

BIOMASS CONVERSION CASE STUDY

Facility Name	Quality Hardwoods Limited
Location	196 Latour Crescent, P.O. Box 40, Powassan, ON, POH 1Z0
Operations Description	Quality Hardwoods Limited is a wholesale Hardwood Lumber business located on a twenty-acre site in Powassan, Ontario.
Conversion Decision	The decision to convert was due to rising oil prices. The price of oil in 1995 was 0.26/litre and it rose to \$1.10/litre by January 2008. This created the strong desire to put forth an investment in alternative fuels. In February 2008, the planning process was started. Quality Hardwoods signed for the boilers in early June 2008, they had the pipes installed by August and the whole system running in November 2008. Quality Hardwoods did all of their own research regarding what equipment would fulfill their heating requirements and they also sourced all of the equipment. The conversion cost approximately one million dollars to implement.
Site Size (Acres)	20 Acres.
Type	Commercial setting.
Heating Requirements	Biomass heating for kilns and warehouse.

**System
Description**

The system consists of two Dekker boilers and a Scrubber. Dekker Manitoba is a company out of a Hutterite Community which has been working with the design of boilers for many years.

The target temperature of the water is 195 degrees Fahrenheit, and each boiler creates approximately 3.5 million BTU's per hour. Quality Hardwoods uses an average of 3-5 million BTU's per hour therefore this system is very adequate for their needs. When they need full capacity they use both boilers and when they need less energy they have the ability to run off of only one boiler. Quality Hardwoods has kept their oil furnaces as slave/back up to the pellet boilers.

There is approximately 4000 gallons of water in the system sitting at an operating temperature of 195 degrees Fahrenheit. Each kiln has a Programmable Logic Controller with a mixing valve and circulating pump. The water is distributed to fin pipe coils in each of the 10 kilns and the warehouse. This system can heat an equivalent of 100 sub division homes.

The pellets are place into the dumping station. A vertical bucket elevator brings the pellets up into a silo where they funnel down into an auger system which moves them into the furnace. The furnace burns the pellets until they are inert and then an ash auger and a conveyer belt remove the ash. The ash can be used as a neutralizer.

Feedstock Type	<p>The boilers at Quality Hardwoods are restricted to wood waste. They can burn any size of pellet but are still somewhat limited in what they use due to the potential issue of the pellets clogging the auger system. The size of the pellet is 6-8mm in diameter with a humidity level of 6 to 8 percent. Durability, moisture and BTU/lb are the critical factors for feed and efficiency. They are currently considering switching to wood briquettes. They use either soft or hard wood. Soft wood is preferable due to a higher amount of lignin's and therefore a higher ability to compress as well as a higher durability.</p>
Fuel Storage/ Delivery	<p>A truck backs up to the dumping station and dumps the pellets into the pellet bin. The dumping system cost approximately \$75000.00 to install and it holds approximately 60 tonnes of pellets. In the Winter season they receive deliveries every 10-15 days, and in the summer about once a month. A bucket elevator moves the pellets from the dumping station into a silo. At the bottom of the silo there is an auger system which moves the pellets into the furnace.</p>
Operation & Maintenance	<p>This boiler system is controlled by a computer. The program is called Argus. Argus can be monitored from anywhere; on the road or on a laptop from home. There is a main control system at Quality Hardwoods which is operated by the same people who operated the previous oil system. They learned how to operate and maintain the new boiler system easily with training.</p>

**Conversion
Economics**

Quality Hardwoods offered this conversion and comparison between Furnace Oil and Wood Pellets:

Calculation of cost per Giga-Joule for Furnace Oil

1 Giga-Joule = 947815 BTU'S
Furnace oil is 36700 BTU/litre
 $947815/36700=26$ litres
@ \$0.80/litre = \$20.80/GJ

Calculation of cost per Giga-Joule for Wood Pellets

Pellets are 8000 BTU/Lbs
1 tonne = 2200lbs
 $2200 \times 8000 = 17600000$ BTU = 18.6 GJ/tonne
\$170/tonne
=\$9.20/GJ

Savings Calculations for Quality Hardwoods:

Oil versus Pellet Use

5505970 litres of Oil was used in 2006.
=19591GJ @ \$20.80/GJ
=\$407492.80
@\$9.20/GJ for pellets
=\$180237.20
In total this saves \$227255.60

Photos



Quality Hardwoods Arial View



One of the ten kilns





From left to right: Boiler building, Pellet silo, Dumping Station



Silo and Bucket Elevator





Silo and Bucket Elevator and Dumping Station



Boilers





Water Distribution



Ash Auger inside furnace



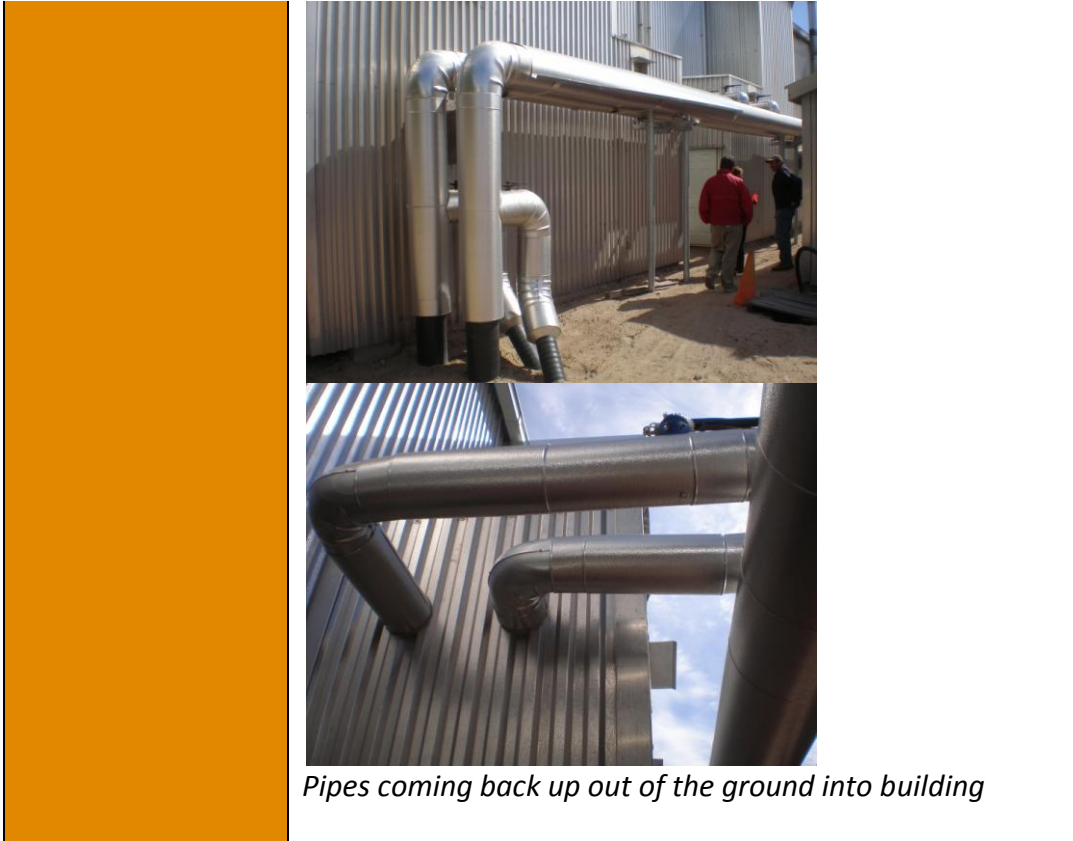


Ash chute inside furnace



Pipes leaving Boiler room going underground to service buildings







Main Distribution



Coils and heat pipes within Kiln





Air exchanger outside

and inside kiln

System Control



