



Rough and Ready Lumber

1.5-MW Woody Biomass CHP System



Quick Facts

LOCATION: Cave Junction, Oregon
MARKET SECTOR: Forest Products
FACILITY SIZE: 12 Dry Kilns
FACILITY PEAK LOAD: 1.5 megawatts (MW)
EQUIPMENT: Coppus Murray backpressure steam turbine
FUEL: Hog Fuel and Logging waste (50-50)
USE OF THERMAL ENERGY: Kiln Drying
CHP TOTAL EFFICIENCY: 68% – at the flame
ENVIRONMENTAL BENEFITS: Natural Gas offset 7182 MT/yr CO₂ e with 85% particulate reduction
TOTAL PROJECT COST: \$6 million
PAYBACK: 4 years after incentives
CHP IN OPERATION SINCE: February 2008

Site Description

Rough and Ready Lumber is a 100 year old family owned lumber mill in Josephine County. Just prior to its closure in April 2013 due to raw log supply issues, the mill employed approximately 85 full time workers in a community of under 2,000 people. Subsequent state and federal loans, along with the sale of tax credits provided the funding infusion in mid-2014 allowing Rough and Ready to re-tool, resume operations, and rehire most of the full time workers. Funding included Federal New Market Tax Credits and other support mechanisms provided through the 2013 passage of the Restoring Healthy Forests for Healthy Communities Act (H.R. 1526). The Cave Junction community greatly benefited from the reopening of the mill with the rehiring of the workforce.

Reasons for CHP

Rough and Ready Lumber recognized the need to improve overall mill efficiencies including a shift away from air-dried lumber in order to remain competitive and profitable. The decision was made to transition from a three-shift, two mill operation to single-mill, single shift processing of high quality low-production specialty items. Additional boiler capacity and efficiencies were needed to meet that change. Other reasons for moving forward with a CHP System:

- Increased emphasis in national forest thinning by the federal government would supply more biomass fuels
- Reduction of overall energy costs
- More consistency, predictability, and quality of final product drying time

CHP Equipment & Configuration

Main components of the CHP system:

- Steam boiler: Wellons 40,000 PPH 300 psig water tube, Model #1D1C8.0A
- Turbine: Coppus Murray 1.5 MW backpressure, Model "U"
- Gen-set: Kato Reliance generator, Model # A2484200000,

The CHP system has a 40,000 PPH (pounds per hour) wood-fired 300 psig (per square inch gauge) water-tube boiler that feeds saturated steam into the 1.5 MW backpressure steam turbine. The turbine is harnessed to a Kato Reliance generator. Discharge steam is reduced to 20 psi and used to heat 12 double-track dry kilns. Kiln condensation is then returned to the boiler to be reheated.



Wellons Boiler System

CHP Operation

The plant produces power and captures heat (in the form of steam) to dry lumber in 12 kilns. Rough and Ready operates on a "buy all /sell all" arrangement with the utility. It buys all the power needed for the mill and in turn, sells all the CHP produced power to the utility (approximately 10 million kWh annually) with a current value of \$73/MWh. The primary steam need is for kiln drying – generating electricity as part of the pressure reduction process adds value.

Collaborative Business Arrangement

The project was a successful collaboration between Rough and Ready Lumber and several other organizations:

- Pacific Power handled interconnection and purchases the electric output of the system;
- The Energy Trust of Oregon provided a grant, administered in the form of a power production premium;
- A Business Energy Tax Credit was provided by the State of Oregon;
- USDA Rural Development of Oregon provided a loan guarantee and grant and;
- Northwest Farm Credit Services was the lender for the USDA loan guarantee.

Lessons To Share

- Fluctuating costs for fuel (wood chips) purchases on the open market were higher than original models suggested after factoring in transportation and other costs; be aware of this eventuality.
- Rising utility rates and fixed PPA's may eventually create an "upside down" relationship – power purchase price will exceed PPA. Do not depend on PPA to support the profit margin of operations in perpetuity.
- Having an experienced biomass project analyst review changes in power costs / generating models is critical to success.

"The dual components of the CHP system (steam and power) gets us two bangs for the buck; a real value added component to our business model."

Link Phillippi, Owner

For More Information

U.S. DOE NORTHWEST CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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More CHP Project Profiles:

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Date produced: 2014 Rev. 2015

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