



# GRAIN



**YOUR WASTE  
IS WORTH IT**

# FROM COST TO PROFIT

How one lumber mill plans to transform \$3m in waste fees into \$5m in biochar & carbon revenue

THE CHALLENGE: RISING WASTE DISPOSAL COSTS & LOST REVENUE.

Like many mills, this operation faced increasing costs to dispose of wood residuals, with tipping fees cutting into margins (the average tipping fee for wood was \$60,34/tonne in the U.S in 2022\*). Regulatory pressures were also tightening, making landfill disposal a growing liability.

THE SOLUTION: TURNING WASTE INTO VALUE

Rather than paying for waste disposal, the mill installed a biochar production system that converts wood waste and offcuts into a high-value soil amendment and carbon removal product.

HOW IT WORKS

**Biochar production:** The mill processes wood waste into biochar, an in-demand product for agriculture, concrete, and soil restoration.

**Carbon credit sales:** By sequestering carbon through biochar production, the mill generates verifiable carbon removal credits, which can be sold on voluntary carbon markets.

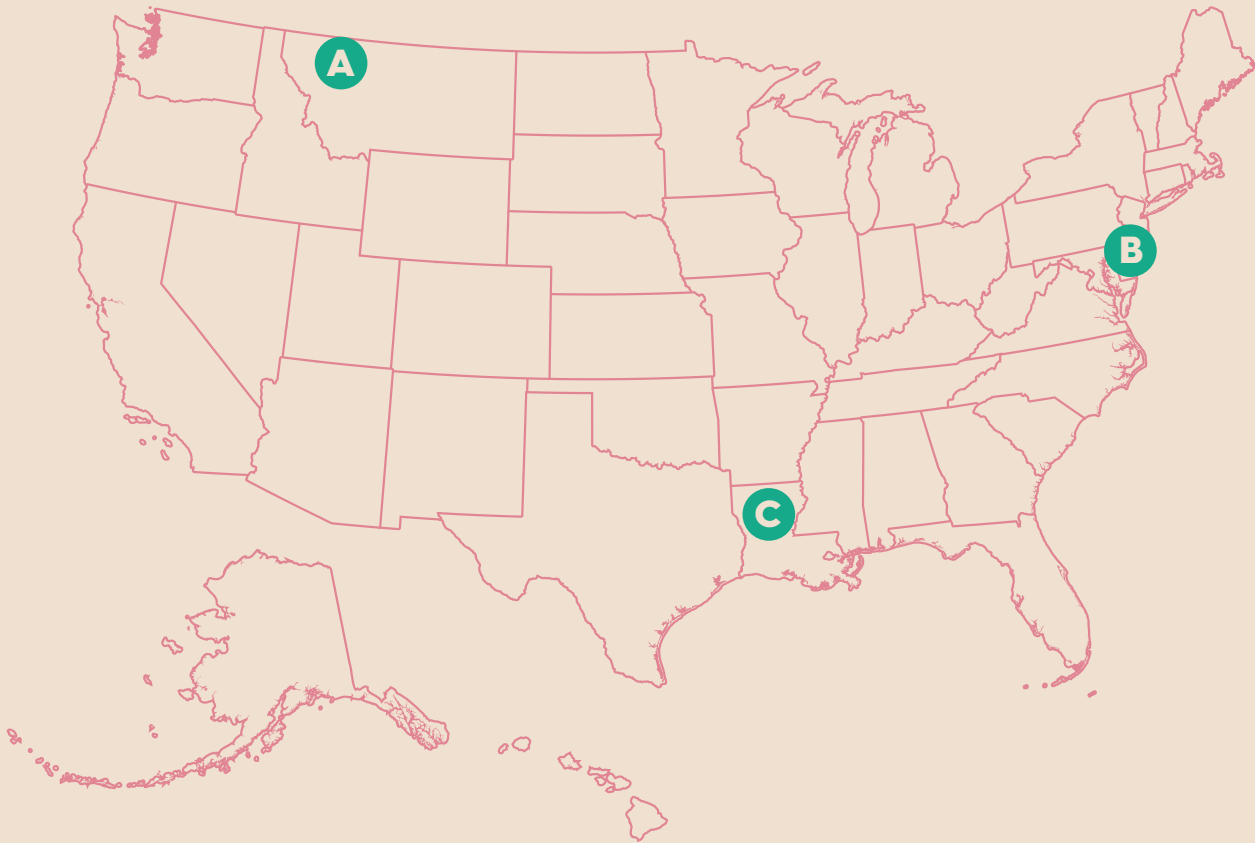
**New revenue model:** The combined biochar sales and carbon credit income creates a new profit center—without disrupting existing operations.

PROJECT A  
SAWMILL

70,000 tonnes of feedstock/year  
16,000 tonnes of biochar/year  
34,000 credits/year  
IRR: 26%

PROJECT B  
WOOD PALLET FACTORY

15,000 tonnes of feedstock/year  
7,000 tonnes of biochar/year  
17,000 credits/year  
IRR: 32%



PROJECT C  
SUGAR MILL

29,000 tonnes of feedstock/year  
10,000 tonnes of biochar/year  
14,000 credits/year  
IRR: 51%

KEY TAKEAWAYS  
FOR OTHER LUMBER  
MILLS

Waste isn't just a cost—it's a revenue opportunity. Carbon credits make biochar even more profitable. Modern biochar systems are scalable & easy to integrate.

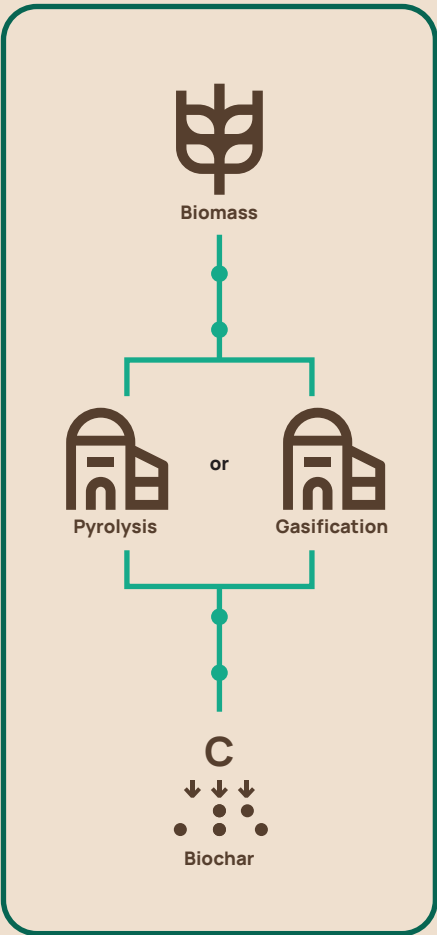
THE RESULTS:  
\$5M IN NEW REVENUE & ZERO WASTE COSTS.

# WHAT IS BIOCHAR?

Biochar is a stable form of carbon made by heating organic materials in a low-oxygen environment.

**PYROLYSIS**  
A process where biomass is heated to high temperatures in the absence of oxygen, causing it to chemically decompose. This process converts the biomass into solid carbon (biochar).

**CARBON SEQUESTRATION**  
The carbon in the biomass, which was absorbed from the atmosphere during the life of the living organism, gets locked into the biochar. This process of capturing and storing atmospheric carbon dioxide is called 'carbon sequestration'.



**BIOMASS**  
Biogenic material that is produced by living organisms. For example, crops and agricultural residues, forestry by-products, manure and other animal wastes, fruit seeds and stones, nut shells, and wood industry waste.

**GASIFICATION**  
A process where biomass is converted into syngas (synthesis gas) at high temperatures without combustion, in the presence of a controlled amount of oxygen or steam. Biochar is a byproduct of this process.

## BIOCHAR IS CREATED THROUGH THE PYROLYSIS OR GASIFICATION OF BIOMASS.



### BIOCHAR CARBON REMOVAL IS AMONG THE MOST DURABLE CARBON DIOXIDE REMOVAL (CDR) TECHNOLOGIES CURRENTLY AVAILABLE

Estimates of biochar’s permanence, or the duration that its carbon content is retained, vary, often approximating around a thousand years. However, recent studies\* indicate that under specific conditions, biochar could take approximately 100 million years to degrade and lose half of its carbon content.

### → USES FOR BIOCHAR



Agriculture



Construction



Water Filtration



Industrial uses

### → WHY IS BIOCHAR A SMART INVESTMENT?

- Biochar solves a waste problem by removing the need for disposal.
- It creates a material that is useful in different industries.
- Biochar carbon credits are in high demand given their level of permanence and scarcity, trading for upwards of \$140 per tonne of CO2\*.



ARTICLE

# FEEDSTOCK SOURCING & ELIGIBILITY

Biochar is created from biomass, which consists of biogenic materials (coming directly from living organisms). What kind of waste can you turn into biochar?

Selecting the right feedstock for biochar production is essential, as it directly impacts the biochar’s quality, stability, and environmental footprint. Key characteristics—such as carbon sequestration potential, surface area, water-holding capacity, mineral composition, and ash content—are shaped by the feedstock itself. However, the final biochar composition depends not only on the biomass type but also on production conditions, including the temperature and duration of processing. For example, biochar stability is strongly influenced by the temperature used. While feedstock selection provides a good indication of the biochar’s properties, each batch should be tested to confirm its specific characteristics.

To be considered sustainable and eligible for Grain, biochar feedstock must primarily consist of waste materials or residues/byproducts from other production processes. Purpose-grown feedstock exclusively for biochar production is not permitted, ensuring that biochar does not compete with critical land uses such as food production.

Knowing which feedstock you have available and ensuring that it is waste based is a key step in choosing the right methodology, but it’s not the only factor in determining eligibility. Other important considerations include the assumed business-as-usual fate of the feedstock if it is not used for biochar, specific environmental safeguards, transportation, storage, production type, pre-processing steps, and the intended end-use of the biochar .

## TYPES OF FEEDSTOCKS FOR BIOCHAR PRODUCTION

Here are some types of feedstock accepted across all methodologies, along with examples.

### AGRICULTURAL WASTE

Byproducts of farming operations, including crop waste and leftover plant material.

Examples: Crop residues like straw, corn stover, nut shells, rice husks, and cotton stalks. Harvest residues, orchard, vineyard, woody biomass pruning, orchard/vineyard renewal clearings, fruit and vegetable residues, sugar cane bioproducts (bagasse).

### FORESTRY/WOOD RESIDUES

These include non-commercial wood and byproducts from lumber or paper production.

Examples: Sawdust, tree bark, wood chips, branches from thinning operations, and pruned limbs. Agroforestry and rangelands management woody biomass waste, residues from harvesting or forest management activities, including fuel reduction or pest management activities. Wood processing byproducts.

### ANIMAL MANURE

Animal manure and byproducts of animal production systems consists of feces, urine, and potentially animal bedding materials.

Examples: Poultry litter, cattle manure, horse manure, swine manure.

### ALGAE OR WASTE AQUACULTURE PLANTS

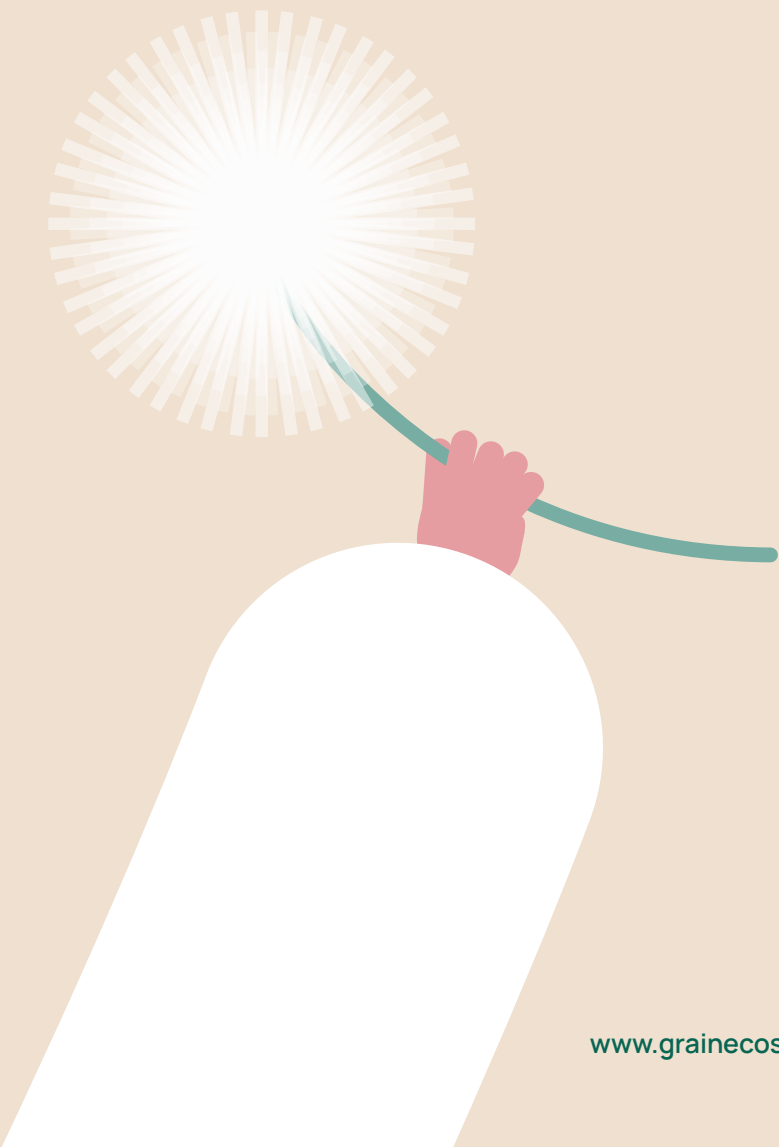
Algae are a diverse group of simple, plant-like organisms that range from single-celled microalgae to large multicellular forms like seaweed. Waste aquaculture plants refer to plant material that is a byproduct of aquaculture operations.

Examples: Seaweed, waste algae, aquatic invasive species. Screenings, floating debris, mowed materials.

### FOOD PROCESSING WASTE

Food processing by-products, residues and other waste biomass from food processing operations.

Examples: Material from washing, cleaning, peeling, centrifugation, and separation processes. Fruit and vegetable peels, pomace, kernels, husks, tobacco dust, tea and coffee grounds. Expired food residues.



FEEDSTOCK ELIGIBILITY IN CARBON REMOVAL STANDARDS

Standards serve an essential role in the Voluntary Carbon Market (VCM): they establish the requirements for quantifying the carbon impact of carbon projects. To generate carbon credits in a VCM, every project is required to be listed and registered with one of the existent certifying/standards bodies. ICROA, or the International Carbon Reduction and Offset Alliance, is an organization that represents businesses engaged in voluntary carbon offsetting. It acts as a global alliance of leading environmental and carbon market companies and plays a significant role in the VCM by providing guidelines and frameworks for carbon offsetting.

At Grain, we work with the four established biochar methodologies: Verra Verified Carbon Standard (VCS), Puro.Earth, Climate Action Reserve (CAR), and

Isometric. We continuously seek new solutions and remain open to incorporating additional methodologies, provided they meet the appropriate standards.

The standards have several differences, including certain requirements around feedstock. For example, Puro.Earth requires feedstock to be entirely biogenic material, whereas Verra VCS allows feedstock to contain up to 1% non-biogenic material—or up to 10% if the biochar is not intended for soil or agricultural use. Most importantly, each methodology accepts different types of biomass as feedstock. Therefore, when deciding which methodology to use, the type of waste available is a crucial consideration.

	CAR	Puro.Earth	Verra VCS	Isometric
Agriculture residues	Yes	Yes	Yes	Yes
Anaerobic digestion	Yes	Yes	No	Sometimes
Food processing residues	Yes	Yes	Yes	Sometimes
Forestry and other wood processing	Yes	Yes	Yes	Yes
Aquaculture plants	Yes	Yes	Yes	No
Animal manure	Yes	Yes	Yes	Yes
Other animal “by-products” (such as bones)	No	Yes	No	Sometimes
Recycling economy or urban waste	Yes	Yes	Yes	No
Herbaceous feedstock	No	Yes	No	Sometimes
Biosolids (paper sludge, sewage sludge)	Yes	Yes	Yes	No
Kitchen and canteen organic waste	Yes	Yes	No	No
Textiles	No	Yes	No	Sometimes
Other industrial biomass residues	No	No	No	Yes
High-carbon fly ash from biomass	No	No	Yes	Sometimes

FIND A MORE IN-DEPTH ARTICLE ON FEEDSTOCK SOURCING AND ELIGIBILITY, ALONG WITH MORE CONTENT, AT [GRAINECOSYSTEM.COM](#)



# THE GRAIN PLATFORM

## How does it work?



**YOUR FEEDSTOCK IS ELIGIBLE—NOW IT’S TIME TO ENGAGE**

Once you've confirmed that your feedstock qualifies for biochar production, the next step is turning that potential into a profitable, sustainable project.

At Grain Ecosystem, we streamline the biochar development process, empowering you to transform agricultural and industrial by-products—or other biomass—into high-quality, carbon-rich biochar. This not only sequesters emissions but also creates new revenue streams for your business.

**HOW DOES IT WORK?**

Our platform is built specifically to support businesses like yours, integrating carbon analysis, project modeling, and financial optimization into one seamless experience. We eliminate complexity by programming eligibility criteria, carbon accounting requirements, and financial modeling directly into the platform so you don't have to navigate the intricate details alone.

With an interactive, gamified approach to project design, you'll gain a clear and holistic understanding of your operations and how biochar and carbon credits can enhance your bottom line.

**WHAT’S YOUR CHALLENGE?**

You generate organic waste—agricultural residues, wood industry by-products, manure, or other biomass—but managing it sustainably and profitably is a challenge.

The carbon market is notoriously complex, often requiring:

- Costly consultants and feasibility studies
- Extensive documentation and bureaucratic hurdles
- Lengthy approval processes that stall projects before they even begin

**YOUR SOLUTION: A COMPLETE BIOCHAR & CARBON MANAGEMENT PLATFORM**

Grain Ecosystem simplifies every step of the process—from eligibility assessment to implementation and monetization—so you can focus on growing your business, not managing red tape.

**HERE’S HOW WE HELP:**

1. **Instant Eligibility Checks** – Quickly determine if your waste qualifies for biochar production and carbon credits.
2. **Investment & Equipment Matching** – Get connected to the right technology and funding partners to scale your operations.
3. **End-to-End Project Support** – We guide you through feasibility studies, documentation, and project registration, ensuring you reach the market successfully.
4. **Seamless Carbon Credit Management** – Digitized monitoring with expert support for reporting and verification, helping you get paid faster for your carbon storage.

**GRAIN: YOUR ONE-STOP PLATFORM**

Beyond project execution, Grain is your connection point to the entire biochar ecosystem—bringing together investors, producers, and manufacturers in one integrated marketplace. Whether you need technology evaluation, funding strategies, or revenue protections, we provide the tools to turn your waste challenge into a long-term profitable solution.

By becoming a Grain Member, you don't just launch a biochar project—you join an entire community dedicated to sustainable and profitable business practices. Everything you need, all in one place.

**READY TO GET STARTED?**

Your waste isn't just a by-product—it's an untapped opportunity. Let's turn it into a profitable, sustainable business today.

**WITH THE GOAL OF ACCELERATING TIMELINES, GRAIN PROVIDES PRODUCERS WITH THE HUMAN AND TECHNOLOGICAL RESOURCES TO PROGRESS YOUR PROJECTS FROM AN IDEA TO AN INVESTMENT.**

CREATE YOUR OPPORTUNITY

DESIGN

- Carbon Eligibility
- Equipment Matcher
- Greenhouse Gas Calculator
- Return on Investment Calculator
- Investor Matcher



BUILD

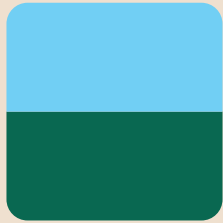
- Carbon Credit Compliance
- Registry Documentation
- Monitoring Software
- Data Processing
- Reporting
- Verification Support



OPERATE

AT SCALE

- Multi-Site Monitoring
- Portfolio Management
- Customized Analytics
- Bulk Project Registration



GRAIN



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