

AgriLab Technologies, LLP

Heat Capture and Transfer from Aerobic Composting

Renewable Energy from Aerobic Composting

- HEAT is the target !

We have developed systems for extraction of thermal energy from aerobic decomposition.

AgriLab has successfully completed two major installations of systems in New England on specialized livestock operations.

Systems are designed for heat transfer efficiency, ease of use, safety, cost effectiveness to construct & operate.

IsoBars: Super Thermal Conductors

- IsoBars are evacuated two phase heat exchangers made from 2.5 “ or 3” stainless steel, sealed at each end and charged with a working fluid.
- Heat applied to the IsoBar at any specific point is immediately transferred to the entire surface area of the IsoBar, regardless of length.
- IsoBars are “ganged” together in groups of typically 6-12 and housed within a heavily insulated jacket.
- The IsoBar assembly is positioned to capture the steam vapor generated by the aerobic process.

IsoBars: Super Thermal Conductors



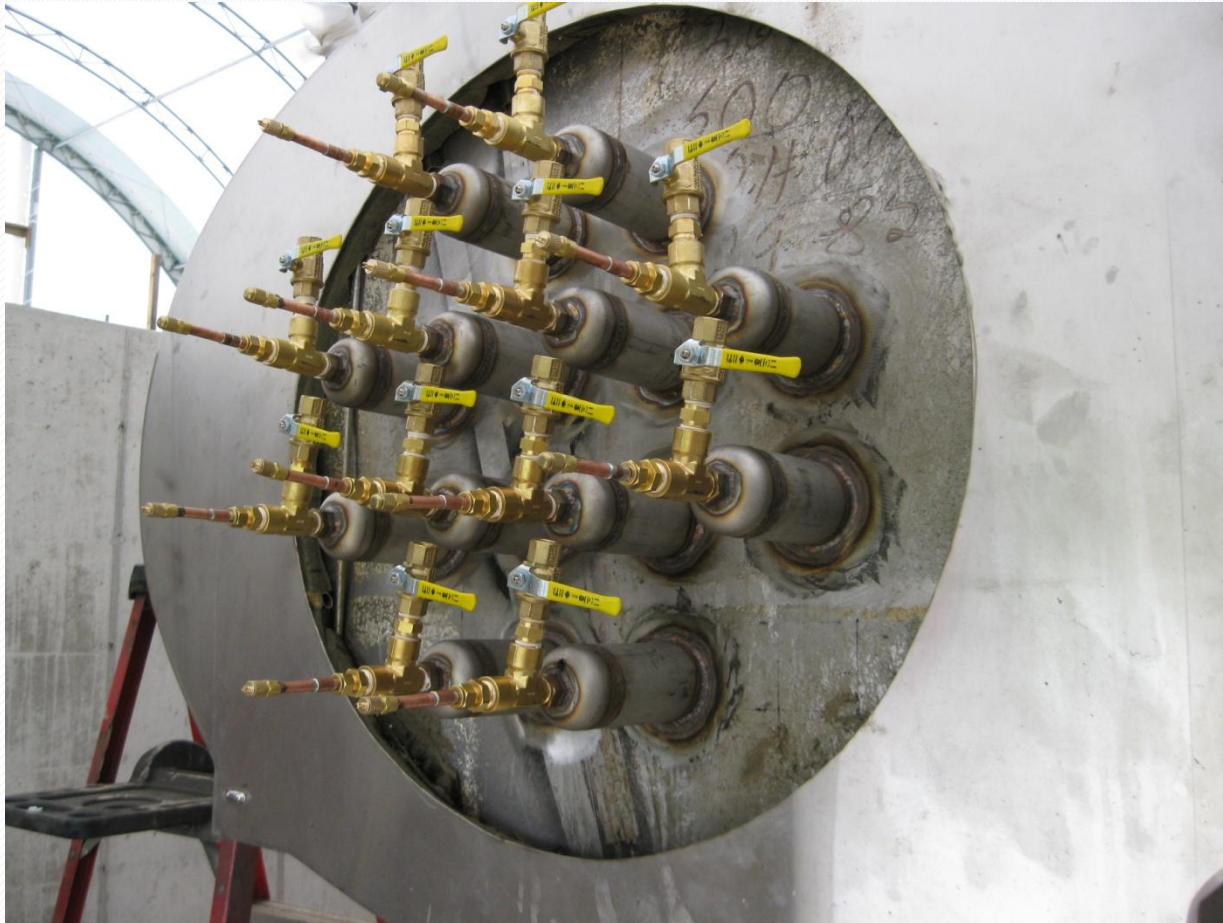
The AgriLab Process

- IsoBars are isothermal devices working constantly to achieve uniform temperatures on their surface as a result of the heat source.
- A portion of the IsoBar array is welded or sealed into a water jacket. This is referred to as the “pre-heater”.
- As hot water vapor is drawn across and condenses on the IsoBar, heat is immediately captured and dispersed across the surface area.
- The IsoBar section sealed in the “pre-heater” transfers the heat from the IsoBar to the water reservoir.

Pre-Heater Water Jacket

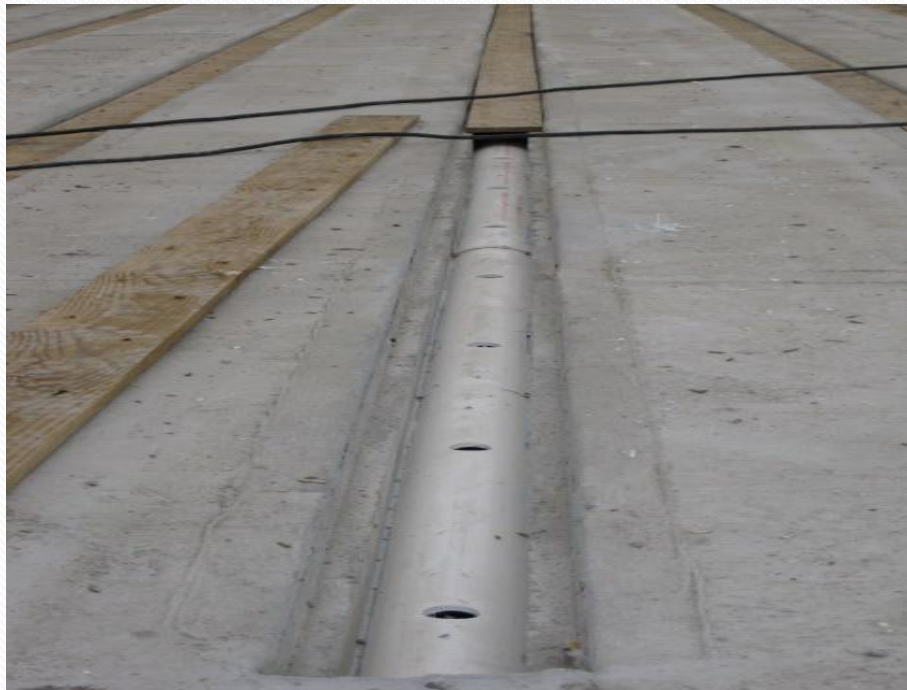


Pre-Heater Water Jacket



Negative Aeration is Key!

- We specially design an insulated composting pad floor which has air channels positioned 2' on center, running the length of the pad floor.



Composting Pad floor



Insulated Floors



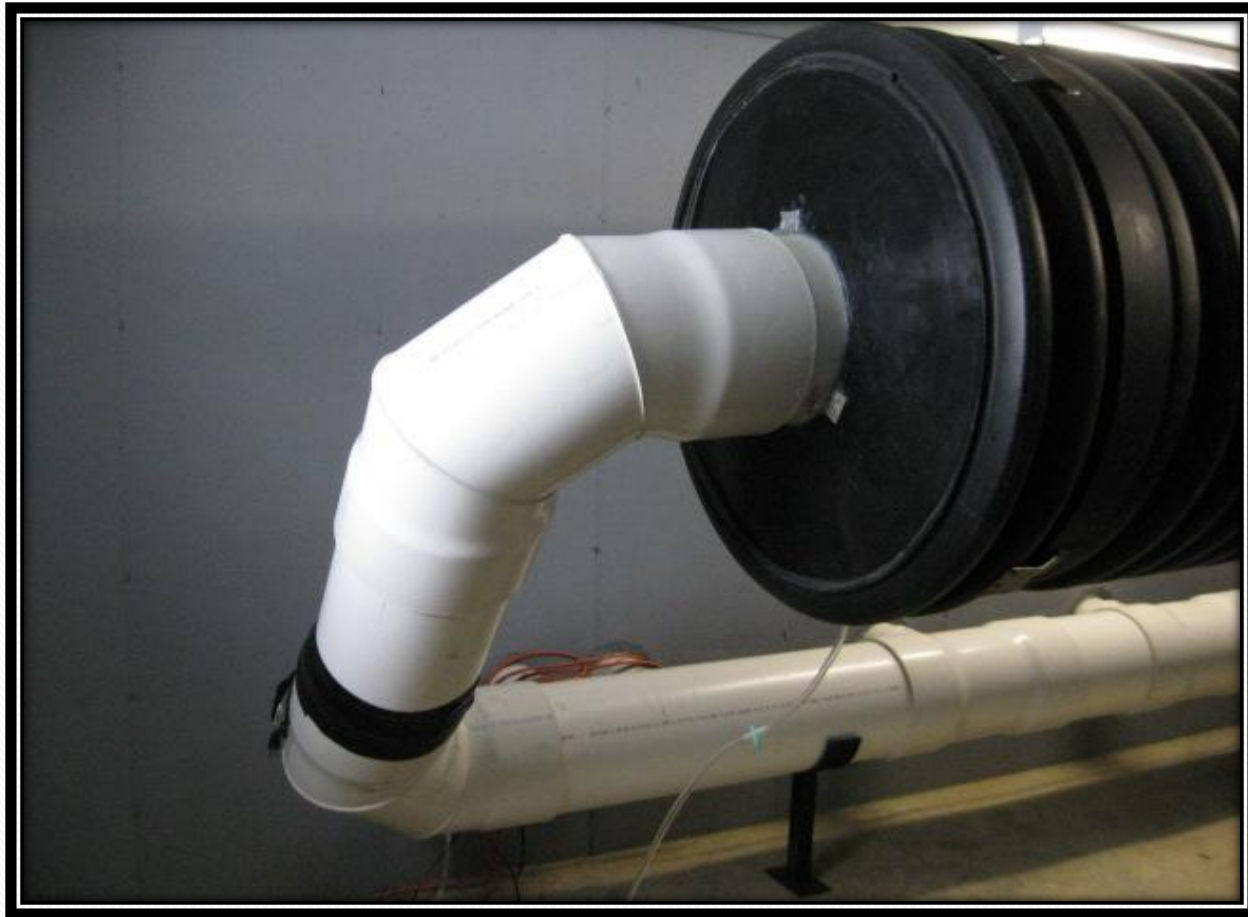
Good Aeration down through the Pad Floor



Heat Capture Process



Drawn Air: $\frac{1}{4}$ hp In-line Blower



Timed & Controlled Air Flow

- Compost Pad Floor is divided into 4 Zones.
- Air ducts from Pad have in-line dampers to control and regulate air flow.
- Timers are set to optimize aeration of the feedstock for high microbial activity and heat generation.



Zone Monitoring & Tracking

- We use Data Loggers made by Reo-Temp.
- One data logger is placed on each zone of the intake from the pad floor.
- Information is downloaded into a program developed by Green Mountain Technologies.



Insulation for Thermal Retention

- The entire IsoBar array is insulated to maximize heat retention and reduce external condensation,



Air Flow & Exhaust Venting

- As air is pulled off the compost pad floor and pushed through the IsoBar array, an exhaust stack is positioned adjacent to the pre-heater, insuring the steam vapor from the compost is pulled across the entire array.



Hot Water

- This facility uses an average of 10,000 gallons of hot water daily for calf ration preparation, pail washing, equipment, truck and trailer sanitizing and building heating needs offsetting propane, diesel and electric use.



Water Temperatures

- The Agrilab system has been able to maintain tank temperatures of 130F.
- This is an ideal temperature for daily use.
- Temperatures can be bumped up using a hot water tank if needed.
- Well water temperatures average 50F.
- A bleeder valve is used to cool the mix if needed.
- Water Temperature recharge is continuous.
- Highest demand for hot water is morning, insuring maximum overnight recharge.

Heat Capture

- We have successfully demonstrated and documented the technologies ability to capture an average of 1000 BTU/ton of feedstock/hour.
- The Sunset View farm was designed to manage 500 yards feedstock/week.
- This works out to approximately 190,000 BTU per hour.
- In excess of 4,000,000 BTU per day.
- Heat can be moved with a loss of 1 F / 100' pipe.

IsoBar Heat Capture Applications

- Greenhouse Heating
- Aquaculture Operations
- Space Heating
- Washing Systems
- Slaughterhouse facilities who use large volumes of hot water for washdown.
- Fruit and Produce Processing facilities
- Poultry facilities needing to warm air prior to introduction to houses.
- Equestrian facilities can use heat for arenas, wash bays & facility rooms.
- Swine operations

Isobar Heat Capture Applications

- **Rotary Drum Systems**
 - Isobar arrays can be coupled to stationary rotary drum units at the exhaust stack.
 - Captured heat can be used as needed.
- **In-Vessel Operations**
 - Potential is there to capture heat from existing systems where the IsoBar array can be positioned between the air exhaust and Bio-filters.

IsoBar Heat Capture Applications

- Anaerobic Digesters
- IsoBar technology has two primary benefits if coupled with an AD system.
 - 1. Digestate can be aerobically managed to reduce odor issues.
 - 2. Captured heat can be used to run a heating loop through the main digester to insure proper heating of material in the reactor vessel.

Benefits of In-Vessel Management

- A 30-40% reduction in fuel, man-hour and equipment related expenses since feedstock is static but aerated via negative aeration.
- Reduction of weather related challenges such as snow, rain or drought.
- Excellent leachate control.
- Reduced operation footprint.
- Better odor control
- Very Easy to manage
- No methane gas and health risks for workers.
- Cost effective to operate.
- Cost effective to acquire.
- Reduction of existing dependence on propane, diesel and grid based energy.

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