

Collins Powder Hill Farm Compost Heat Recovery Case Study



CASE STUDY OVERVIEW

The **Collins Powder Hill Farm** in Enfield, CT, has completed a pilot project that utilizes a promising form of renewable energy known as **Compost Heat Recovery (CHR)**. CHR captures waste heat from on-site composting for use in agricultural operations.[1] This energy can be used to heat water or buildings, and the system simultaneously curbs greenhouse gas emissions, enhances compost production, and prevents manure from contaminating the environment. At Collins Powder Hill Farm, energy generated from the composting process provides water and space heating

UPGRADES AT COLLINS HILL FARM

The farm makes compost from thousands of cubic yards of leaves and animal bedding obtained off-site as well as cow manure collected on the farm. The conventional handling of this material has been to repeatedly turn it with a bucket loader in order to aerate it and promote the breakdown of these ingredients into an effective compost product. [2] The considerable waste heat generated in a well-aerated compost pile or windrow of this sort is lost to the atmosphere.

CHR captures much of this waste heat and puts it to use. At Collins, the machinery that makes CHR possible is the **Hot Skid 250R**, developed by Agrilab Technologies Inc., based in Enosburg Falls, VT. Installed in a shed, it draws air through the compost, aerating it, while continuously capturing excess **thermal energy** and controlling odors. [3] Agrilab Technologies' specialized heat-exchangers allow it to extract heat from this moist, hot air. [4] The Hot Skid 250R offers contemporary technologies like remote data monitoring for temperatures, oxygen levels, and flow rates; computerized controls; and hot water and condensate recirculation systems that enable year-round operation, even in extreme winter conditions. At Collins, extracted heat is sent to a hot water tank in the farm's milk room for pre-heating wash water and space heating.

Key Terms

Compost Heat Recovery (CHR)

A form of renewable energy that harnesses excess heat from compost production. Also called Compost Aeration and Heat Recovery.

Hot Skid 250R

Machinery developed by Agrilab Technologies to carry out CHR.

Thermal Energy

Energy in the form of heat.

Carbon, nitrogen & phosphorus

Nutrients necessary for the creation of rich, fertile compost that builds soil organic matter



The Hot Skid 250R

Other CHR Examples

Agrilab Technologies' CHR systems also are in use at Foster Brothers Farm in Middlebury, VT; Catlin Farmstead in Winchendon, MA; VernMont Farm in Vernon, VT; Sunset View Farm in Schaghticoke, NY; the University of New Hampshire Organic Dairy Research Farm in Lee, NH; Jasper Hill Farm in Greensboro, VT; and Diamond Hill Custom Heifers in Sheldon, VT. A mobile system was installed at City Soil & Greenhouse in Boston, MA from 2015 to 2017. [7]

ACHIEVED SAVINGS

The Hot Skid 250R promotes oxygen circulation in the pile, increasing heat production, and reducing the need to mechanically turn the compost.

1

In the first year of CHR operation at Collins, the system yielded up to 11 gallons per minute of heated water/glycol mix while maintaining 130-160 degree F. temperatures in the compost piles.

2

In year one, pre-heating water in the dairy barn offset heating oil consumption by 760 gallons (\$2,280 annually @ \$3/gal). [5] Corresponding operational changes allow the farm to save an additional 1,400 gallons of diesel fuel and 400 labor hours.

3

A finished compost product that previously took about 2 years to generate is now achieved in as little as 3-6 months. The finished compost — rich in carbon, nitrogen, and phosphorus — is of high value as a soil amendment for agricultural, landscaping, and home use. [6] The system has the capacity to meet additional shop heating or product drying demands.

Available Grants and Assistance

The Collins project received funding from the Connecticut Farm Energy Program (a program of Connecticut Resource Conservation & Development) via a State Energy Program grant administered by CT Department of Energy and Environmental Protection and the U.S. Department of Energy. Farms can get assistance in planning energy efficiency and renewable energy projects by contacting the Connecticut Farm Energy Program. [8] The program has aided projects in obtaining over \$4 million in grants and loans through the USDA Rural Development REAP program that resulted in over \$16 million in installed energy projects in Connecticut.



Installation of Hot Skid 250R

1. <https://ctrkd.org/agriculture/compost-heat-recovery-project/>
2. <http://collinscompost.com/product>
3. https://ctrkd.org/wp-content/uploads/2018/11/Collins_Report_DIGITAL.pdf
4. <http://agrilabtech.com/technology>
5. https://ctrkd.org/wp-content/uploads/2018/11/Collins_Report_DIGITAL.pdf. These figures do not include savings from reduced use of propane for space heating.
6. <https://ctrkd.org/agriculture/compost-heat-recovery-project/>
7. <http://agrilabtech.com/projects>
8. <https://www.ctfarmenergy.org/>