

COMBINED HEAT AND POWER

GENERATING POWER FROM URBAN WOOD RESIDUALS

An 800 ton/day biomass power plant in St. Paul, Minnesota is scheduled for start-up by winter 2002-2003, with electricity output of 25 megawatts/day.

A DISTRICT heating and cooling system is not new to downtown St. Paul, Minnesota. What is new, however, is the fact that starting this winter, the steam — and 25 megawatts/day of electricity — will be generated by boilers fired with wood residuals. The plant is being built by a joint venture between Market Street Energy Company LLC (MSE) and Trigen-Cinergy Solutions. It will be operated by MSE, a District Energy St. Paul, Inc. (DESP) affiliate. DESP operates the district heating and cooling system. The \$55 million biomass combined heat and power (CHP) project will create the largest wood-fired district energy system in the U.S., according to its developers. Electricity will be sold to Northern States Power Company (now Xcel Energy) under a 20 year agreement signed in December 1998.

DESP has provided hot water district heating service to downtown St. Paul for almost 20 years. The system currently serves over 27 million square feet of building space. In 1992, DESP constructed a chilled water system to help its customers respond to the phase-out of CFC refrigerants and new restrictions on the use of groundwater for cooling. This system currently serves over 12 million square feet of building space, according to DESP. Once the wood-fired boilers are on line, the original boilers will be used for back-up steam during peak demand periods. The wood burning plant will reduce air pollution and greenhouse gas emissions by primarily displacing coal, notes Anders Rydaker, president of DESP. "This will reduce sulfur dioxide emissions by roughly 600 tons/year and reduce carbon dioxide emissions from fossil fuels by roughly 280,000 tons/year."

SOURCING THE WOOD

The biomass CHP facility is designed to take 800 tons/day of urban wood residuals. The plant also can burn other biomass, such as crop residues from the food processing industry (e.g. oat hulls left over from cereal production). Wood specifications are four inches in length or less in any direction. "We can tolerate a small amount of material at a larger length because tub grinders typically have 'tails' that come through," says John Madole, who was hired by St. Paul Cogeneration LLC — a joint venture of MSE and Trigen-Cinergy Solutions — to procure the wood



Completion of the combined heat and power plant (above), fueled by urban wood residuals, is scheduled for this winter. The existing boilers will be used as needed during peak demand periods.

The new facility
 "will reduce carbon
 dioxide emissions
 from fossil fuels by
 roughly 280,000
 tons/year," says
 Anders Rydaker,
 president of DESP.

residuals. "We will pay more for dry wood such as dimensional lumber because what we really want are the Btus and if someone is giving us more Btus in a load, that has more value." Less than one percent foreign material, e.g. rocks, gravel, grit, metal, concrete, is allowed in the feedstock.

In the Twin Cities area of Minneapolis/St. Paul, the value of chipped urban tree wood waste as a fuel is about \$8 to \$9/ton, adds Madole. "It just so happens that Minnesota is one state away from Wyoming where the coal comes from and utilities in Minnesota own coal trains and coal mines, so the price for electricity is comparably low. In other urban areas, wood waste might have a higher

value as a fuel, where other sources of energy cost more."

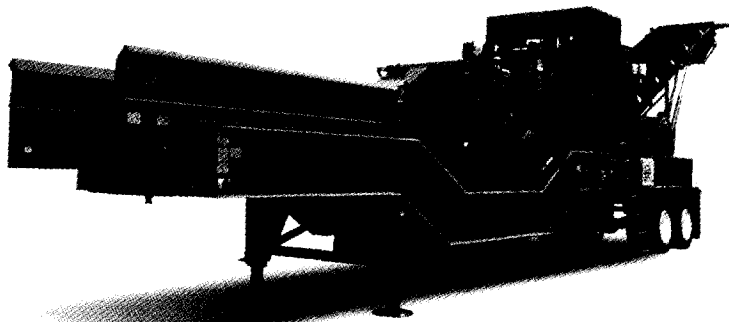
Currently, the project has more than 50 percent of the feedstock lined up in long-term contracts and is seeking more sources. After many years of experience with wood recycling, Madole divides the markets for wood residuals in an urban area into a hierarchy, with the highest end use being lumber, pulp/paper and manufactured wood products such as particle board. "Typically, in most urban areas, there will be some sawmill broker who comes into town and will buy anything over eight feet in length and over 36 inches in diameter. And if it's walnut or other high value species, they will take almost any size," he explains. This market usually accounts for less than five percent of available urban wood residuals.

Mulch is the second tier, and prices paid for this feedstock vary across the board depending on the region of the country. "In some parts of the country, like many parts of the Great Plains, where there are very few trees, mulch will be expensive because it is being shipped in from great distances," says Madole. Colored mulch has taken over the market in a lot of areas and is more expensive than straight wood mulch, excepting for natural mulches such as cypress, redwood or cedar bark. "Almost all of the colored mulch is made from dimensional lumber, and construction and clean demolition waste," he says. "So almost zero is coming from urban tree waste because that wood doesn't absorb the colors as well."

The third tier market is fuel, although Madole points out that in some areas, fuel is not the bottom tier. "There are probably places in California in particular that are paying in excess of \$25/ton for the fuel because of the high electricity costs and established biomass markets. But that is pretty rare in the rest of the U.S. Most prices for wood fuel are around \$10 to \$15/ton. Plants in Georgia and Maine, for example, are paying in that range."

"In short, the key factors that come into play when sourcing urban wood waste for fuel are what is the value compared with alternatives, i.e., what is the mulch market doing? If the mulch market is in the higher price range, it will be more difficult to get urban wood waste rounded up, and in many areas of the U.S., mulch markets are growing because horticulture overall is growing in this country. I think there is a way to go in terms of saturating the mulch market."

Land clearing debris is a good source of biomass for fuel. The only challenge, notes Madole, is that it is generated further away from downtown St. Paul, so it is more costly to transport. Brush seems to be one source of urban biomass where there is no competition. "Most generators of processed brush are willing to bring it here because we will pay for it. Since brush chips make a lousy mulch, the fuel value is the best option," he says. "In our area, it's been kind of a good fit."
 — N.G. ■



"The Brute gives us a definite competitive advantage."

-Tim Garrison, Oregon Fiber

"Because the Brute is so tough, we can take on a wider range of waste, and process it faster and better."

Tim Garrison of Oregon Fiber is convinced, because their Brute turns waste into profit every day.

WSM grinders are built tougher and pack more processing power than anything else on the market - at a price you can afford.

Need to process wood waste in a serious way? Call today to see how the experts at WSM can deliver the best solutions for your grinding operation.

Tough, Reliable, Built to last.



Call (800) 722-3530 or see us at westsalem.com
 email sales@westsalem.com
 (503) 364-2213 Fax (503) 364-1398
 P.O. Box 5288 Salem, OR 97304 USA



WSM's Brute Portable Recycling System brings serious grinding power to your plant or jobsite.