



NEWTRIENT SNAPSHOT

Biomass Controls PBC

Pyrolysis Technology



BUSINESS OVERVIEW

Since 2016, Biomass Controls PBC has provided innovative thermal technologies to address modern challenges in sanitation, agricultural, and food output sectors through pathogen treatment, greenhouse gas (GHG) reduction, carbon sequestration, and soil health improvements. Focusing on decentralized, community scale implementations, Biomass Controls provides rapid nutrient recovery and treatment of high moisture biogenic resources such as manure, textiles, food, and excreta.

PROJECT

TECHNOLOGY OVERVIEW

Biomass Controls' pyrolysis technology utilizes moderately high temperatures, typically ranging from 570-1,290° F, to heat dairy manure solids in an oxygen-limited reactor. Without the presence of oxygen, the solids do not combust; instead, the chemical compounds in the manure break down into (1) combustible gas, (2) condensable vapors (bio-oil/tars), and (3) biochar, a valuable soil amendment rich in nutrients and high in carbon. The gas/vapors are used in the system to provide process heat.

PROJECT SIZE

While commercial installations are currently unavailable in the U.S., a study at a New York dairy with 2,000 cows and 1,800 heifers used a pilot system to better understand the Biomass Controls pyrolysis system. The volume of separated solids going into the system was reduced to match the scaled-down pilot unit. Solids with 65%-75% moisture were stored in a hopper and dried to 25%-40% moisture in a drying auger via heat from the pyrolysis unit with a prototype hydronic jacket, after which they were fed into the pyrolysis chamber. Pyrolysis requires about 10 minutes to process the manure solids into biochar.

REQUIREMENTS

To prevent high-moisture solids from entering the system, dairy manure must undergo solid-liquid separation such as a screw press as a pretreatment step for the pyrolysis unit. If sand bedding is used, sand must be removed prior to solid-liquid separation to maintain system energy balance and improve the carbon content of the biochar produced. Farms should provide covered space for the biochar product, as well as the pyrolysis chamber, to protect them from adverse weather. Continuous monitoring, maintenance, and record keeping, along with thorough training and safety protocols, support seamless operation.

KEY CALL-OUTS



Soil Amendment: Nutrient-rich biochar can be used with fertilizer mainly from carbon, phosphorus, potassium, calcium, and magnesium.



Runoff Prevention: Slow-release, partitioned nutrients can reduce runoff risk when paired with adequate nutrient planning and erosion control.



Decreased Manure Handling Costs: Significant reductions in manure volume and mass lower the costs associated with storage and transport.



Odor and GHG Mitigation: Rerouting solids from anaerobic storage prevents the generation of GHGs and odors.

Findings are based on an evaluation conducted under a Conservation Innovation Grant awarded to Newtrient. To view a more detailed description of these results, visit the Biomass Controls Pyrolysis Technology Evaluation Summary on the [Newtrient website](#).

FINANCIAL OVERVIEW



CAPITAL INVESTMENT & OPERATIONAL COSTS

As of 2025, Biomass Controls only leases its equipment. The cost to lease a pyrolysis unit, including maintenance costs, is approximately \$10,000 per month and if a dryer is added, the cost increases to \$15,000 per month. Operating costs are expected to be low, encompassing electricity and internet connection, as the system can provide its own energy if the feedstock is sufficiently dry and has a high energy content.



DOWNSTREAM BENEFITS

Markets for biochar are emerging and regionally variable. Higher-value outlets may require consistent quality specifications and documentation. Biochar can be used as a fertilizer and soil amendment for crop production, reducing the reliance on commercial fertilizers and promoting a closed-loop system. During pyrolysis, manure undergoes substantial reductions to its mass and volume, resulting in decreased hauling and transportation costs.

ENVIRONMENTAL IMPACTS

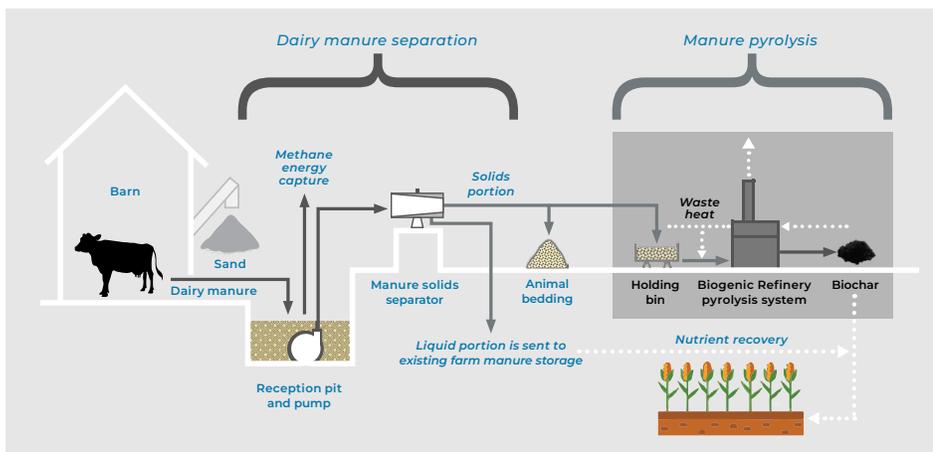
WATER QUALITY

Nutrient partitioning achieved through pyrolysis, particularly for phosphorus, during biochar production minimizes the risk for potential runoff events into surrounding surface waters. Functioning as a slow-release fertilizer, biochar gradually provides nutrients to plants, further reducing the likelihood of excess nutrient losses through runoff.

SOIL HEALTH

Biochar acts as a stable, nutrient-rich soil amendment, containing partitioned nutrients such as carbon, nitrogen, potassium, and phosphorus. Its addition to soil can enhance soil properties by improving nutrient retention, water holding capacity, and soil structure. The enhancement of these properties is particularly valuable in nutrient poor soils where biochar can build soil health and improve crop productivity. Providing a stable form of carbon to the soil contributes to long-term carbon sequestration.

Biomass Controls Dairy Manure Pyrolysis System (Adapted¹)



REFERENCES: ¹ Biomass Controls (2025). <https://biomasscontrols.com/project-products/>

NEWTRIENT'S 9-POINT TECHNOLOGY SCORING

For Biomass Controls Pyrolysis Technology

Visit the **Biomass Controls Pyrolysis Technology** page in Newtrient's Solutions Catalog



Each solution can earn up to nine points, one for each criterion. Colored numbers indicate fulfilled criteria.

- 1 | Operational History
- 2 | Operational Reliability
- 3 | Market Penetration
- 4 | Capital Cost
- 5 | Operations & Maintenance Cost
- 6 | Value Proposition
- 7 | Vendor Information Sharing
- 8 | Case Study
- 9 | Funding Availability

Discover Newtrient's technology evaluation process: [Learn more about Newtrient's 9-Point Technology Scoring System.](#)



Newtrient's mission is to reduce the environmental footprint of dairy while making it economically viable to do so.

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