

# Investing in Nature-Based Supply Chain Solutions



Re-Husk Fund

April 24, 2026

# America's corn farmers prop up global food supply...



## U.S. Corn Production

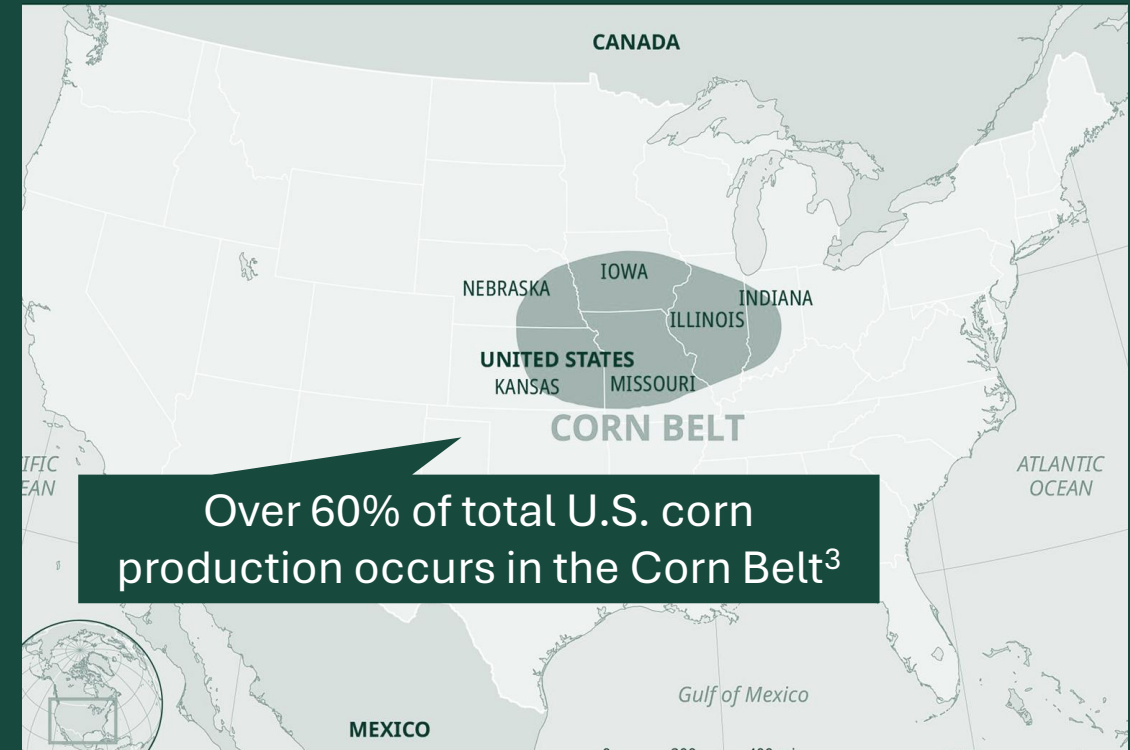
**1/3** of corn produced worldwide is farmed in the U.S.<sup>1</sup>

**~40%** of corn harvested feeds U.S. livestock<sup>2</sup>

**~80%** of total worldwide feed grain volume is from U.S. corn exports<sup>2</sup>



## The Corn Belt



Sources

1. Statista: Corn in the U.S.
2. USDA: Corn and Other Feed Grains
3. AgDaily

# ...but these farmers may struggle to feed themselves

## Financial Challenges

**-\$1,830** median income from farming alone in 2024<sup>1</sup>

**-\$90-160** average corn loss per acre in the state of Illinois from 2023-2025<sup>2</sup>

**11.7%** increase in food insecurity in farm-dependent counties 2013-2030<sup>3</sup>

## Key Input Costs

- Fertilizer is **33-44% of corn operating costs**<sup>4</sup>
- Fertilizer and fuel supply is linked to **geopolitical risks**



Urea prices have **increased 49%** since the Iran War, while **corn prices have only increased 0.5%**<sup>5</sup>



**Farm diesel prices increased 46%** since February, 2026<sup>6</sup>

### Sources

1. [USDA: Farm Household Well-being](#) (\*Note, not corn-farming specific)
2. [University of Illinois, Farm Doc Daily](#)
3. [Investigate Midwest](#) (\*Note, not corn-farming specific)
4. [Union of Concerned Scientists Ag Web](#) (as of April 14, 2026)
5. [Farm Bureau](#) (as of April 14, 2026)
6. [Farm Bureau](#) (as of April 14, 2026)

# As the demand for packaging grows, so does its negative environmental impact

## Packaging Demand

**67M** parcels shipped daily in the U.S.<sup>1</sup>

**\$1.2T** expected e-commerce revenue in the U.S. this year<sup>2</sup> (2026)

**6.3%** CAGR for corrugated cardboard in the U.S, with \$33 B in revenue projected by 2030<sup>3</sup>

## Environmental Impact

**87B** gallons of net water consumed each year in corrugated cardboard manufacturing<sup>6</sup>

**361B** kWh renewable + nonrenewable energy consumed each year<sup>7</sup>

**37.2B** kg CO2 eq<sup>8</sup> or 37.2 million metric tons



~132K Olympic pools



~16M homes' energy



~8.1M cars' emissions








Sources

- 1. IMH Packaging
- 2. Statista
- 3. Grand View Research
- 4. NCASI/Athesis
- 5. American Forest & Paper Association
- 6. Benchmark consumption of 2,795 gallons/ton of paper<sup>4</sup> x 31M tons of containerboard (accounts for 40-50% of total paper & paperboard capacity)<sup>5</sup>
- 7. Renewable + nonrenewable consumption of 41.69MJ/kg<sup>4</sup> x 1,000 kg/ton for ~41.7GJ / metric ton. Multiply by 31M tonnes<sup>5</sup> = ~361 billion kWh
- 8. 1.20 kg CO2 eq./kg<sup>4</sup> x 1,000 kg/metric ton for 1,200 kg CO2 eq per ton x 31M tonnes<sup>5</sup> = 37.2B kg CO2 eq = 37.2M metric tons

# Meanwhile, there is an emerging packaging market for under-utilized agricultural products

**17B** bushels of corn produced in 2025<sup>1</sup>

**~20M** tons of husks available to be repurposed<sup>2</sup>

Company	Inception Year	Geography	Role in Value Chain	Product(s)
 <b>FiberX</b>	2022	Indiana, U.S.	Material / Fiber Production	Corn-husk based fiber and bio-composites / plastic alternatives ( <i>funding from Purdue University</i> ) <sup>3</sup>
 <b>Gaia Ag</b>	Pre-plant as of 2024 <sup>4</sup>	Kansas, U.S.	Material / Fiber Production	Corn-husk derived pulp to replace virgin wood pulp fibers in recycled cardboard
 <b>FOOTPRINT</b>	2014	Arizona, U.S.	Finished Goods Fabrication	Molded fiber trays, cups, shippers ( <i>partnership with major companies like Sweetgreen, Unilever</i> ) <sup>5</sup>
 <b>growPack</b>	2018	Brazil	Production & Fabrication	Corn-husk based bio-packaging for clamshell baskets, trays, and inserts ( <i>funding from Ambev brewing company</i> ) <sup>6, 7</sup>
 <b>bluecat paper</b>	2018	India, Bangladesh, Ethiopia	Production & Fabrication	Tree-free paper from a variety of materials (e.g., lemongrass, banana, barley) ( <i>partnerships include IKEA and Lush cosmetics</i> ) <sup>8</sup>
 <b>envoPAP</b> <small>The Sustainable Materials Company</small>	2015	UK, India	Production & Fabrication	Sugar-cane and wheat-straw-derived paper and packaging ( <i>partnership with Amazon for The Climate Pledge</i> ) <sup>9</sup>
 <b>PLANTSWITCH</b>	2020	North Carolina, U.S.	Production & Fabrication	Agri-based resin pellets used for utensils and containers ( <i>key partnerships include Sysco and Walmart</i> ) <sup>10</sup>

Sources

1. [Brownfield Ag News](#) (U.S. production)
2. Assuming 56 lbs/bushel (952B lbs or 476M tons of corn grain), 1:1 ratio for grain weight to stover weight, only remove 50-60% of stover (238-285M tons), then isolate the husks which are 8-10% of the total stover residue weight (~20M tons)

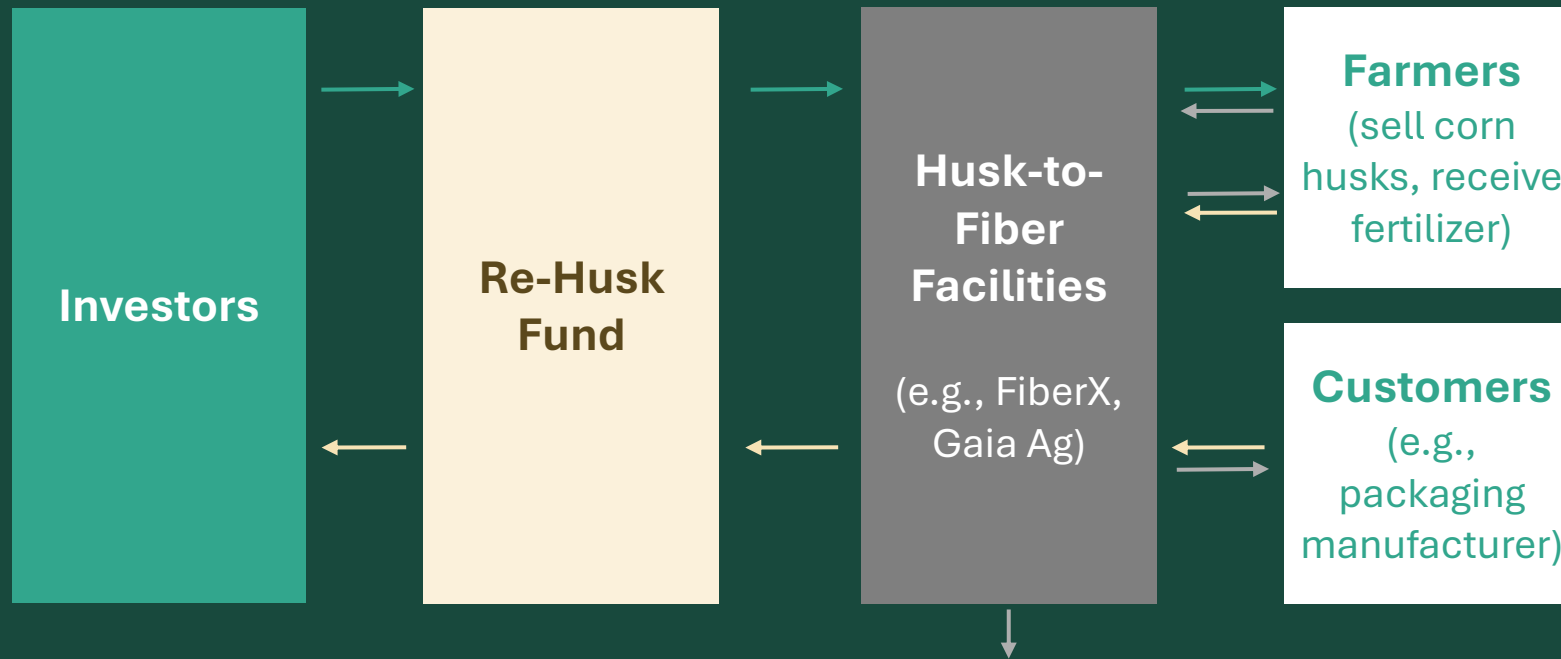
3. [FiberX](#)
4. [Gaia Ag](#)
5. [Footprint](#)
6. [GrowPack](#)

7. [TI Inside](#)
8. [Bluecat Paper](#)
9. [EnvoPAP \(The Climate Pledge\)](#)
10. [PlantSwitch](#)

# Re-Husk offers a sustainable, circular solution

## Fund Structure with Circular Benefits

→ Outbound Cash Flow  
 ← Inbound Cash Flow  
 ⇄ Resources Flow



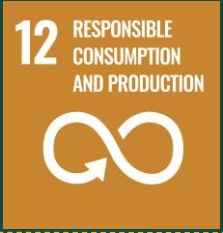



**Additional benefits** (e.g., reduced methane emissions, improved customer sentiment for sustainable packaging, etc.)

## Re-Husk Fund Goals

- ✓ Support local farmers
- ✓ Create a circular economy
- ✓ Uplift rural economies
- ✓ Scale innovative technologies
- ✓ Produce sustainable, compostable packaging
- ✓ Reduce emissions
- ✓ Conserve water
- ✓ Prevent deforestation
- ✓ Provide returns to investors

# Re-Husk's impact can be measured against Sustainable Development Goals

Goal	Impact	Metrics
 <p><b>9</b> INDUSTRY, INNOVATION AND INFRASTRUCTURE</p> <p><i>Industry innovation &amp; infrastructure</i></p>	<p>Retrofits traditional agriculture supply chains with advanced technology to promote economic development in rural areas</p>	<ul style="list-style-type: none"> <li>• Total capital (\$) invested in rural industrial infrastructure</li> <li>• # of green manufacturing jobs created</li> </ul>
 <p><b>13</b> CLIMATE ACTION</p> <p><i>Climate action</i></p>	<p>Mitigates climate change by reducing energy and GHG emissions from traditional cardboard manufacturing</p> <p>Prevents methane emissions in the field from decomposing husks</p>	<ul style="list-style-type: none"> <li>• # metric tons of CO2e avoided or sequestered</li> <li>• Carbon intensity (kgO2e) per unit of husk-derived packaging</li> </ul>
 <p><b>12</b> RESPONSIBLE CONSUMPTION AND PRODUCTION</p> <p><i>Responsible consumption &amp; production</i></p>	<p>Promotes circularity by using an organic material (corn husks) to replace single-use plastics and virgin wood pulp</p>	<ul style="list-style-type: none"> <li>• # tons of agricultural waste diverted</li> <li>• # tons of plastic/virgin paper displaced</li> </ul>
 <p><b>15</b> LIFE ON LAND</p> <p><i>Life on land</i></p>	<p>Promotes soil biodiversity with sustainable residue management</p> <p>Reduces pressure on natural forests and prevents land-use conversion by replacing wood-pulp</p>	<ul style="list-style-type: none"> <li>• # acres of forest equivalents saved (not harvested for pulp)</li> <li>• # acres corn-land managed with sustainable corn stover harvesting</li> </ul>

# Financial model overview

## Key Assumptions



6-year holding period



Modelled on an individual recycling plant



5-10 investments throughout fund life



Initial WACC of 11.68%, exit WACC of 11.19%<sup>1</sup>

## Investment and Return Structure



10-20% stake in husk recyclers



Asset mix: 80% Equity, 20% Debt



Community Fund: 15% carry beyond 10% IRR



Management Fee : 2% base + 15% carry beyond 12% IRRs

Re-Husk will initially operate as a non-traditional VC firm with a blend of both equity and debt financing. While the fund invests in early-stage companies, the risk and return profiles of these companies are less extreme than traditional VC investments

1. WACC decreases as a result of anticipated increase in leverage after exit. Leverage increase justified by decreased debt risk via proven technology and customer demand

# Stakeholder analysis and return summary

Stakeholder	Rationale for investment / participation	Example players	Size of investment, \$M	Return, \$M (% IRR)
Equity investor	Receive guaranteed supply of sustainably sourced packaging	<ul style="list-style-type: none"> <li>Food &amp; Bev (e.g., Chipotle)</li> <li>Packaging (e.g., Smurfit WestRock)</li> <li>E-commerce (e.g., Amazon)</li> </ul>	\$40	\$89.7 (14.30%)
Debt investor	Secure a steady return backed by physical machinery and offtake agreements and fulfill impact lending requirements	<ul style="list-style-type: none"> <li>Institutional investors (e.g., Morgan Stanley, Goldman Sachs)</li> <li>Private credit</li> <li>USDA / RBIC Loans</li> </ul>	\$10	N/A (5.26%)
Farmer	Improve bottom line and decrease reliance on global fertilizer market	N/A		\$12.9 <sup>1</sup> (N/A)
Community Fund	Distribute funds to community farmers in need			\$4.0 (N/A)
Re-Husk / Fund Managers	Coordinate an untapped impact opportunity and waste-to-value investment			\$3.9 (N/A)
<b>Total</b>			<b>\$50</b>	

1. Farmer profit increased as a result of direct revenue and fertilizer cost savings. Breakdown is as follows: Direct Revenue: \$11.1 M; Fertilizer Savings: \$1.8 M (Note: farmer impact is measured only as the impact to farmers during the investment (6 years) and scaled by ownership of the portco (20%). Total benefit to the farmers exceeds the value captured here

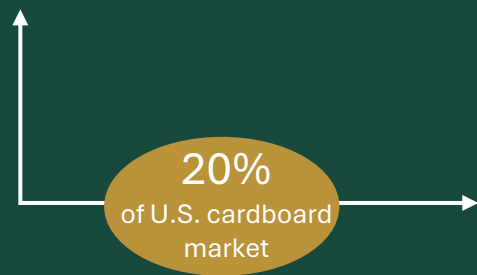
# Husk-derived cardboard could penetrate ~20% of the U.S. market and put \$800M in farmers' pockets

## Cardboard Market

**100B** cardboard boxes produced in the U.S. each year<sup>1,2</sup>



**~33M** tons of cardboard produced



## Husk Packaging

**17B** bushels of corn produced in the U.S. in 2025<sup>3,4</sup>



**476M** tons of corn grain available to be repurposed<sup>5</sup>





**~20M** tons of husks available to be repurposed





**6.7M** tons of pulp / cardboard output

Assuming full-capture (20% market share) Re-Husk could contribute to:

**~17.4B** gallons of water conserved<sup>7</sup> 

**~7.44B** kg CO2 eq. emissions reduced<sup>7</sup> 

**~114M** trees saved<sup>8</sup> 

**~800M** additional farmer revenue (\$40/ton of husk)<sup>9</sup> 








Sources & Details:

1. [Capital City Recycling](#)
2. ~0.6-0.7 lbs per box
3. [Brownfield Ag News](#)
4. ~56 lbs per bushel (0.028 tons per bushel)

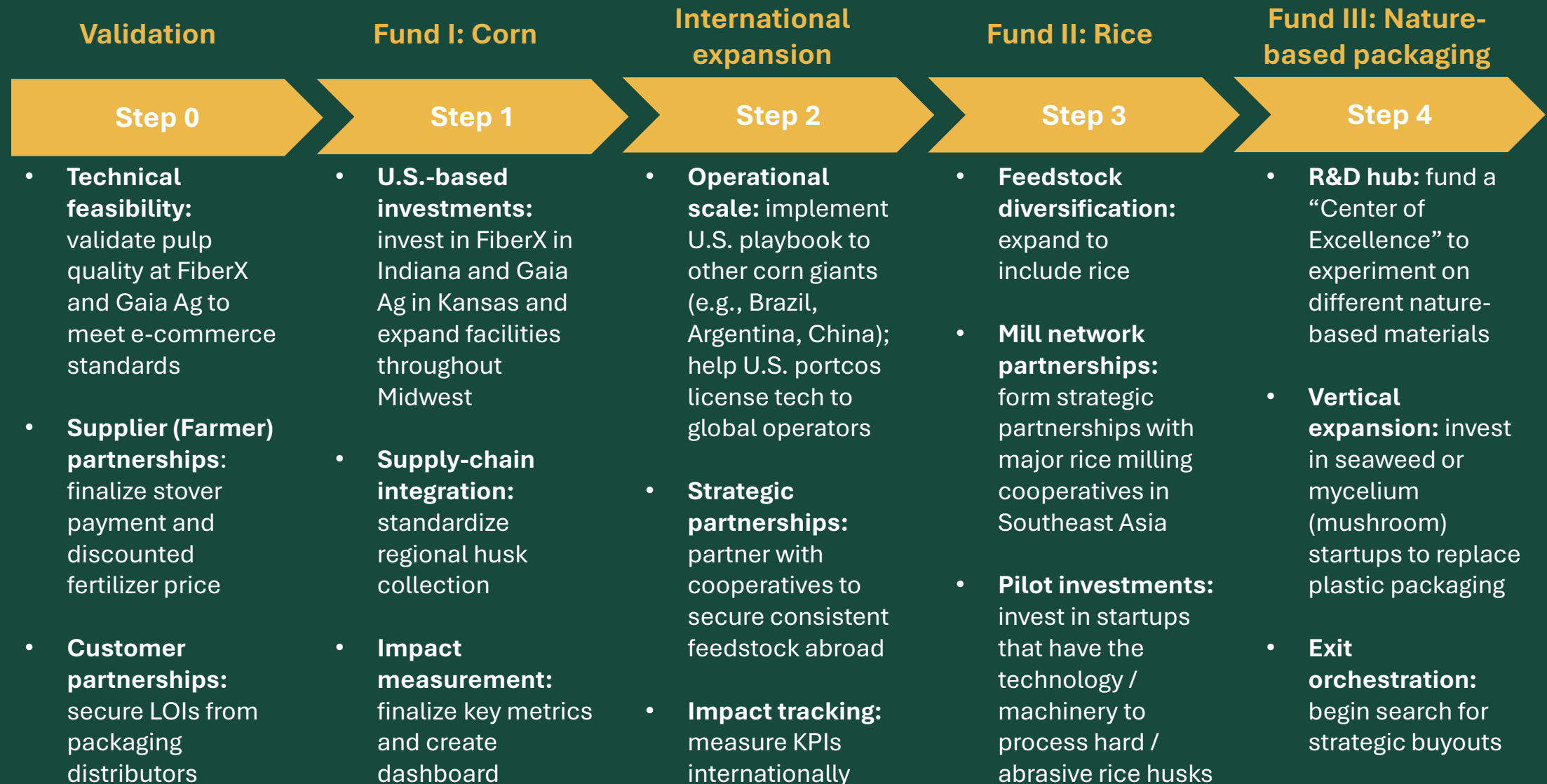
5. 50% stover left for ground cover; ~10% stover weight is unusable husk
6. 3:1 dry-fiber-to-pulp ratio
7. Assumes 20% of values derived on Slide 4
8. [SCCMO](#)
9. \$800M does not include fertilizer discount to farmers

# Key risks and mitigation strategies

 Most critical

Risk	Mitigation
 <p><b>Farmer: Soil Nutrient Depletion</b></p>	<p>Fear that removing husks will damage soil-health and crop yields</p> <p>Remove no more than 50% of stover; utilize retrofitted combines that prevent unnecessary ground disturbance</p>
 <p><b>Farmer: Risk Aversion</b></p>	<p>Reluctance to join a new program due to thin margins and minimal proof-of-concept</p> <p>Launch multi-year pilots with transparent data on yield, soil health, and financial impact</p>
 <p><b>Commercial: Demand Uncertainty</b></p>	<p>Risk that packagers / end-customers don't commit volume needed for plant profitability</p> <p>Secure binding offtake agreements with companies to derisk investments</p>
 <p><b>Operational: Seasonality &amp; Storage</b></p>	<p>Corn is a single-year harvest crop but facilities require a year-round supply</p> <p>Pass husks through rotary dryers to reduce moisture and prevent decay (can be done in parallel with pelletizing step below)</p>
 <p><b>Operational: Transportation Costs</b></p>	<p>Raw husks are incredibly light (~2lbs/cu. ft); shipping loose husks is not cost effective for transport</p> <p>Convert raw husks into pellets to maximize the density of material per truck</p>
 <p><b>Operational: Feedstock Quality</b></p>	<p>Stover can vary by farmer and be contaminated with soil or rocks that damage machinery</p> <p>Implement a grading system at the factory; pay a premium for high-quality bales</p>
 <p><b>Financial: Liquidity</b></p>	<p>Significant upfront inventory in first year without proven ability to generate cash</p> <p>Investment sized to cover upfront costs and multiple initial years of negative cashflow</p>

# Fund rollout and next steps



**Questions?**

# Appendix

# Our team from Kellogg School of Management



**Hannah Devlin**

*Consultant at McKinsey & Company with experience in the Energy Industry and Public Sector focusing on supply chain resilience and operational improvement initiatives*



**Eddy Ciobanu**

*Former Admissions Officer at Yale University and Williams College with experience in nonprofit management and institutional development*



**Nick Laning**

*Former Project Manager at Kimley-Horn with experience in community and utility scale solar development and construction*

# Agriculture

# Profitability of corn farming in the U.S.

## Breakeven price for corn, soybeans, and wheat (as of January 2026)

**Table 2. 2026 Purdue Crop Budget for Average Productivity Soil.**

	Continuous Corn	Rotation Corn	Rotation Soybeans	Wheat	Double-Crop Soybeans
Expected Yield per Acre	186	198	60	85	42
Harvest Price	4.35	4.35	10.20	4.95	10.20
Market Revenue	\$809	\$861	\$612	\$421	\$428
Less Variable Costs					
Fertilizer	240	221	93	146	64
Seed	124	124	74	44	86
Pesticides	115	110	70	45	63
Dryer Fuel	52	42	0	0	5
Machinery Fuel	20	20	12	12	9
Machinery Repairs	45	45	40	40	40
Hauling	20	21	6	9	4
Interest	27	26	14	14	12
Insurance and Miscellaneous	50	50	40	30	10
Total Variable Costs	\$693	\$659	\$349	\$340	\$293
Contribution Margin	\$116	\$202	\$263	\$81	\$135
Government Payments	\$50	\$50	\$50	\$50	\$0
Overhead Costs (Land, Labor, and Machinery Ownership)	\$409	\$399	\$399	\$399	\$0
Earnings	-\$243	-\$147	-\$86	-\$268	\$135
Breakeven Price	\$5.92	\$5.34	\$12.47	\$8.69	\$6.98

See ID-166-W, 2026 Purdue Cost Cost & Return Guide, for more detail, January 2026 Estimates.

**Table 2.** 2026 Purdue Crop Budget for Average Productivity Soil.

## Projected profitability from market trends

According to Purdue University, at a **harvest price of \$4.35/bushel** for corn, the expected earnings per acre are **negative** (-\$243 and -\$147 for continuous and rotation corn, respectively)<sup>1</sup>

As of mid-April 2026, **corn prices may trend lower than \$4.35 (\$4.00-\$4.15)<sup>2</sup>**, which would **increase the losses**

Furthermore, **input costs have increased<sup>3</sup>** since the conflict in Iran, with nitrogen (urea), diesel fuel, and interest rates all higher than Purdue's initial estimates, likely leading to even **more negative earnings**

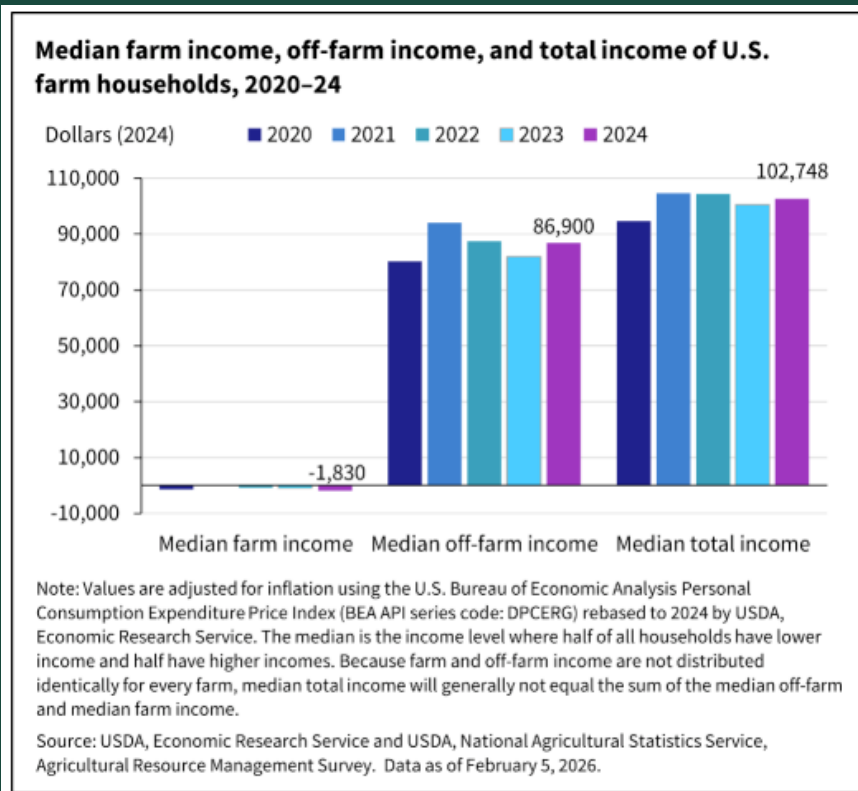
Without **government subsidies**, the **unit economics of corn are not sustainable**

Sources

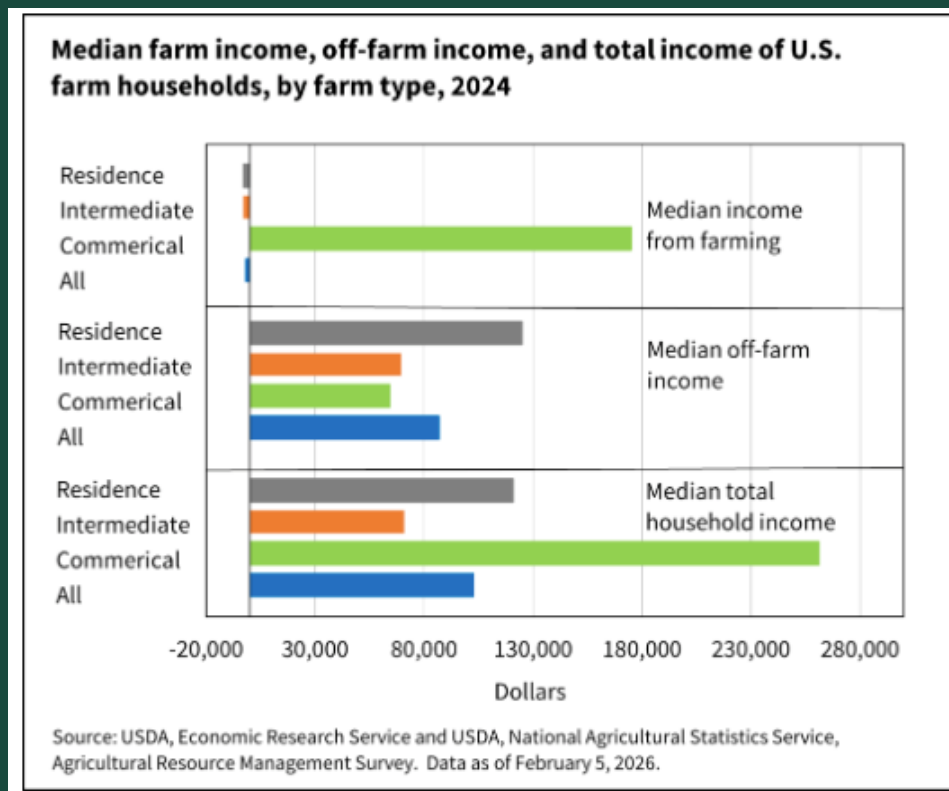
1. Purdue University: What 2026 Crop Budgets Mean for Profitability and Cash Rent Decisions
2. DTN National Corn Index priced \$4.03 (April 14, 2026)
3. CSIS: Iran, Fertilizer, and Food Security: Risks, Impacts, and Policy Responses

# 2024 U.S. farming income statistics

Note: statistics are not specific to corn or corn farmers but are representative given corn's high input and capital costs



Median income from on-farm activities (activities directly related to agricultural production) is negative across all farms in the U.S., at -\$1,830 in 2024



Off-farm income (from outside jobs or investments) drives income for residential and intermediate farms, whereas on-farm income drives income for commercial farms

## Additional takeaways

The number of **U.S. family farms** has decreased from 6.8 million in 1935 to 1.8 million in 2026

Since the total amount of farmland is not decreasing at the same rate, **small family farms are being absorbed** into larger commercial operations

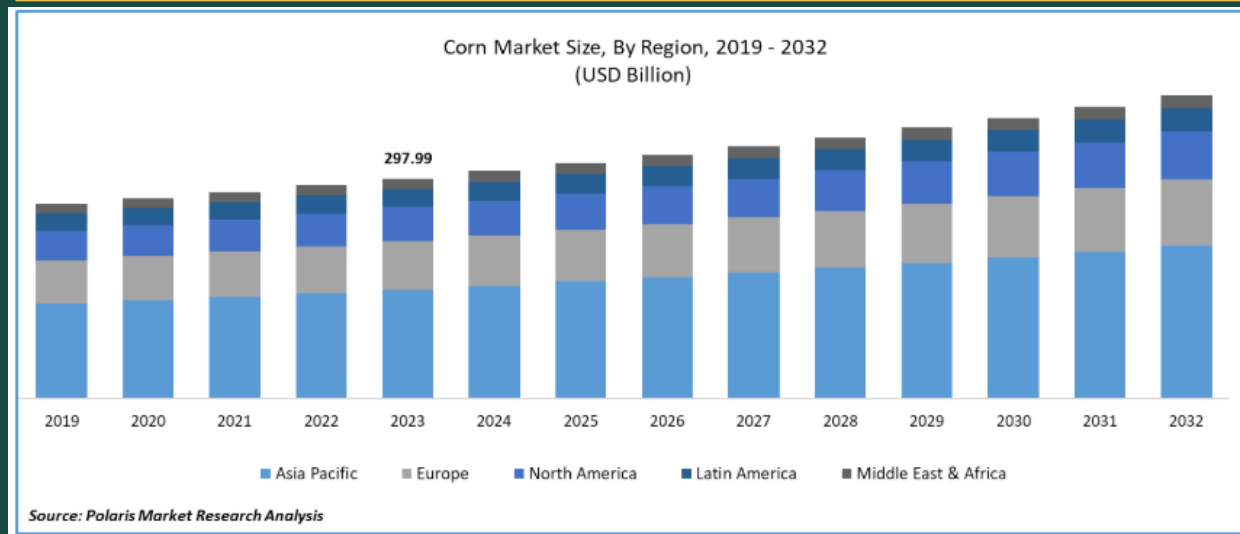
The capital required to start or maintain a farm today is significant, and **larger farms are able to achieve economies of scale that family farms cannot**

Sources

1. USDA: Farm Household Well-being

# Projected international corn demand and U.S. domestic supply statistics

## International corn (maize) market size<sup>1</sup>



The global corn market is expected to grow from **\$307.91 billion in 2024 to \$410.02 billion in 2032 at a CAGR of 3.6%**

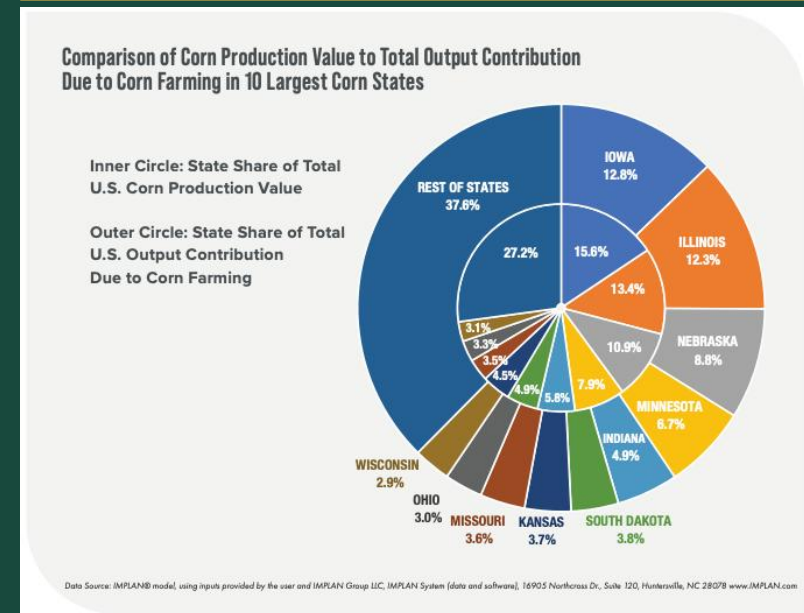
The increase in **corn demand is fueled by a variety of industries** including food processing, pharmaceuticals, ethanol production, cosmetics, and animal feed

Additionally, as **the world population grows**, the demand for corn and corn-derived products also increases to **support the global food supply**

Sources

1. [Polaris Market Research](#)
2. [National Corn Growers Association](#)

## United States corn supply<sup>2</sup>



As of 2024, there were **289,382 corn grain farms in the U.S.**, producing 14.9 billion bushels

The **10 largest producing states** of corn in the U.S. are Iowa, Illinois, Nebraska, Minnesota, Indiana, South Dakota, Kansas, Missouri, Ohio, and Wisconsin

# Illustrative example of impact for an individual farmer in the Midwest

## Revenue

**8,000** bushels of corn grown by an individual farmer<sup>1</sup>

~16 lbs husk/bushel<sup>2</sup>

**64** tons of husks

Keep 50% of husks for ground cover; 32 tons \* \$40/ton

**\$1,280** earned in revenue

## Cost Savings

**12.8** tons of fertilizer

15% discount \* ~\$107 per ton of fertilizer \* 12.8 tons of fertilizer

**\$205** saved from discounted fertilizer

Note: at the current price of ~\$4.50 per bushel, the financial gain represents automatic profits of ~4% of revenue

**\$1,485** net financial gain per year

Sources

1. Indiana Farm Bureau and USDA
2. Penn State University

# Re-Husk could scale into adjacent markets, including rice husks in Southeast Asia

## Environmental and Social Impacts of Rice

Rice is **essential to food security and the livelihoods** of millions of smallholder farmers in Southeast Asia, feeding more than **half of the population each day**<sup>1</sup>

**Over 90% of rice husks are disposed of as waste** instead of being used as a valuable resource<sup>2</sup>

**Burning rice husks** is a quick way for farmers to clear fields for new planting but results in the **release of greenhouse gases** and air pollutants<sup>3</sup>

These **pollutants cause adverse health effects** including increased rates of asthma, chronic bronchitis, and premature death

## Market Opportunity

Average annual global rice production between 2016-2025 was **513 million metric tons**, with most production in **Asia and Southeast Asia**<sup>4</sup>

Rice husks are comprised of silica, lignin, and cellulose, ideal for **strong, water-resistant, and flame-retardant materials**<sup>5</sup>

Rice husks' predictable, consistent compositions are important for **manufacturing quality control**

Southeast Asia's **e-commerce market is growing** with a **CAGR of 11%**, expected to increase from \$50.37B in 2026 to 84.74B in 2031<sup>6</sup>

## Key Questions for Diligence

What is the most **ideal end-product / form of packaging** (i.e., cardboard vs. plastic substitutes)?

How can the **supply chain be optimized** between multiple smallholder farms to reduce transportation costs?

Which **regions in Southeast Asia are most suitable** for investment based on volume of rice production and manufacturing maturity / capability?

Who are **critical stakeholders to engage** to create partnerships between smallholder farmers, manufacturing facilities, investors, and e-commerce companies?

Note: some companies already exist repurposing rice husks as cutlery for single-use plastic alternatives (e.g., HuskUp, Turtle Tales, etc.)

Sources

- 1. [ADB](#)
- 2. [FAO AGRIS](#)
- 3. [MDPI](#)

- 4. [USDA](#)
- 5. [Frontiers](#)
- 6. [MORDOR Intelligence](#)

# Research on Stover Removal & Crop Yield

Received: 19 August 2024 | Accepted: 19 March 2025  
DOI: 10.1002/agj2.70058

Agronomy Journal

**ORIGINAL ARTICLE**  
Agronomy, Soils, and Environmental Quality

**Stover harvest increases yield stability in continuous corn systems**

Cecilia Crespo<sup>1,2,3</sup> | Peter L. O'Brien<sup>1</sup> | Natalia Rogovska<sup>1</sup> |  
Dionisio Martinez<sup>1,2,3</sup> | Sabrina J. Ruis<sup>1</sup> | John L. Kovar<sup>1</sup>

## Key Summaries<sup>1</sup>

- 50-90% stover removal results in high corn yield and yield stability
- Yields increased 6%–15% when stover was harvested
- Stover removal increased yields and yield stability across both tillage types and biochar applications, showing it is the most important factor at this research site
- 13-year study, incorporating stover harvest may improve resilience to projected weather fluctuations

### Sources

1. [Agronomy Journal](#)
2. [Agronomy Journal](#)

Received: 3 November 2020 | Accepted: 9 May 2021 | Published online: 29 June 2021  
DOI: 10.1002/agj2.20724

Agronomy Journal

**ARTICLE**  
Agronomy, Soils, and Environmental Quality

**Science-based maize stover removal can be sustainable**

Marcio R. Nunes<sup>1</sup> | Mriganka De<sup>2</sup> | Marshall D. McDaniel<sup>3</sup> | John L. Kovar<sup>1</sup> |  
Stuart Birrell<sup>4</sup> | Douglas L. Karlen<sup>5</sup>

## Key Summaries<sup>2</sup>

- Stover harvest increased plant nutrient removal, but crop grain yields were not affected
- There was no effect on soil organic carbon, soil inorganic carbon, pH, bulk density, or cation exchange capacity
- With good soil management, crop residue harvest can be sustainable
- Another 13-year study; plant tissue and soil-test nutrient concentration effects were also minor and site-specific

# Research on Hust/Stover As Packaging Material

Received: 12 June 2024 | Revised: 2 August 2024 | Accepted: 4 August 2024  
DOI: 10.1002/pen.26930

**RESEARCH ARTICLE**

**Enhanced sustainable packaging solutions through corn stover-reinforced polypropylene biomass composites: Characterization, performance, and potential applications**

Jian-Hua Du<sup>1</sup> | Wei-Hua Yao<sup>2</sup> | Chih-Yuan Tsou<sup>3</sup> | Chin-San Wu<sup>4</sup> | Lei Meng<sup>1</sup> | Xue-Fei Hu<sup>5</sup> | Chi-Hui Tsou<sup>1,2</sup>

SPS ADVANCING PLASTICS PROFESSIONALS AND SCIENCE  
POLYMER ENGINEERING AND SCIENCE  
WILEY

## Key Summaries<sup>1</sup>

- Corn stover-reinforced polypropylene (PP) composites offer a sustainable, eco-friendly packaging option
- At 20% corn stover (CS) content, the tensile strength of the modified polypropylene (MPP) / CS composite material is about 120% higher than PP / CS composites
- Integrated study demonstrates the optimization of composite material performance through CS variables, revealing innovative potential for CS in enhancing PP and guiding the design of future sustainable packaging materials.

### Sources

1. Polymer Engineering & Science
2. Journal of Cleaner Production

Contents lists available at [ScienceDirect](#)

**Journal of Cleaner Production**

journal homepage: [www.elsevier.com/locate/jclepro](http://www.elsevier.com/locate/jclepro)

ELSEVIER

Review

Advances and prospects of corn husk as a sustainable material in composites and other technical applications

Aditi Sarker Ratna<sup>a</sup>, Anik Ghosh<sup>a</sup>, Samrat Mukhopadhyay<sup>b,\*</sup>

<sup>a</sup> National Institute of Textile Engineering and Research, University of Dhaka, Dhaka, 1000, Bangladesh  
<sup>b</sup> Department of Textile and Fibre Engineering, IIT, Delhi, 110016, India

Check for updates

## Key Summaries<sup>2</sup>

- Applications of corn husk include paper production, composites, biomedical, electronics, adsorbents, natural coloring substance, and more
- Addition of corn husk lignocellulose increases the flexural properties of polyester composites
- Corn husk's moderate strength, toughness, pliability, and durability make it viable for packaging
- Corn husk-reinforced starch films show better mechanical strength and gas barrier vs. wheat hulls
- Corn husk is a confirmed viable pulp substitute for timber in paper and paperboard production

# E-Commerce & Packaging Demand

# Sustainability Commitments & Investments

## Company

## Details



Top 3 containerboard & corrugated packaging company in North America

- Vision 2030 Aggressive Targets<sup>1</sup>
  - Source 100% of fiber from sustainably managed forests or recovered fiber
  - "Accelerate the transition to a low-carbon economy through innovative fiber-based products"
  - Advance circular solutions through value chain to create innovative products



Top 3 containerboard & corrugated packaging company in North America

- Smurfit Kappa's Sustainable and Responsible Sourcing Policy<sup>2</sup>
  - Fibrous raw materials have sustainable origin. Recycled fiber makes up 56% of primary raw materials, 45% is renewable, responsibly sourced virgin wood fiber
  - All fiber is responsibly sourced through Chain of Custody (CoC)-certified supply chain



PACKAGING CORPORATION OF AMERICA

- Sustainable Fiber Sourcing<sup>3</sup>
  - Commitment to first-use fiber and recycled fiber
  - Research & Innovation Center to develop innovated paper-based packaging products that improve sustainability



- Climate Pledge Fund: \$2B corporate venture fund
  - Circular economy is 1 of 8 investment sectors, including investment include Genecsis, climate biotech converting organic food waste into PHAs (biodegradable bioplastic)<sup>4</sup>



- Climate & Nature Fund: €1B fund, €0.7B committed through 2024<sup>5</sup>
  - Alignment on Investment value: regenerative agriculture & positive action on nature.
  - Founding partner of The Regenerative Agriculture Fund (RAF)<sup>5</sup>








- Regenerative Agriculture Emphasis<sup>6</sup>
  - 800,000 achieved out of 1,000,000 acres by 2030
  - Farmer-centered approach to offer resources in overcoming agronomic challenges
- Global Responsible Sourcing Program; Farmer-to-Farmer Mentorship Program

### Sources

1. [International Paper 2024 Sustainability Report](#)
2. [Smurfit Westrock 2024 Sustainability Report](#)
3. [PCA 2024 Sustainability Report](#)

4. [Amazon News](#)
5. [Unilever Climate & Nature Fund](#)
6. [2026 Global Responsibility Report](#)

# Restaurants and CPG companies are turning to compostable and fiber-based packaging

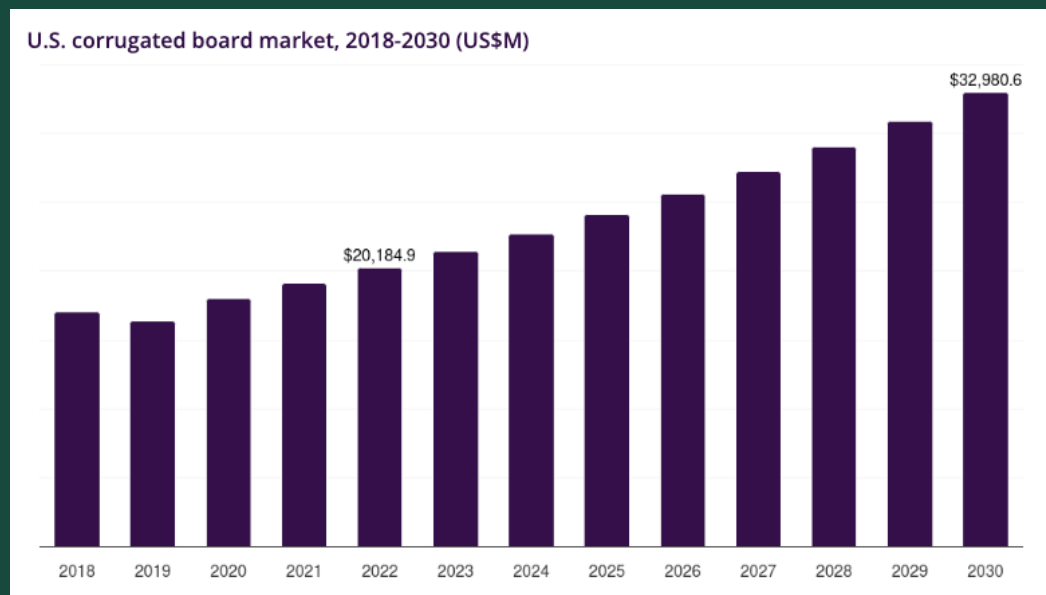
Company	Packaging Strategy	Sustainability Goal
	Uses PFAS-free molded fiber bowls	Partnership with Footprint to eliminate single-use plastic packaging <sup>1</sup>
	Plant-based fiber bowls; testing circular systems where bowls are collected for industrial composting	84% of packaging is designed to support circular economy <sup>2</sup>
	Molded fiber bowls for takeout and reusable service ware for dine-in	Prohibits supplies of packaging material from intentionally adding PFAS <sup>3</sup>
	Partnered with growPack to use corn-husk fiber	Ambev partnership with growPack for sustainable packaging from lignin & cellulose <sup>4</sup>
	Recycling commitments for both corrugated board and paperboard	98% of packaging is recyclable or recycle-ready <sup>5</sup>

Sources

1. [Footprint](#)
2. [Chipotle 2024 Sustainability Report Executive Summary](#)
3. [Cava 2025 Impact Report](#)
4. [Ambev Annual & ESG Report 2021](#)
5. [WK Kellogg Co Sustainability Report](#)

# U.S. corrugated cardboard market and North America compostable packaging market

## Cardboard



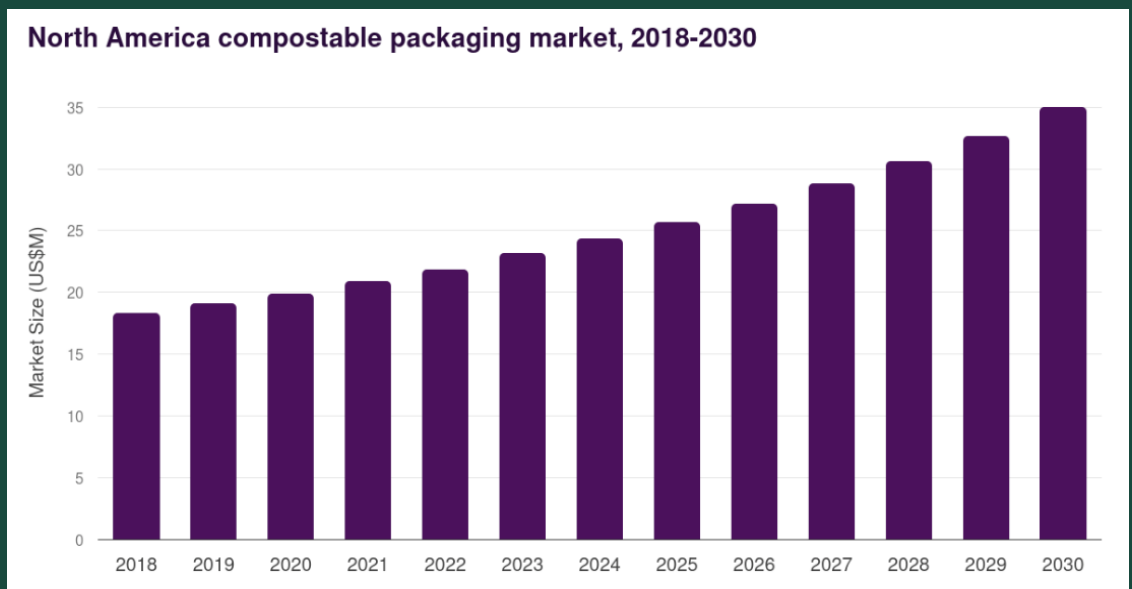
### Key stats:

- CAGR 6.3%, expected market size \$33B in 2030
- Top players: Westrock Co, International Paper Co, Georgia-Pacific, Mondi PLC
- Top applications: e-commerce shipping, food & beverage, industrial logistics

### Sources:

1. [Grand View Research](#)
2. [Grand View Research](#)

## Compostable Packaging



### Key stats:

- CAGR 6.4%, expected market size \$35M in 2030
- Top players: WestRock Co, International Paper Co, Mondi PLC, Tetra Pak
- Example materials: polylactic acid (PLA), cellulose, bamboo, wood (PLA most widely used)
- Top applications: food & beverage, pharmaceuticals, cosmetics

# Financial Model

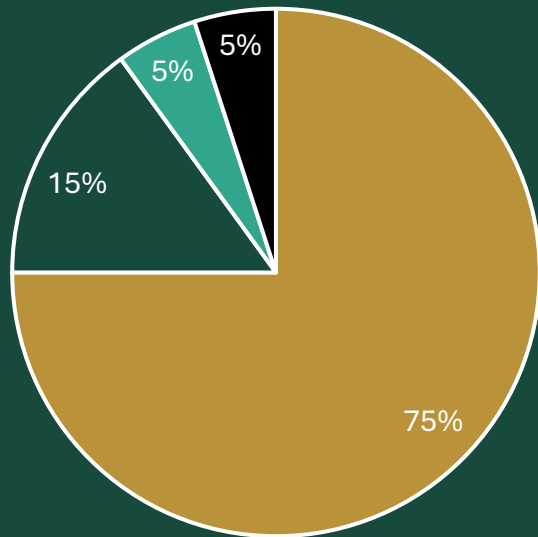
# Sensitivity Analysis – Equity IRR

		Interest Rate				
		5.08%	4.58%	4.08%	3.58%	3.08%
Plant Operating Margin	35.5%	10.14%	10.75%	11.40%	11.97%	12.56%
	40.5%	11.90%	12.44%	13.00%	13.60%	14.22%
	45.5%	13.33%	13.89%	14.48% <sup>1</sup>	15.11%	15.76%
	50.5%	14.68%	15.26%	15.88%	16.53%	17.22%
	55.5%	15.95%	16.56%	17.20%	17.87%	18.58%

1. NOTE: Difference between 14.48% shown here and 14.30% shown previously as the expected return is because the 14.48% is for the base case while the 14.30% is the weighted average of the three cases considered. The base case ONLY was used for this table because operating margin assumptions already vary between the three cases.

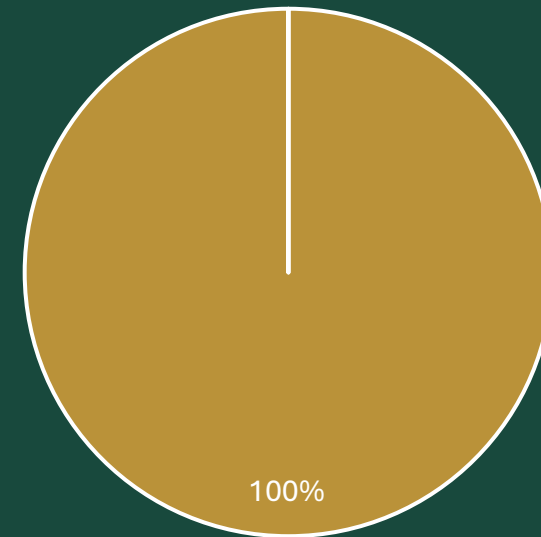
# Management Fee Uses

2% Management Fee Allocation



■ Salaries ■ Legal/Compliance ■ Travel ■ Workspace Rent

15% Carry Allocation



■ Incentives

# Potential Farmer Fund Investment SPV

Note: NOT currently included in fund mechanics or financial modeling

## SPV Structure

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**Retail Investor** friendly  
and restricted to participating farmers

**Exempt** from community fund  
and management carry contributions

**10%** maximum total contribution  
towards fund equity<sup>1</sup>

## Differences from Community Fund

### Farmer SPV

- Direct equity investor
- Personal wealth building

### Community Fund

- Passive beneficiary of fund
- Broad-based community benefits

1. If the total fund beginning equity was \$40M, the farmer SPV would max out at \$4M for the initial investment

# Traditional VC vs. Re-Husk Fund

## Traditional VC

**Early-Stage** investments

**100%** equity investments

**High** risk/return profile (20-25% expected returns)

**8-9 Year** holding period

## Re-Husk Fund

**Early-Stage** investments

**80%/20%** split between equity and debt investments

**Moderate** risk/return profile (10-15% expected returns)

**6 Year** holding period

# Exit Opportunities

## Secondaries - Likely

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- 6 year holding period
- De-risk focus of fund
- Evolving return profile
- D-SAFE comparable

## IPO - Unlikely

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- 6 year holding period
- Speed of scaling
- Manufacturing margin concerns

## Acquisition - Likely

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- Strategics
  - International Paper
  - WestRock
- E-Commerce / CPG Giants

## Re-Capitalization - Undesirable

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- Downside case
- Restructuring rather than true exit
- Significantly different investors

# Return Amplifiers

## Grant Funding

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- USDA Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP)
- EPA Smart Growth and Environmental Grants



## Business vs. Plant Returns

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- Scalability
- Efficiencies across plants
- Expansion opportunities
- Amount of leverage



## Tax Incentives

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- Qualified Opportunity Fund (QOF) designation
- New Markets Tax Credit (NMTC)



## Other Packaging

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- Paperboard
- Plastic replacements
  - Bubble wrap
  - Packing peanuts
  - Clamshell



# Financial Model WACC Calculation

Inputs	
Risk free return	4.08%
Market return	10%
Federal tax rate	25%
Cardboard asset beta	0.71
Recycled cardboard debt rating	BB - BBB

Variables	
Husk cardboard asset beta increase	0.4
Husk cardboard debt rating	BB
% grant funding	0%
% equity funding	80%
% debt funding	20%
Probability of default	10%
Loss in default (% of debt)	50%

Calculated	
Husk cardboard debt beta	0.2
Husk cardboard asset beta	1.11
Husk cardboard equity beta	1.34
Husk cardboard debt return	5.26%
Husk cardboard equity return	12.00%
Husk Cardboard Investment WACC	11.68%
Husk Cardboard Exit WACC	11.19%

# Financial Model Revenue Assumptions

Product	Price per ton	Notes
Thermoformed packaging	\$1,700	Sold to regional Third Party Logistics; sold at a premium over standard recycled pulp (\$1,100) due to Amazon-grade moisture resistance and strength
Industrial Lignin	\$700	Competitive with Kraft Lignin used in bio-resins and adhesives
Biofertilizer	\$90	Direct to farmer sales; priced at a 15-20% discount to standard organic NPK blends to ensure farmer buy-back

Product	% of Output - Year 1	% of Output - Year 2	% of Output - Year 3	% of Output - Year 4 onward
Thermoformed packaging	20%	25%	30%	40%
Industrial Lignin	0%	10%	20%	20%
Biofertilizer	60%	55%	40%	40%
Scrap loss	20%	10%	10%	0%

Plant Operations	Year 1	Year 2	Year 3	Year 4 onward
% Capacity	40%	65%	95%	95%
Output (tons)	20000	32500	47500	47500
# of employees	25	40	45	50

# Financial Model Cost Assumptions

Variable COGS	Cost per ton	Assumption
Raw materials	\$60	Covers \$40 payment to the farmer plus \$20 to replace nutrients (Source: Iowa State University Extension)
Logistics	\$45	Covers baling, staging, and diesel/trucking to transport husks to the plant within 50 miles (Source: USDA Biofuel Logistics Studies)
Variable overhead	\$55	\$0.08-0.12/kWh in the Midwest, industrial power ~\$40/ton, Process water & chemicals ~\$8 per ton, Consumable Tooling/maintenance ~\$5 per ton

Fixed COGS	Cost per FTE	Assumption
Direct Labor	\$70,000	Estimates fully burdened rate incl. \$50k wages, 10k health insurance, 4k taxes, 2k retirement, 2k liability, 2k training/PPE

Additional COGS as % of revenue	Year 1	Year 2	Year 3	Year 4 onward
SG&A	30%	18%	12%	8%
Working capital	80%	30%	20%	20%
Fleet	55%	40%	30%	17%

# Financial Model CapEx Assumptions

CapEx & Depreciation							
Facility	Component	Est. Unit Cost	Units	Qty/Size	Unit	Total Cost	Assumption Logic
Real estate & site prep	Shell purchase	65	\$/Sq.Ft	50,000	SF	\$3,250,000	Based on Midwest Industrial sale averages
	Site retrofitting	15	\$/Sq.Ft	50,000	SF	\$750,000	Concrete reinforcement, industrial drainage, 3-phase electrical
Pupling & refinement	Hydro-Pulper Line	1500000	per line	2	Line	\$3,000,000	High-capacity industrial pulpers for agricultural waste
	Cleaning/Sifting	1750000	Per system	2	System	\$3,500,000	Silica removal and automated bale de-wiring systems
Thermoforming lines	Molding machines	2250000	per line	3	Line	\$6,750,000	High-speed automatic units with integrated drying
	Custom Tooling	125000	per set	10	Set	\$1,250,000	Precision molds for specific Amazon/CPG inserts
Soft costs / EPC	EPC/Design	7.50%	of Total	n/a	Project	\$1,387,500	Engineering, procurement, and construction management fees
Contingency	Risk Reserve	10%	of Total	n/a	Project	\$1,988,750	Buffer for supply chain delays or material price increases
						\$21,876,250	<--Depreciates over 7 years based on MACRS asset class
						\$3,125,179	Depreciation per year for 7 years
Fleet							
	Price per unit	Quantity	Est. Cost	Source/Logic			
Class 8 Day Cab Trucks	\$ 185,000	6	\$ 1,110,000	2026 Kenworth T880/International LT price benchmarks			
High-volume Walking Floor Tr	\$ 95,000	12	\$ 1,140,000	48' High-volume Aluminum trailers for lightweight husks			
Industrial Telehandlers/Loade	\$ 125,000	4	\$ 500,000	10k lb capacity units (e.g., Skyjack or Bobcat)			
Commercial Baling Units	\$ 150,000	10	\$ 1,500,000	Heavy-duty stover-optimized units for field collections			
Maintenance Kit	\$ 25,000	10	\$ 250,000	Telematics, spare parts, field repair tools			
			\$ 4,500,000	<--Depreciates over 5 years based on MACRS classes			
			\$ 900,000	Depreciation per year for 5 years			

# Financial Model Income Statement Sample

<b>Income Statement</b>				
	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Revenue	\$7,880,000	\$17,696,250	\$32,585,000	\$40,660,000
-COGS	(\$4,950,000)	(\$8,000,000)	(\$10,750,000)	(\$11,100,000)
Depreciation	(\$4,025,179)	(\$4,025,179)	(\$4,025,179)	(\$4,025,179)
SGA	(\$2,364,000)	(\$3,185,325)	(\$3,910,200)	(\$3,252,800)
Fleet	(\$4,334,000)	(\$7,078,500)	(\$9,775,500)	(\$6,912,200)
Operating Profit	(\$7,793,179)	(\$4,592,754)	\$4,124,121	\$15,369,821
Debt payments	(\$41,056)	(\$41,056)	(\$41,056)	(\$41,056)
Pre-tax profit	(\$7,834,235)	(\$4,633,810)	\$4,083,065	\$15,328,765
Taxes	\$0	\$0	(\$1,020,766)	(\$3,832,191)
Net Operating Profit after tax	(\$7,834,235)	(\$4,633,810)	\$3,062,299	\$11,496,574
Depreciation	\$4,025,179	\$4,025,179	\$4,025,179	\$4,025,179
Capital Expenditures	\$0	\$0	\$0	\$0
-Change in working capital	\$ 995,125	\$ (1,208,125)	\$ (1,615,000)	\$ -
<b>FCF</b>	<b>(\$2,813,931)</b>	<b>(\$1,816,756)</b>	<b>\$5,472,478</b>	<b>\$15,521,753</b>

# Financial Model Balance Sheet Sample

<b>Balance Sheet</b>						
	Year 0	Year 1	Year 2	Year 3	Year 4	
<b>Current Assets</b>						
Cash	\$ 12,319,750	\$ 9,505,819	\$ 7,689,063	\$ 13,161,541	\$ 28,683,294	
A/R	0	0	0	0	0	
Inventory % of Revenue	80%	30%	20%	20%	20%	
Inventory	\$6,304,000	\$5,308,875	\$6,517,000	\$8,132,000	\$8,132,000	
Total current Assets	\$18,623,750	\$14,814,694	\$14,206,063	\$21,293,541	\$36,815,294	
<b>Non-current Assets</b>						
PPE	\$26,376,250	\$22,351,071	\$18,325,893	\$14,300,714	\$10,275,536	
Total non-current assets	\$26,376,250	\$22,351,071	\$18,325,893	\$14,300,714	\$10,275,536	
<b>Current liabilities</b>						
A/P	0	0	0	0	0	0
Total current liabilities	0	0	0	0	0	0
<b>Non-current liabilities</b>						
Debt	\$9,000,000.06	\$9,000,000.06	\$9,000,000.06	\$9,000,000.06	\$9,000,000.06	
Total non-current liabilities	\$9,000,000.06	\$9,000,000.06	\$9,000,000.06	\$9,000,000.06	\$9,000,000.06	
<b>Shareholder's equity</b>	\$36,000,000.24	\$28,165,765.67	\$23,531,956.09	\$26,594,255.17	\$38,090,829.24	
<b>NWC</b>	\$6,304,000	\$5,308,875	\$6,517,000	\$8,132,000	\$8,132,000	
<b>Change in NWC</b>		\$ (995,125.00)	\$ 1,208,125.00	\$ 1,615,000.00	\$ -	

# Financial Model Case Assumptions

## Upside Case

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- Industrial lignin sold at 20% premium due to supply chain and sustainability benefits
- Scale savings
  - 20% logistical cost saving
  - 10% variable overhead cost saving
  - Fleet costs reduced to 15% of revenue (from 17%)

## Downside Case

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- Thermoformed packaging sold at 20% discount to achieve market penetration
- Plant capacity scales up over 8 years (rather than 4)

# Total Fund Returns

<u>Fund Equity Returns</u>			
	Base Case	Upside Case	Downside Case
Year 0	\$ (8,000,000)	\$ (8,000,000)	\$ (8,000,000)
Year 1	0	0	0
Year 2	0	0	0
Year 3	0	0	0
Year 4	0	0	0
Year 5	0	0	0
Year 6	\$19,596,671.49	\$24,480,359.65	\$14,296,793.76
IRR	16.10%	20.49%	10.16%
Weight	70%	15%	15%
<b>Weighted Avg</b>	<b>15.87%</b>		

# Community Fund Returns

<b>Community Fund Returns</b>			
Assumption: Beyond 10% return, community fund gets 15% of the excess return			
Year 0	\$	(8,000,000)	
Year 1		0	
Year 2		0	
Year 3		0	
Year 4		0	
Year 5		0	
Year 6	\$	14,172,499	
IRR		10.00%	
		<b>Base Case</b>	<b>Upside Case</b>
Fund Equity Cashflow	\$	19,596,671.49	24,480,359.65
Baseline (10% return)	\$	14,172,499.44	14,172,499.44
Community Fund Cashflow		\$813,625.81	\$1,546,179.03
Weight		70%	15%
<b>Weighted Avg</b>	<b>\$</b>	<b>804,261.54</b>	

# Management Returns

<b>Management Returns</b>			
<b>Assumption: 2% Management Fee + 15% on returns in excess of 12%</b>			
Year 0	\$	(8,000,000)	
Year 1		0	
Year 2		0	
Year 3		0	
Year 4		0	
Year 5		0	
Year 6	\$	15,790,594	
IRR		12.00%	
		<b>Base Case</b>	<b>Upside Case</b> <b>Downside Case</b>
Fund Equity Cashflow	\$	19,596,671.49	\$ 24,480,359.65      \$ 14,296,793.76
Baseline (12% return)	\$	15,790,594.23	\$ 15,790,594.23      \$ 15,790,594.23
Management Cashflow		\$770,911.59	\$1,503,464.81      \$200,000.00
Weight		70%	15%      15%
<b>Weighted Avg</b>	<b>\$</b>	<b>795,157.83</b>	

# Equity Investor Returns

<b>Equity Investor Cashflows</b>			
	<b>Base Case</b>	<b>Upside Case</b>	<b>Downside Case</b>
Fund Equity Cashflow	\$19,596,671.49	\$24,480,359.65	\$14,296,793.76
Community Fund Cashflow	\$813,625.81	\$1,546,179.03	\$18,644.15
Management Cashflow	\$770,911.59	\$1,503,464.81	\$200,000.00
<b>Equity Investor Cashflow</b>	<b>\$18,012,134.09</b>	<b>\$21,430,715.80</b>	<b>\$14,078,149.61</b>
Year 0	\$ (8,000,000)	\$ (8,000,000)	\$ (8,000,000)
Year 1	0	0	0
Year 2	0	0	0
Year 3	0	0	0
Year 4	0	0	0
Year 5	0	0	0
Year 6	\$18,012,134.09	\$21,430,715.80	\$14,078,149.61
IRR	14.48%	17.85%	9.88%
Weight	70%	15%	15%
<b>Weighted Avg</b>	<b>14.30%</b>		

# Farmer Impact Calculations

<b>Farmer Impact</b>			
	<b>Base case</b>	<b>Upside Case</b>	<b>Downside Case</b>
Total Farmer Revenue	\$ 93,300,000.00	\$ 93,300,000.00	\$ 90,100,000.00
Total Discounted Fertilizer Savings	\$ 14,956,975.00	\$ 14,956,975.00	\$ 14,403,160.00
Weight	70%	15%	15%
<b>Total Expected Farmer Revenue</b>	<b>\$ 92,820,000.00</b>		
<b>Total Expected Fertilizer Savings</b>	<b>\$ 14,873,902.75</b>		
Lifetime (Years)		50	
Avg Farmer Revenue (per year)	\$ 1,856,400.00		
Avg Fertilizer Savings (per year)	\$ 297,478.06		
Fund % Project Ownership		20%	
Investment Length (years)		6	
Fund Farmer Revenue (per project)	\$ 2,227,680.00		
Fund Fertilizer Savings (per project)	\$ 356,973.67		
Number of Projects Invested In		5	
Total Fund Farmer Revenue	\$ 11,138,400.00		
Total Fund Fertilizer Savings	\$ 1,784,868.33		
<b>Total Fund Farmer Impact</b>	<b>\$ 12,923,268.33</b>		