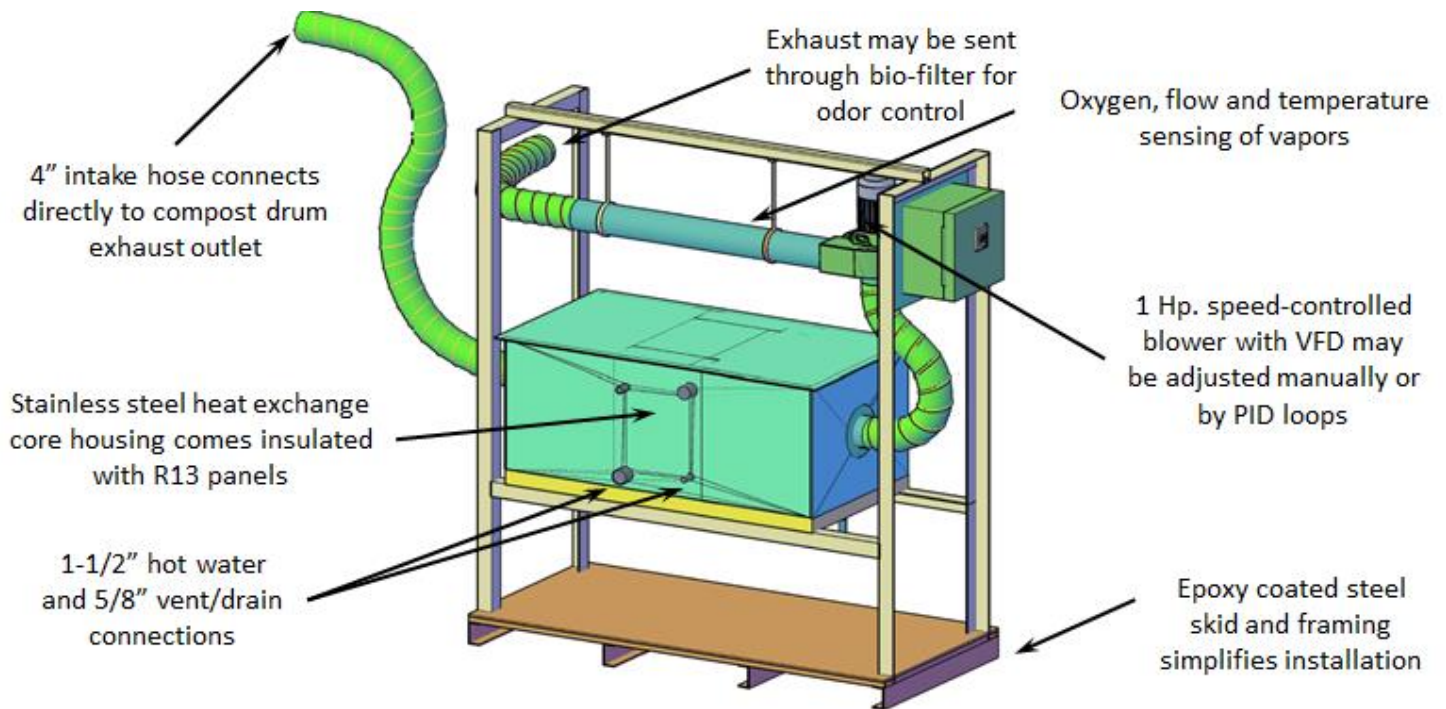


# Case Study: The Drum Dragon 200™ at Vern Mont Farm, Vernon Vermont

The **Drum Dragon 200™** is a next-generation compost aeration and heat recovery platform developed by Agrilab Technologies, Inc., which owns multiple patents on the compost heat recovery process. It is designed to be “plug and play” to capture predictable and continuous heat from the exhaust of rotary drum compost systems.

This Case Study shows installation and performance data from the system installed at Vern Mont Farm in Vernon, Vermont in the spring of 2016.

## Diagram of Drum Dragon Components



**Drum Dragon 200 as installed**



**Enviro-Drum from DTE, Inc., which the Drum Dragon 200 is connected to at Vern Mont Farm**



# Heat Recovery Performance Summary

The thermal power of the system, in Btu/hr, is measured by multiplying the mass flow rate of the water with the temperature increase over time. Shown here is a data set of all system performance and hot water load factors from June 8 to June 16, 2016.

While the Drum Dragon 200 is capable of capturing more than 120,000 Btu/hr, the actual output of the system is determined by how much hot water the farm is using. In this case the average hot water usage over a 24 hour period is 30,000 Btu/hr.

The maximum hot water temperature produced was 150F, and the average temperature of hot water produced was 134F.

Drum Dragon Performance Data at Vern-Mont Farm June 8-16, 2016 Vapor CFM: 100; Water Circulation: 8 gallons per minute		
Data Point	Average	Maximum
<b>Average Btu/hr, Average Hot Water Use by the Farm</b>	30,000	<b>59,000</b>
Water Out Temp F	134	<b>150</b>
Water In Temp F	95	144
Vapor In Temp F	150	159
Vapor Out Temp F	128	146

Since rotary drum compost systems operate continuously, and since dairy farm hot water usage patterns are fairly consistent, the data from this time period can be used to reasonably project the annual energy value.

Below is a summary of the economic value of the energy captured compared to different propane prices.

Daily, Monthly and Annual Value of Thermal Energy Captured and Used by the Farm, As Measured					
Price per Gallon Propane Comparison for ROI	Cost Per Million Btu	Measured Average Btu/hr Used	Daily \$ Value of Btus Used	Monthly \$ Value of Btus Used	Annual \$ Value of Btus Used
\$1.50	\$18.20	30,000	\$13	\$393	\$4,716
\$2.00	\$24.26	30,000	\$17	\$524	\$6,288
\$3.00	\$36.39	30,000	\$26	\$786	\$9,432

Below is a summary of the potential economic value of the Drum Dragon 200, in a scenario where the farm/site has an average hot water/space heating load that matches the maximum output of the Drum Dragon 200.

Daily, Monthly and Annual Value of Energy Captured and Used by the Farm If the Farm's Average Hot Water Demand was 120,000 Btu/hr instead of 30,000 Btu/hr					
Price per Gallon Propane Comparison for ROI	Cost Per Million Btu	Maximum Btu/hr Available From Drum Dragon 200	Daily \$ Value of Btus Used	Monthly \$ Value of Btus Used	Annual \$ Value of Btus Used
\$1.50	\$ 18.20	120,000	\$52	\$1,572	\$18,865
\$2.00	\$ 24.26	120,000	\$70	\$2,096	\$25,153
\$3.00	\$ 36.39	120,000	\$105	\$3,144	\$37,729