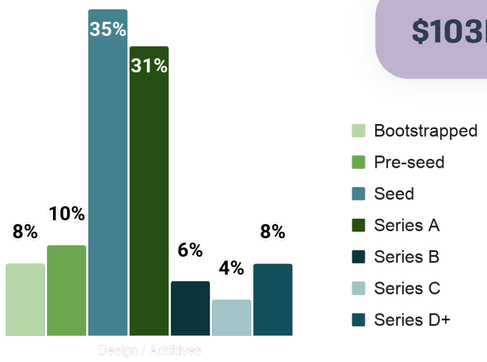
Performance Additives & Coatings

- New dispersion water-based coatings
  - Effective barriers against oil, grease, and oxygen
  - No use of aluminum foil or PFAS.
- Chain extenders
  - Molecular glue to reconnect broken polymer chains
  - Restoring the plastic's original strength.
- Compatibilizers
  - Allow different plastics (PE and PP) to mix and bond together during melting.

Challenges

- Introduces chemical additives that can accidentally pollute standard recycling processes.
- Demands complex, high-energy recovery methods that risk releasing hazardous chemical byproducts.

Financial Stage Breakdown



$103M+ total amount raised

Startup Spotlight

Melodea
RECYCLABLE PACKAGING SOLUTIONS

INTERFACE POLYMERS

KEBOTIX

GRAFT POLYMER
COMBINE INCOMPATIBLE

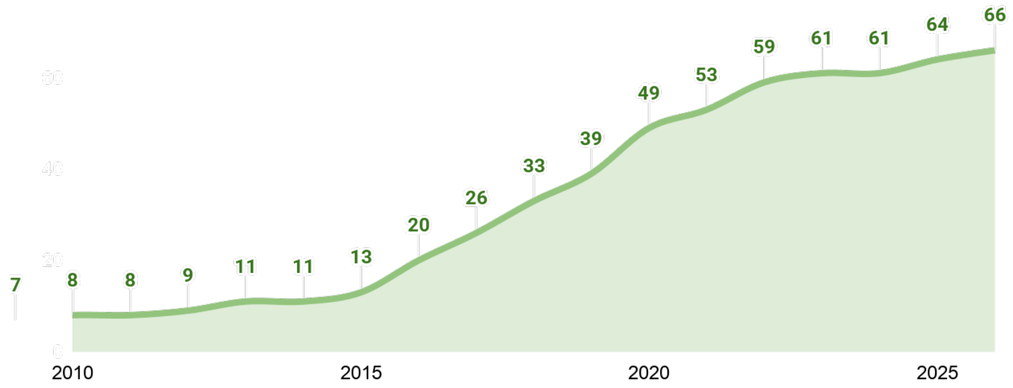
Calyxia

aqdot

BERKM

Advanced Waste Sorting

Cumulative Number of Startups Since 2010



Key Insights

- Uses advanced AI-enhanced robotics to automate sorting of chaotic waste streams.
- Identifies and isolates different plastic types with molecular precision.
- Reaches a 99% purity goal needed to create virgin-quality material.
- Serves as the primary tool to fight and manage stream chaos.
- Drives a hyper-competitive market with startups chasing industry leadership.
- **$230M+** total amount raised.

Startup Spotlight

AMP ROBOTICS

greyparrot

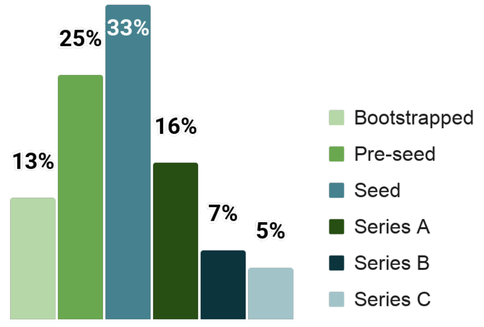
WASTE ROBOTICS

RECYCLEYE

SADAKO TECHNOLOGIES

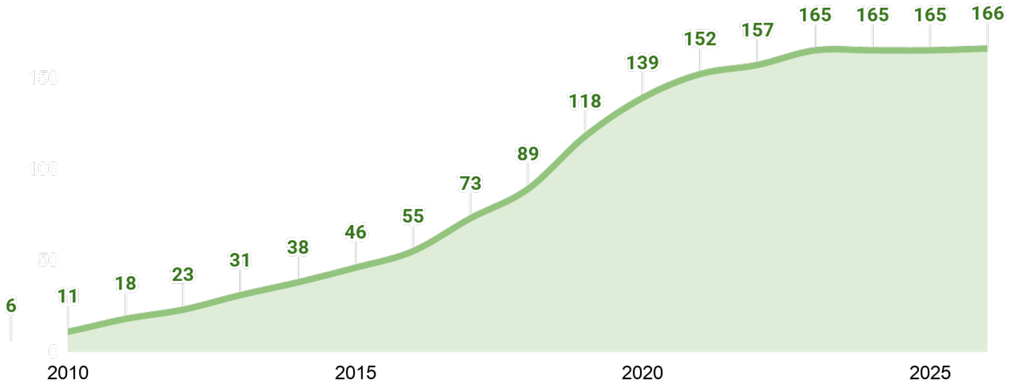
GLACIER

Financial Stage Breakdown



Recycling: Mechanical Recycling Technologies

Cumulative Number of Startups Since 2010



Key Insights

- Transforms plastic waste physically through grinding, washing, separating, drying, thermal processing, and compounding.
- Upcycles recovered resins and granules into materials for the construction and fashion industries.
- Relies on advanced waste sorting as a key driver to unlock better downstream market opportunities.

Challenges

- Degrades in material quality with every single recycling cycle.
- Requires eventual downcycling into lower-value industrial items.
- Exhibits high sensitivity to even minor plastic contamination.
- Risks ruining an entire batch of recycled resin with one wrong plastic type.

Startup Spotlight

BYFUSION

ARQLITESPC

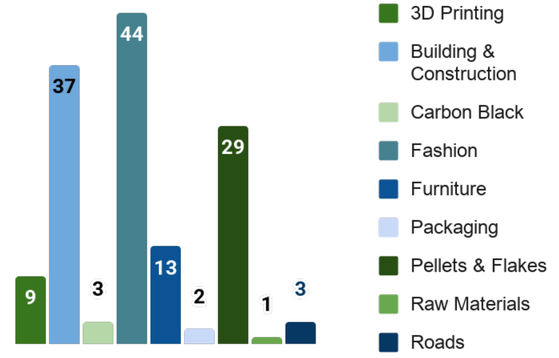
ubq

Fych Technologies

OTHALO

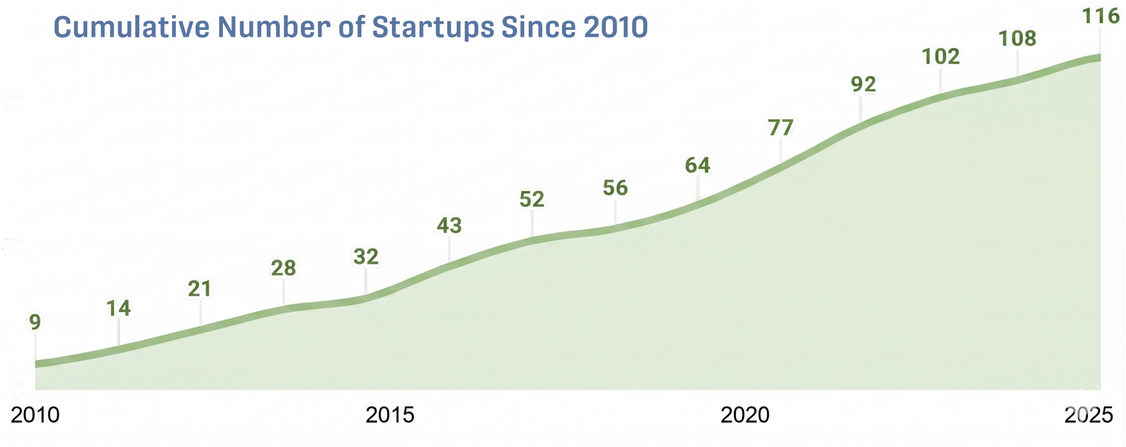
CRDC MATERIALS

End Use Market Breakdown



Recycling: Chemical Recycling Technologies

Cumulative Number of Startups Since 2010



Startup Spotlight

loop INDUSTRIES · PLASTIC ENERGY · agilyx · GR3N · DePoly · PYROWAVE · Resynergi

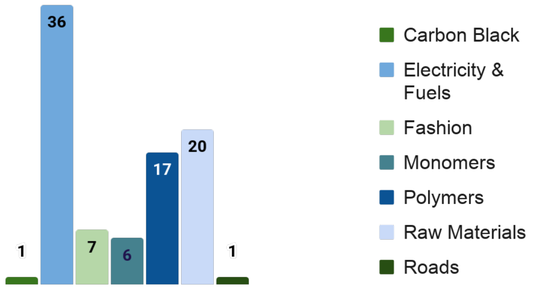
Key Insights

- Breaks plastic waste down to its original chemical components using pyrolysis or solvolysis.
- Converts these components back into raw materials to be repolymerized.
- Erases molecular memory completely to create virgin-quality plastic.
- Relies heavily on advanced waste sorting to succeed.

Challenges

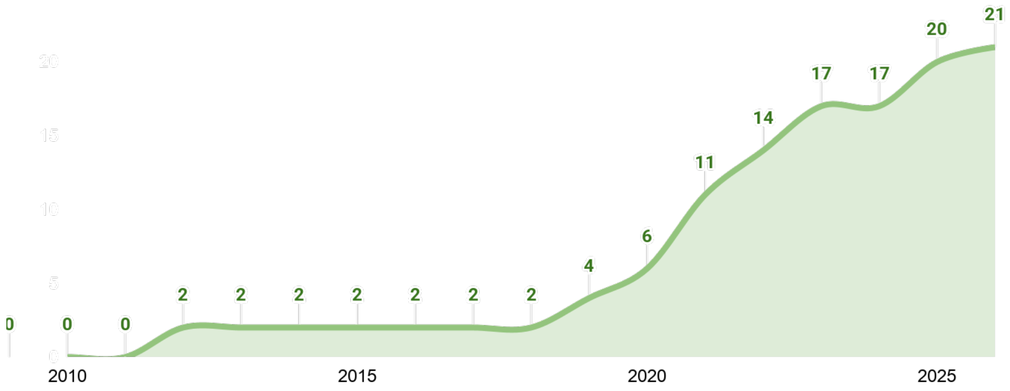
- Requires massive upfront capital costs for both sorting and processing facilities.
- Operates as an inherently energy-intensive recovery process.
- Risks emitting hazardous chemicals during the molecular breakdown phase.

End Use Market Breakdown



Recycling: Biological Recycling Technologies

Cumulative Number of Startups Since 2010



Startup Spotlight

CARBIOS

samsara eco

EPOCH BIODESIGN

enzymity

BIRCH BIOSCIENCES

SCINDO

norbite

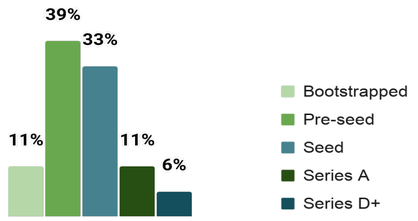
Key Insights

- Uses enzymes to break down plastics with 100% molecular selectivity.
- Turns polymers back into pure monomers, erasing molecular history without extreme heat.
- Attacks only the surface of solid plastic, limiting direct chemical access.
- Requires energy-intensive mechanical pulverization to maximize enzyme contact.

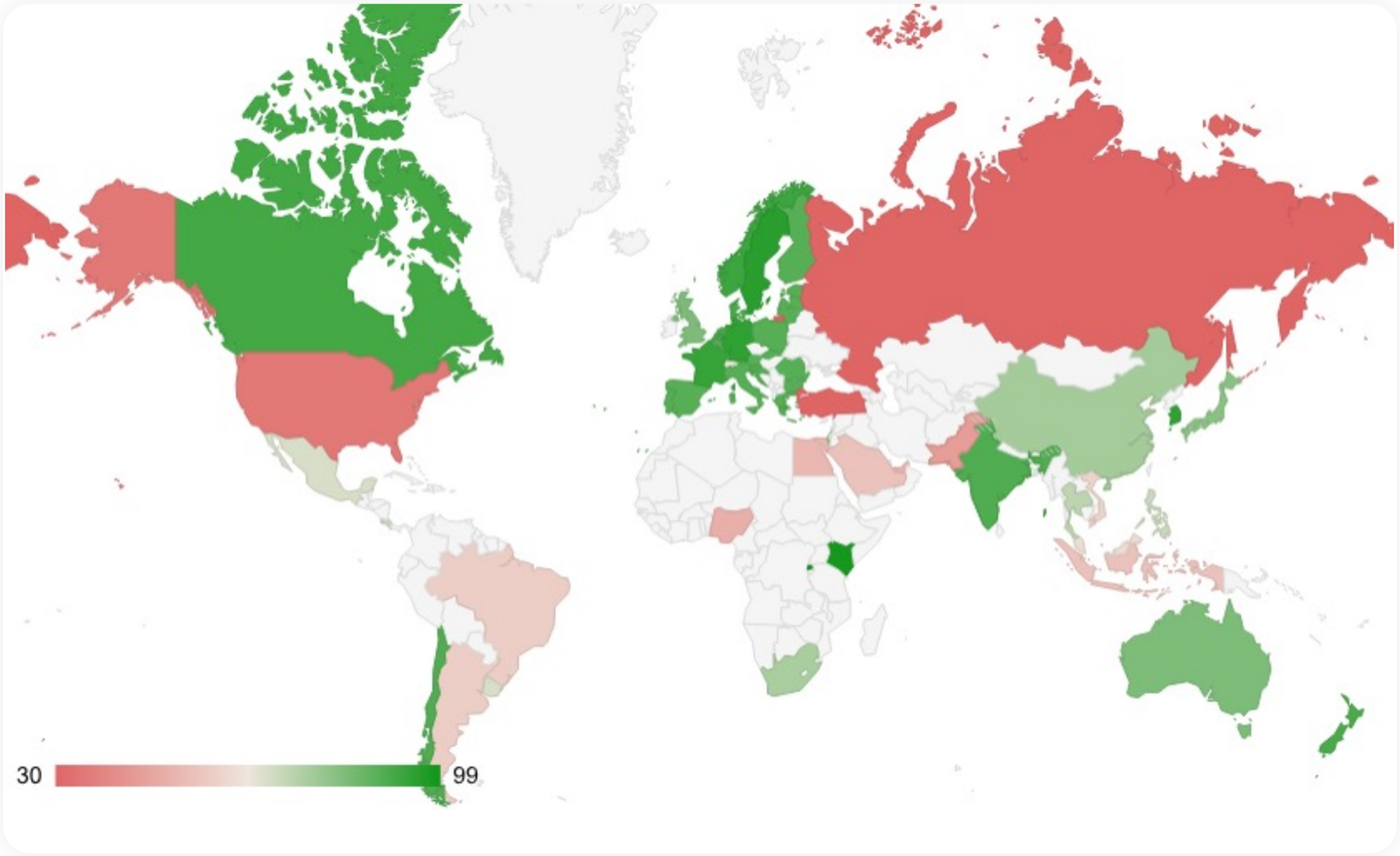
Challenges

- High substrate specificity required.
- Extremely slow reaction times.
- Fragile enzyme stability issues.
- Sensitive to chemical contaminants.
- Expensive enzyme production costs.
- Poor crystalline plastic breakdown.

Financial Stage Breakdown



Single-Use Plastic Regulation: World Landscape



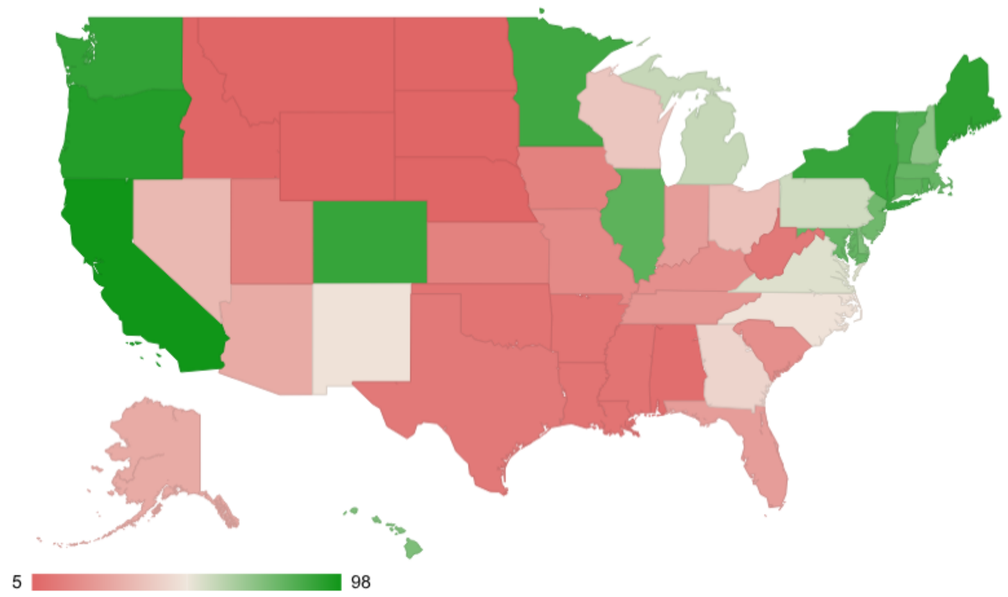
European Union (PPWR 2026):
August mandates harmonize labelling and ban PFAS in packaging.

Asia-Pacific (China & SE Asia):
Mandatory reporting and phased bans on non-degradable delivery plastics.

South America (Chile & Colombia):
Phasing out thirteen specific single-use categories by year-end 2026.

African Strictness (Rwanda & Kenya):
Exceptional enforcement includes confiscations at borders and potential jail time.

Single-Use Plastic Regulation: US Landscape



- CA, OR, ME, CO, MN, MD, and WA have enacted Extended Producer Responsibility (EPR) laws, forcing manufacturers to fund the entire lifecycle of their packaging.
- CA's Landmark Mandates: Effective January 1, 2026, SB 1053 eliminates grocery checkout loopholes; SB 343 prohibits the recycling symbol on non-recyclable items.
- States like IL and ME enforced 2026 bans on PFAS in food packaging, while states like FL and TX legally block local municipalities from passing plastic bans.

Key Takeaways

The original linear model of plastic production was revolutionary for its time, but its exponential growth has created a global entropy crisis. Future industry dominance belongs to materials that maintain low-entropy states (reuse) or technologies capable of a total molecular reset.

Emerging technologies in bio-based feedstocks and performance additives are actively working to transition these alternatives from niche innovations to industry standards.

Technical and financial limitations often cause promising startups to stall at the seed stage, as the capital required for industrial scaling remains a significant barrier to long-term success.

Future breakthroughs will rely on the strategic integration of advanced mechanical sorting, chemical depolymerization, and biological recycling to manage increasingly complex packaging waste streams. These processes bypass the degradation limits.

As of 2026, global regulations like the EU's PPWR and expanded producer responsibility laws have moved sustainability from a voluntary brand goal to a mandatory legal and operational requirement.

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STARTUP PRESENTATIONS

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Spain/Europe

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Industrial-Scale Home-Compostable PHBV Food Packaging

Large-scale biodegradable packaging via patented PHBV technology

First Demo Batch	Commercial Scale	Market Leadership
5 t/y	**5k t/y**	**47 %**
Initial Validation	Full Market Entry	EU Market Share
Qualify with converters	Pan-EU distribution	Capture PHA demand

May 2026 | 5 min pitch | For Investors & Partners

Market opportunity

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A MASSIVE NEED. A CLEAR GAP.

4.6M
tonnes
plastic waste annually
for 2030

+203%
market growth
2.31M (2025)
to **4.69M (2030)**

41.3%
of total bioplastics is used for packaging.

REGULATORY DRIVERS

SUP Directive:
Restriction on single-use plastics, driving **77%** collection targets.

2030 Mandate:
All packaging must be strictly recyclable or fully circular by **2030**.

€0.45/kg Tax:
Punitive financial measures applied to non-recycled plastic waste.

MARKET REALITY

€7.6B Market:
Projected value of the European bioplastics sector by 2030.

22.56% in 2030:
Explosive growth rate within the PHA packaging segment.

100% Import Dependency:
Spain currently imports all its compostable food films.

THE OPPORTUNITY

Massive demand. Clear regulations. No local supply.
We are building the solution.

Our Solution

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ADVANCED PHBV TECHNOLOGY

PHBV starch-based HOME-COMPOSTABLE FOOD PACKAGING

- Compostable
- Eco-friendly
- Food-safe



Blown film roll



Thermoformed trays



Rigid trays / cap



Flexible screw cap

ADVANCED PHBV BLENDS

- PHBV + PLA
- PHBV + Cellulose
- PHBV/PHA + Aluminium

DESIGNED FOR TODAY'S PACKAGING APPLICATIONS

- Blown film (Flexible)
- Thermoformed trays
- Rigid trays & containers
- Caps & closures (Flexible)

Full performance. Zero compromise.

Back to nature.

Roadmap

From innovation to market leadership

PHASE 1 (2024–2026)
VALIDATION



PHASE 2 (2027–2029) | Commercial Exploitation

COMMERCIAL SCALE-UP
- Establish 5,000 tonne capacity

INTERNATIONAL DISTRIBUTION
- Optimize global logistics hubs

MARKET LEADERSHIP (EU/NA)
- Deepen strategic partnerships
- Obtain global food-safety certifications

SCALE STRATEGY: Building the first large-scale PHBV platform for home-compostable packaging in Europe.

The team

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FOUNDING TEAM



OPERATIONS & SCALE-UP

Proven track record moving from lab scale to industrial manufacturing.

Jose Maria Cobo



BIOPROCESS & MATERIALS

Deep domain expertise in bacterial fermentation and PHBV science.

Javier Vera



MARKET DEVELOPMENT

Strong relationships across the EU packaging and bioplastics ecosystem.

Fernando Frauca

STRATEGIC R&D PARTNERS

TECNALIA

Co-developers of our patented proprietary methodology.

tecnalia
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

GAIKER

Key partner for materials compounding and home-compost compliance.

Gaiker
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

UBE (PILOT TRIAL)

We are conducting a pilot trial with UBE to validate our PHBV materials in real industrial conditions.

UBE
UBE Corporation Europe

KEY ADVISORS

RAISA
RAISA FILM DE POLIETILENO, S.A.

PACKAGING CONVERTERS

Validating blown-film and extrusion line compatibility.

UBE
UBE Corporation Europe

COMPOSTING SYSTEMS

Advising on home-compost certification pathways.

EROSKI

RETAIL SUSTAINABILITY

Aligning product strategy with supermarket ESG mandates.

Traction & Growth

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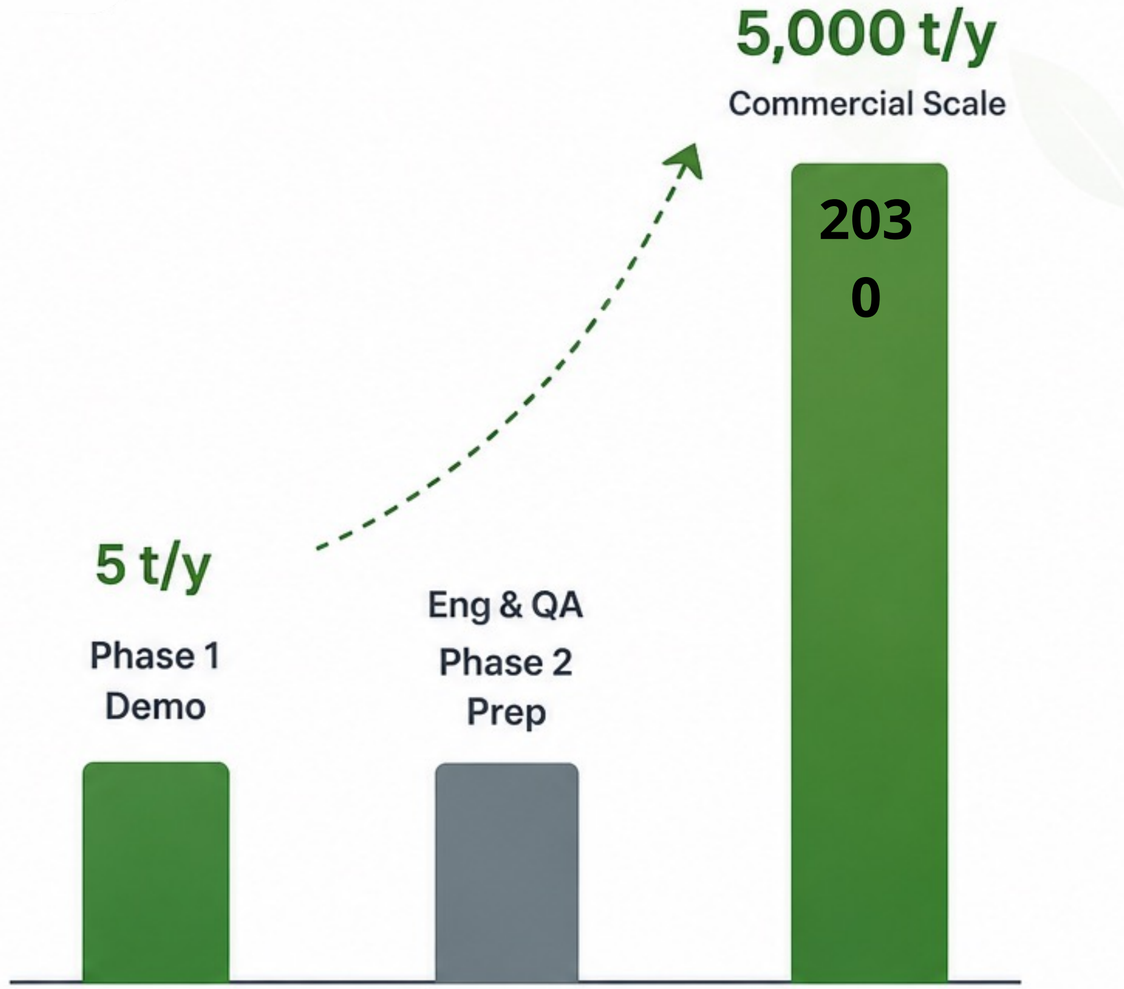
EARLY TRACTION. CLEAR MOMENTUM.

5 TONS
Phase 1 demo batch produced

CUSTOMER PIPELINE
Qualifying material with leading EU packaging converters

CERTIFICATION PROGRESS
Compliance pathways for EN 13432 home-compost standards

MARKET VALIDATION
Early offtake interest and NDAs to allocate future 5,000 t/y capacity



Funding & Strategic fit

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CURRENT FUNDING SOURCES

FOUNDER CAPITAL
Committed capital from the founders.

NON-DILUTIVE GRANTS
Public funding to accelerate innovation and impact.

STRATEGIC PARTNERS
Collaborations that strengthen our ecosystem.

KEY INVESTORS & PARTNERS

RAISA
RAISA FILM DE POLIETILENO, S.A.
Gaiker
tranXforma FOOD

All with extensive experience in entrepreneurship and plastics market.

INVESTMENT ASK & USE OF PROCEEDS

45%	20%	20%	15%
CapEx Scaling up production capacity.	**Certification & Compounding** Certifications and materials development.	**Working Capital** Operating expenses to support growth.	**Phase 2 Engineering** Preparation for next scale-up phase.

STRATEGIC RATIONALE – WHY NOW?

PPWR TIMING
2030 circularity mandate accelerates demand for compliant packaging.

EU IMPORT SUBSTITUTION
Replacing 100% of compostable films imported into Spain via local production.

MARKET DEMAND SURGE
22.56 CAGR for PHA and packaging applications outpaces existing supply capacities.

WHY NOW?

- PPWR & 2030 mandates create regulatory pull.
- 100% import substitution opportunity in Spain.
- 23.6% CAGR outpacing supply.

Barriers to entry

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IP PROTECTION

Patented Tecnalia Methodology

Exclusive co-developed process with full freedom-to-operate verification.

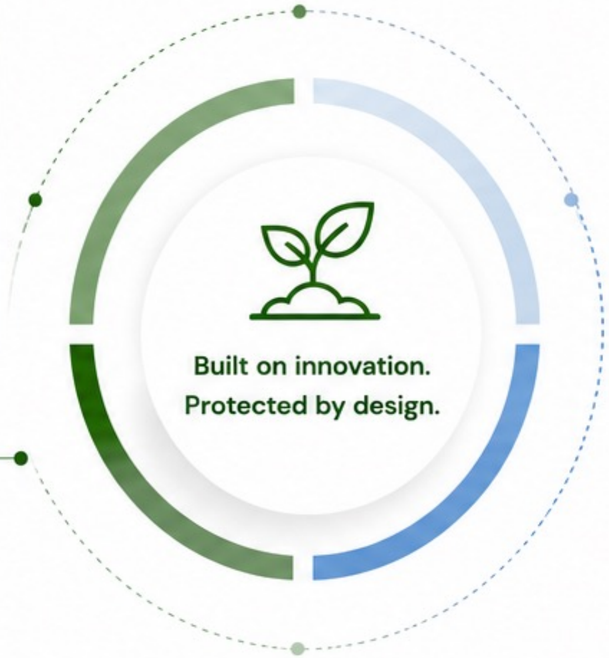
Proprietary PHBV Formulation

Owned compounding recipes (PHBV/PLA/Cellulose) preventing easy replication.

CERTIFICATION EN 13432

EN 13432 Certification

A massive differentiator blocking industrial-only competitors from premium packaging segments. Stringent EU food-contact approvals act as severe barrier for new material entrants.



MARKET ENTRY BARRIERS

01

Regulatory Complexity

Strict compliance with PPWR and sourcing visibility requirements.

02

Capital Requirements

Capital-intensive EU production scale-up blocks fast entry for latecomers.

03

Technical Know-How

Deep integration and qualification with EU packaging converters.

OUR COMPETITIVE ADVANTAGE

- Protected technology and formulations
- Certifications that create a significant moat
- High barriers that defend our market position

Competitive Analysis

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FIRST-MOVER EU SCALE

5,000 t/y
Target Capacity

vs. ~900 t/y
Current EU Competitors



ACCELERATING DEMAND

Global PHA Volume
22.56% CAGR



KEY DIFFERENTIATORS

HOME-COMPOST UNIQUE
Access to premium packaging segment

EU LOCAL PRODUCTION
No imports.
Lower risk.
Faster response.

COST-QUALITY EDGE
Superior barrier properties at competitive costs.



STRONG POSITION
Leading the way in Europe with unmatched scale.

MARKET ADVANTAGE
High-growth market with massive demand potential.

SUSTAINABLE EDGE
Better for the planet.
Better for business.

The Ask & Next Steps

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Seeking strategic funding & industrial partners to reach

5,000 t/y capacity



WHAT WE ARE ASKING

01 PROOF OF CONCEPT

Pilot testing of PHBV/cellulose/lignin/ PBAT...

Validate performance, processability and market potential.

02 INVESTMENT IN PHASE 2 EQUITY RAISE

Provide capital in Q1 2027 via equity.

To enable Phase 2 engineering, equipment and pre-commercial scale-up.

03 CO-INVESTMENT TO BUILD BIOPLASTICS FACTORY

Co-invest to build a scalable bioplastics manufacturing plant.

Create long-term value and lead the bioplastics transition together.

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PLUGANDPLAY

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STARTUP PRESENTATION

RETRN BIO

RETRN

Innovate. Create. Disintegrate.

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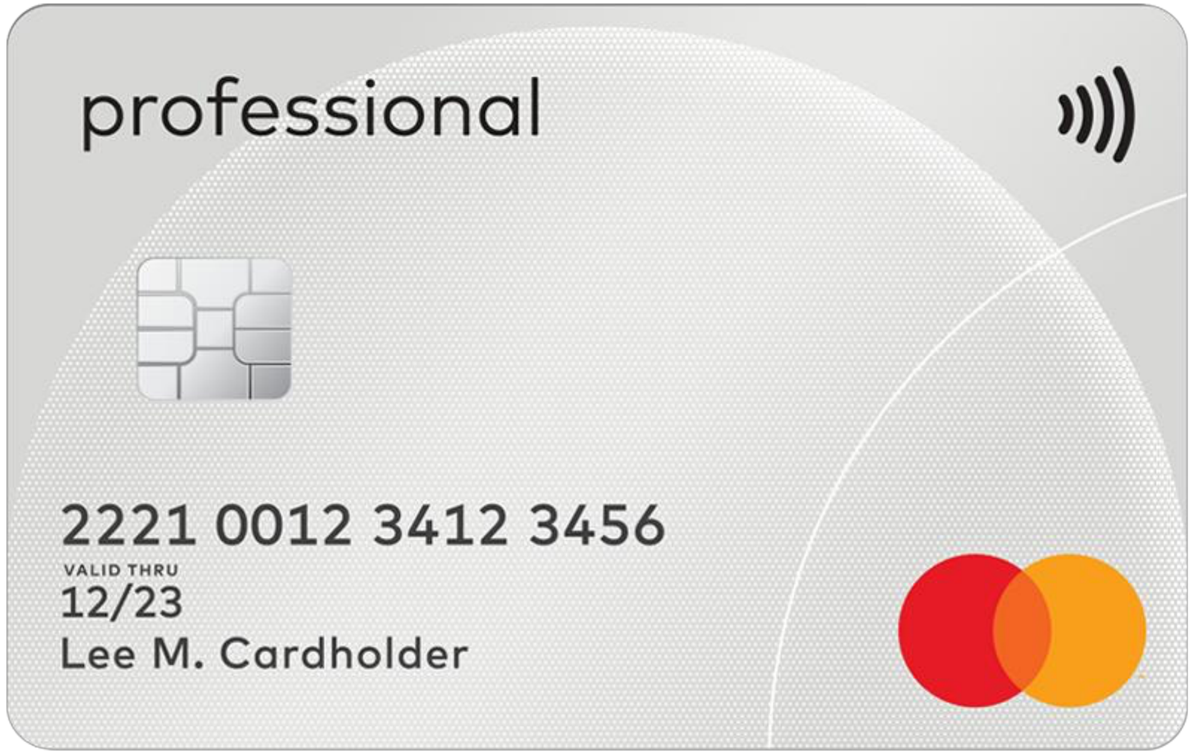
Join us at **pnptc.com**

RETRN

Biotech-platform
Upcycling ag-waste
New materials for sustainable packaging

Chris Thomas, CEO





We are **building the material foundation** for a **plastic-free** food system: **High-performing** materials that are safe **for people and the planet.**

RETRN Bridges the Gap for Sustainable Packaging

with solutions that have lower cost and better performance



Technology Gap

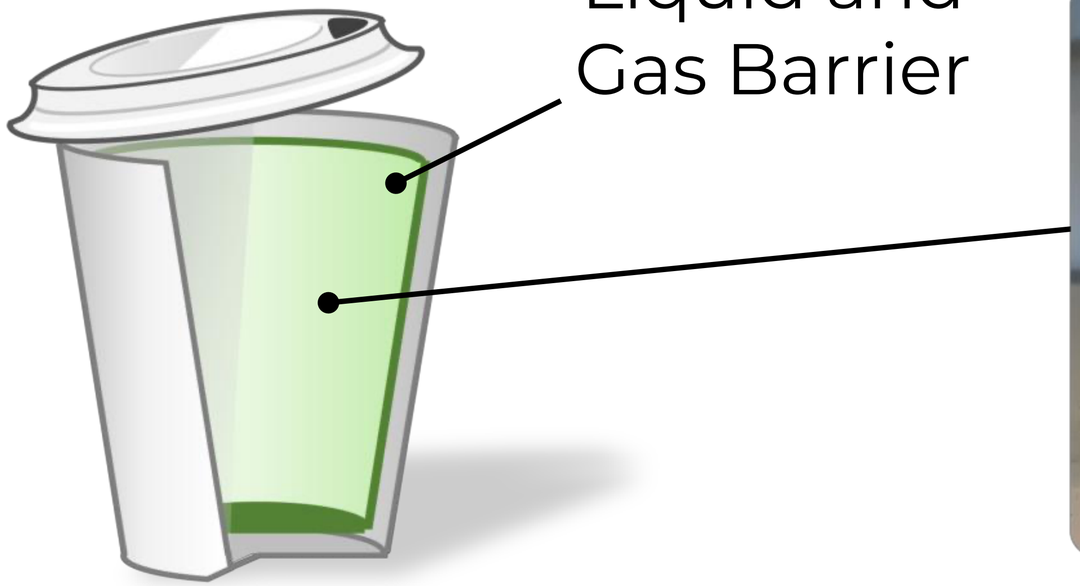
Other Bioplastics



RETRN is capitalizing on **20% CAGR, $40B** Bioplastics Market with 3 key value propositions:

Drop-in Solution · Scalable Prices · True Sustainability

Low Cost Drop-In Formulations Replacing Plastic Coatings in Fiber Packaging





- **Drop in** for **on-line coating**
- Suitable for **cupstock**, **molded fiber**, and more
- **Skips costly** lamination steps
- Fit for **more markets**

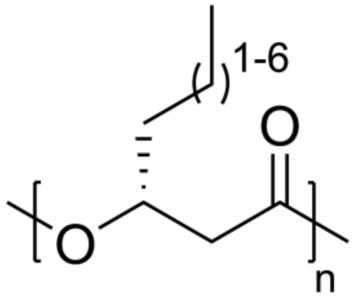
Liquid-Formulation · Heat Sealable · Low T_m · Flexible

Recyclable · Fully Compostable · GHG negative · Bio-Based

The RETRN Advantage

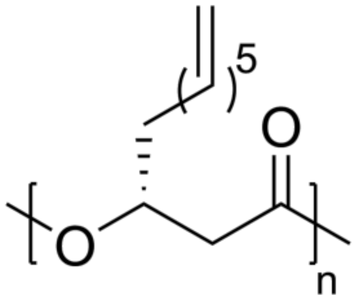
Introducing new chemistries to expand biobased portfolio

Aliphatic



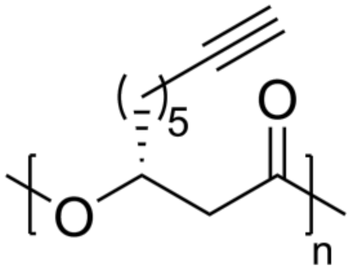
- Compostable coatings and adhesives additive
- Liquid barrier

Alkene



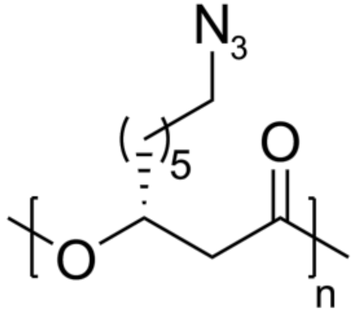
- Expand UV-curable resins
- High performance coatings
- Gas barrier

Alkyne



- Click chemistry
- Cross-coupling additives

Azide



- Click chemistry
- Nanoparticle drug delivery

On-site Value Creation

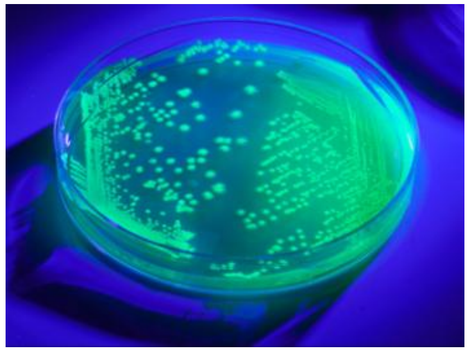
Conversion



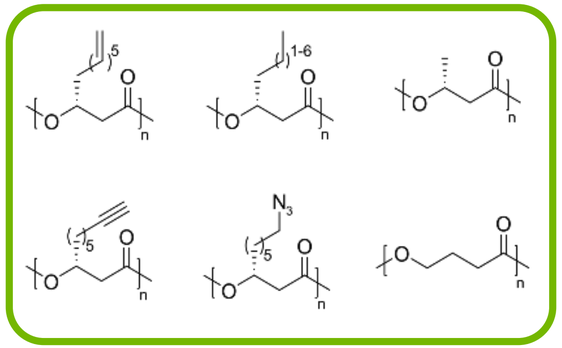
- Low-value waste converted to liquid intermediate.



Fermentation



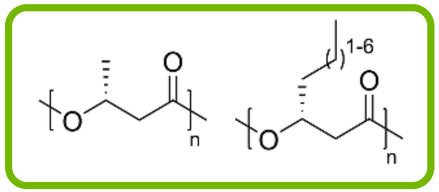
- Patented microbes convert waste into product.



Formulation



- Purified and prepared as aqueous barrier coatings.
- Tunable:
  - Melting temperature
  - Cross-linking compatibility
  - Flexibility, crystallinity
  - Chemical functionalizability



Manufacturing Opportunity: Co-Location Example

Waste Upcycling

Packaging Manufacturer

Low Value Side Stream:
Fiber rejects

Waste Availability:
30,000 tons / year

RETRN Process

Modular System Installed On-Site

Installed Cost:
$20-30M

Opportunity Cost (Landfilling):
-$2.4-2.8M / year

Production Potential

Installed Capacity:
3000-4000 dry tons / year

Cost-Comparable to Petroleum Products

GHG reduction:
40,000+ tons CO_2e / year

Scaling to Market

Lab — *CMO* — *Co-Location*

Properties Testing



Bottles (g)

- Customer testing
- Finalize aqueous formulation
- 6 Registered Patents
- 8 LOS / LOI

NRE agreement for analysis

Capital Targets

Grants $1.7M
Dilutive $1M
USDA STTR* $0.6M
NSF STTR* $1.2M

Product Engineering



Buckets (kg)

- Develop MVMP
- Deliver for customer pilots
- Prove Manufacturability
- Obtain off-takes for commercial

Ongoing support $10-65K / mo

Capital Targets

Seed Round $4M-$6M

Manufacturing



Totes (ton)

- Manufacturer trials
- CM or pilot facility set up
- Begin Exit Strategies

Trials paid per tote or per program

Production Location:

Center for LIFE SCIENCE VENTURES

iFAB Illinois Fermentation and Agriculture Biomanufacturing Tech Hub

Next Rung Technology

**50% odds*

The RETRN Team



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CEO



Kristin Mannion

COO



Dr. Ryan Scheel

CSO

SCIENCE TEAM

Dr. Dariya Getya
Polymer Scientist

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Red Copper Consulting



Dr. Chris Nomura
VP Research
University of Iowa



Jim Fogg
Motus

Impressive Non-dilutive Traction

Federal SBIRs – Phase I

NSF

USDA NIFA

>50% odds for Phase IIs $1.8M

Accelerators and Partners - $1.7M+ awarded to date

Activate

CREATIVE DESTRUCTION LAB

INSPYRE INNOVATION HUB

iFAB Illinois Fermentation and Agriculture Biomanufacturing Tech Hub

PLUG AND PLAY

Center for LIFE SCIENCE VENTURES

COLUMBIA TECHNOLOGY VENTURES

SUNY RF The Research Foundation for The State University of New York

LaunchNY

Empire State Development

NEW YORK STATE OF OPPORTUNITY. NYSERDA

RETRN

THANK YOU!

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CLOSING REMARKS

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DAY 2 — MAY 20

Afternoon: **Sustainability Expo**

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DAY 3 — MAY 21

Morning: **AgriFood Expo**
Afternoon: **Brand & Retail**

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UPCOMING EVENTS

Topeka Pitch and Putt Tournament & Expo
May 27-28 | *Topeka*

Selection Day & Batch Kickoff
August 25-26 | *Minneapolis*

Mining Roundtable
September | *Phoenix*

INX Innovation Day
October 19 | *Chicago*

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UPCOMING EVENTS

WaterTech Roundtable
November | *Phoenix*

November Summit
November 3-5 | *Silicon Valley*

Energy and Data Center Roundtable
December | *Phoenix*

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BREAK

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