



Cox Interior

5 MW Biomass CHP System

Site Description

Cox Interior began manufacturing interior and exterior finishing products in 1983, including moldings, doors, stairs, and fireplace mantels. These products are manufactured from poplar, oak, cherry, and several other species of trees, resulting in an average of 100 tons of wood waste each day at their facility in Campbellsville, Kentucky.



Aerial view of Cox Interior facility at Campbellsville, KY

In 1992 the Cox Waste-to-Energy program was established and two years later a CHP plant began operations. The plant consists of two boilers which burn wood waste to provide steam, heat, and electricity for the manufacturing operations.

Reasons for Installing CHP

Growing disposal costs and regulations in the early 1990's prompted Cox Interior to seek alternatives for their wood waste disposal. Their large and increasing need for steam, building heat, and electricity, coupled with the large volume of waste, made biomass CHP the obvious answer.

Quick Facts

LOCATION: Campbellsville, Kentucky

MARKET SECTOR: Wood Products

FUEL: Wood Waste/Biomass

TYPE OF SYSTEM: Biomass fueled boiler/steam turbine

GENERATING CAPACITY: 5 MW

AVERAGE THERMAL OUTPUT: 72,000 lbs steam/hr

AVERAGE ELECTRICITY PRODUCTION: 1.2-2.5 MW/hr

IN OPERATION SINCE: 1994

EQUIPMENT: Two 61.4 MMBtu/hr Hurst boilers
4 MW condensing turbine
1 MW backpressure turbine

USE OF ELECTRICAL ENERGY: most used on site, some sold to utility

USE OF THERMAL ENERGY: Lumber Dry Kilns, plant heating

ORIGINAL - INSTALLED COSTS: \$5 million

ANNUAL SAVINGS: \$1.2 million

ENVIRONMENTAL BENEFITS: 12,300 tons/year of CO₂ emissions avoided



Wood waste at Cox Interior's Campbellsville facility

The CHP plant has reduced costs for Cox in several ways. Instead of buying dried lumber, the company can purchase less expensive “green” lumber and dry it onsite using the steam produced from the CHP system. This onsite drying process saves Cox Interior over \$1 million in lumber purchases each year. Most of the electricity generated by the CHP system is used on site; depending upon biomass availability they have the capacity to produce about 75% of their electricity needs in the millwork operations. Cox sells electricity to the grid during evenings and weekends when the manufacturing facility is not operating. In 2014, Cox Interior offset \$585,000 worth of electricity in house and sold over 1,100 MWh to East Kentucky Power Cooperative for a total of \$41,000. After taking into account operation and fuel handling expenses, the system ultimately yielded net savings of \$1.2 million in 2014 alone.

In 2014 Cox Interior was certified by the State of Maryland Public Service Commission as a Tier 1 Renewable Energy Facility and is therefore able to generate Renewable Energy Credits (RECs) for the Maryland Renewable Energy Portfolio Standard (REPS). The facility is located within the East Kentucky Power Cooperative which is part of PJM Interconnection, a regional transmission organization and is therefore eligible to produce Maryland RECs. The sale of these RECs brings in additional revenue to help offset the operation expenses.

Equipment and Configuration

Cox Interior has a fleet of 20 trucks with two full time drivers that transport the woody biomass fuel to the CHP plant. The fuel consists of wood waste and wood chips. Cox Interior has developed their own fuel processing operation to help minimize the purchase of additional wood chips. They grind slabs, end cuts, pallets, and urban tree debris. The processed wood is stored in a 20,000 square foot fuel storage building.

Twenty full-time employees keep the two 61.4 MMBtu/hr Hurst boilers running on a 24/7 basis. The system can combust up to 300 tons of wood fuel per day and the boilers produce an average of 72,000 lb/hr of steam. The emission controls include multicyclones and an electrified filter bed.

The boilers produce 235 psi/490 °F steam. The backpressure steam turbine reduces 45,000 lb/hr of steam to 30 psi producing 1 MW of electric power in the process.

The 30 psi steam is then used in Cox’s millwork operations for the 13 lumber dry kilns, millwork priming ovens, and plant heat. The rest of the steam is used to generate electricity in the condensing steam turbine.



Backpressure steam turbine at Cox Interior

Lessons to Share

Wood waste boilers are known to perform nearly as well as coal fired boilers. Although wood has a lower heating value and wood waste boilers require more maintenance, burning wood does not create additional problems such as coal residues. Wood waste boilers are successful when the supply of wood is less expensive and more available than coal, and are appropriate for the wood products and paper industries since wood waste is consistently and inherently available. The biggest challenge for this plant is to assure a consistently-available and cost-effective fuel supply.

For More Information

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