

Compost Aeration and Heat Recovery Project

AgriLab Technologies Hot Skid 250R at Collins Powder Hill Farm



PHOTO CREDIT JACK COLLINS

Left: Jack and John Collins set up and review AGT Hot Skid 250R components and controls during the installation phase with Ryan Koloski, AGT staff. The farm team led site construction with some technical support. **Right,** John Collins unloading compost around aeration pipes. Jack Collins described the breakdown of wood shavings in the compost as achieving in 3–6 months what has previously taken about 2 years. This can be explained through the increased aeration that introduces more oxygen and speeds decomposition compared to traditional turned windrow composting practices.

Compost Aeration and Heat Recovery (CAHR) has been implemented using the AgriLab Technologies Inc. (AGT) Hot Skid 250R. The unit is plug and play equipment consisting of mechanical aeration, heat recovery, plumbing, monitoring, and control components along with the site improvements of a compacted working pad, concrete push wall and insulated ductwork.

The system was installed at Collins Powder Hill Farm in Enfield, CT administered by Connecticut RC&D's Connecticut Farm Energy Program and made possible by funds from the Connecticut Department of Energy and Environmental Protection and the U.S. Department of Energy.

This summary includes energy implications, operating observations and key findings from July 2017 through July 2018, as explained in further detail in the September 2018 Final Report.

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Compost Aeration and Heat Recovery units are modular and service medium to large farms, commercial and institutional compost operations.



Renewable Energy Generating Capacity and Compost Process Efficiency

Key findings to date

- Rapid achievement of thermophilic conditions (131+ F temperatures) have been observed which accelerates the composting process of farm manure, animal bedding and other carbon-rich biomass amendments.
- Compost mixtures that previously took two years to achieve maturity were processed for sale or on-farm land application in three to six months. This accelerated compost sales revenues in spring 2018 by approximately \$21,600.
- The changes in operating practices have saved the farm 1,400 gallons of diesel fuel consumption and 400 labor and equipment hours in the first year. With a 12-month average of \$2.40/gallon, the diesel savings totaled \$3,360.00. At \$50/hour (separate from diesel costs) labor and equipment savings totaled \$20,000.00.
- Preheating wash water in the dairy barn with CAHR over 12 months off set heating oil consumption by 760 gallons @ \$3.00/gallon average or \$2,280.00 annually. Savings increased with the January installation of a hydronic heater in the milk room.
- Additional heating capacity is available, there are plans for a heater in the equipment shop and/or use of heat from drying compost, straw or grain. This will increase the value of recovered thermal energy from the compost in future years.
- Improvements to the site infrastructure including a receiving/mixing pad adjacent to the aerated composting pad and a roof (hoop barn) for the composting area and mixing pad would further improve efficiency while managing moisture

from heavy precipitation events that have become more frequent. The farm is working with USDA NRCS through the EQIP process to obtain cost-share funding.

- Collins Powder Hill Farm installed unit is an AGT Hot Skid 250R and has yielded up to 160F degree water at 11 gallons per minute of flow.
- Vapor flow rates can run 50 to 500 cubic feet per minute (cfm) and are affected by compost pile density and fan power.
- Compost pile vapor temperatures have been observed at up to 165F.
- Alternating and recirculating aeration cycles are adjusted to achieve desired oxygen levels, optimize the thermal energy captured and extend winter operation.



Four batches (110+ cubic yards each) of manure compost loaded into aeration bays at Collins Powder Hill Farm. Hot vapor is pulled to Hot Skid 250R unit inside shed for energy capture while accelerating the composting process.

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