

**Johnson Brothers Lumber  
Buyea Road Kiln CHP Demonstration  
NYSERDA Contract 25108**

**Task 7 – Monitoring Plan**

**Gerster Energy Services**

45 Earhart Drive, Suite 103  
Buffalo, New York 14221

**Johnson Brothers Lumber**

2550 E. Ballina Road  
Cazenovia, NY 13035

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## **Johnson Brothers Lumber – Task 7 – Monitoring Plan**

### **PROJECT DESCRIPTION**

The focus of this project is the installation of five (5) wood kilns to utilize waste heat that is currently being generated by a methane gas generator installed at the Madison County Landfill in Canastota, NY.

A nominal 1600 kW cogeneration machine was installed in 2009 to utilize methane gas produced by the landfill to provide electric power to the local utility. The machine also generates a significant amount of heat, only a small portion of which is currently being used for a few small buildings at the site. Heat exchangers for both the engine jacket water and stack exhaust are currently in place. The jacket water heat exchanger currently provides the heat to the nearby buildings. The stack exhaust heat exchanger is currently being bypassed and not recovering heat.

Johnson Brothers Lumber proposes to install five (5) new wood drying kilns at the site to utilize a majority of the remaining heat that is currently being rejected to the atmosphere. The heat available from both the jacket water and idle stack exhaust heat exchangers will be utilized to provide the required heat for the kilns.

The goal of this monitoring plan to is quantify and trend the amount of heat that is utilized by the kilns that currently is waste heat sent to the atmosphere.

## Johnson Brothers Lumber – Task 7 – Monitoring Plan

### **MONITORING PLAN**

The current system design incorporates three hydronic loops that will be utilized to reclaim heat from the existing cogeneration machine. Refer to Figure 1 for a schematic of the designed heat recovery system

The main heat recovery loop will be a primary loop that will recover heat from both the jacket water and stack heat exchangers. The heat that is added to this loop will be dispersed through two system loops.

The first system loop is small existing hydronic system that circulates water to a few nearby buildings.

The second system loop is a hydronic system that will circulate heated water through heating coils in the five (5) wood kilns. Flow to the kiln heating coils will be modulated via a two way control valve to obtain the desired operating temperature of the kiln. A Variable Frequency Drive (VFD) will be installed on the pumps associated with this loop.

In order to monitor the heat that is rejected into the kilns, a flow meter will be installed in the supply line to the kilns before any branch takeoffs. This will allow for accurate measurement of the flow (gpm) that is being provided to the kilns by the variable speed loop pumps.

A number of temperature sensors will be installed to monitor system temperatures. Included in these will be sensors that will monitor the temperature of the heated water that is being sent to the kilns as well as the temperature of the cooled water that is returning from the kilns.

The flow meter and the temperature sensors will be monitored by a central Building Automation System (BAS) that will calculate the heat rejected by the wood kilns as follows in 15 minute intervals:

$$\text{Btu/hr Heat Rejected} = 500(\text{Constant}) \times \text{flow (gpm)} \\ \times (\text{Water Temp Into Kiln Loop (Deg F)} - \text{Water Temp Out of Kiln Loop (Deg F)})$$

By monitoring the heat transfer rate, the heat rejected over time will be recorded to allow for calculation of annual energy used by the kilns that is currently rejected to the atmosphere.

Figure 1 Heat Recovery System Schematic

