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URBAN WASTE WOOD RECYCLING

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Presented By

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INTRODUCTION

I am pleased to share with you to-day, WCI's experience with our urban waste wood recycling center in the Region of Peel. With increased recycling, new uses for recycled waste products are being developed.

As members of the Canadian Wood Preservation Association, your focus is on treated wood. Initially, it was estimated that about 10% of urban waste wood was treated wood. But at our facility, we have received very little treated wood - about 1%. Later, I'll review some of our thoughts as to how treated wood may be recycled.

Disposal of urban waste wood is a significant problem facing municipalities throughout the industrialized world. Urban waste wood represents about 10% of the total municipal solid waste stream most of which is being landfilled. Landfilling is becoming more and more unacceptable because of associated environmental problems. In Metro Toronto area, it is estimated that about 500 - 600 tonnes per day of urban waste wood is landfilled at tipping fees up to \$140/tonne.

Concurrently with expanding volumes of solid waste, natural resources are being depleted at an alarming rate. Wood is one of Canada's most valuable natural resources and there is now world wide concern over the potentially devastating consequences of the greenhouse effect which is directly attributed to the cutting down of forests.



Recycling of our urban waste wood will simultaneously reduce the demand on our forest resources and reduce the pressure on waste disposal. Since about 90% of Canada's harvested wood is exported, we hope to develop waste wood recycling technology and products that will follow our virgin to export markets and save our trees. In cooperation with The Regional Municipality of Peel and the Ontario Ministry of the Environment, WCI has established Canada's first Urban Waste Wood Recycling Centre in Brampton, Ontario. The Centre was designed and built by WCI and started operation in December, 1989.

The objectives of the Centre are to:

- o achieve 100% diversion of waste wood from landfill
- o provide efficient waste wood handling techniques
- o develop markets for waste wood products

PROCESS DESCRIPTION

The Centre was designed to receive and process 140 tonnes per day of all types of waste wood including:

- construction and demolition wood
- waste wood from manufacturers
- broken and unusable pallets
- poles and railway ties
- trees and trimmings

The process is shown on the attached Flow Diagram and processing steps carried out at the Centre include the following:

Receiving and Storage

Trucks delivering source segregated wood are weighed in/out on a truck scale to determine the weight of wood tipped. Other information such as wood generator, type of wood, degree of contamination and hauler are entered into the computerized weigh scale program. An invoice is automatically printed for each waste wood delivery. For the first three months of operation, WCI worked closely with the generators and haulers to ensure that properly segregated wood loads are received.

The wood is sorted; soft wood, hard wood, mixed, green and treated wood and arranged in piles by a front-end loader. On site storage is limited to 1,500 cubic meters of processed and/or unprocessed wood.

Process Feeding

The track loader moves the roughly sorted wood to the feeding area within reach of the loading grapple. The track vehicle crushes the wood to facilitate loading and because of the irregular shapes of the wood and the tendency for it to knit together into large masses, the grapple is used to selectively load the wood. The wood is selected and fed into the process according to the end product specifications.

Contrary materials such as paper, plastics and non-ferrous metals that may inadvertently be delivered with the wood are removed by the front-end loader operator, yardmen, or the grapple operator and placed into a container for landfill disposal. As much as possible the yardmen will remove the contraries from the tipped waste wood and place the material back into the truck. Corrugated paper is segregated for recycling.

Primary Size Reduction

The bulky wood, including heavy timbers is fed into the hopper of a slow speed rotary shear-type shredder. The opening to the shredder is approximately 1.0 meter by 1.5 meter. The shredder is driven by two 125 hp hydraulic drives. The wood is coarsely size reduced to about 15-20 cm.

Primary Magnetic Separation

The discharge from the shear shredder is conveyed over a magnetic head pulley which removes large free ferrous metal and wood which contains ferrous metal. The mixed ferrous material is chuted into a container which is periodically removed and taken to landfill for disposal.

Secondary Size Reduction

The wood which has been pre-sized, with the majority of the ferrous metal removed, is discharged from the belt conveyor into a hammermill shredder. The shredder is driven by a 250 hp electric drive and is capable of producing product of 1.25 cm to 5.0 cm in size depending on the grates used.

Secondary Magnetic Separation

The size-reduced wood product from the hammermill is discharged onto a belt conveyor which carries the product under a self-

cleaning overhead magnet which removes any remaining ferrous metal - mainly nails and staples. A container receives the ferrous metal and is periodically removed by a scrap metal dealer.

Product Screening

The size reduced product passes over a vibrating screen deck capable of making three size separations. The oversize product, greater than five cm, is conveyed back to the hammermill. The fines, less than 0.75 cm in diameter, is transferred by an auger and piled by the side of the tower. The sized product is discharged from the screen onto a belt conveyor and piled on the ground. Periodically, the front-end loader will clear the product material away from under the conveyor and stockpile the product according to product specification. The front-end loader loads the product into trailers and trucks for transport to market.

Product Markets

A number of markets and uses for waste wood product are being developed. A large number of sample loads of waste wood product have been supplied to potential users. Special effort is taken to work with potential users and to meet their specification requirements. The breakdown of product markets to date is as follows:

- o particle board manufacture
- o roof shingle manufacture
- o mulch
- o road base material
- o compost

Considerable effort is being made to work with government agencies and through procurement policies have our waste wood product specified. The City of Brampton has specified waste wood product for their mulch requirements.

System Components

Waste wood processing is only one of several essential components of a successful waste wood recycling system. Five essential components are shown on the following diagram and include:

- o waste wood generator
- o waste wood collection and transportation
- o waste wood receiving and classification
- o waste wood processing to specifications
- o waste wood product/market development

As with all waste conversion and recycling operations, the major challenge is to produce a product that meets regulatory standards and that meets specifications for specific markets. One can expect that the regulatory standards will become more and more strict and that new markets will need to be developed for recycled waste products.

From our experience, the primary impediments to the recycling of urban waste wood are:

- o variability in the quality and quantity of urban waste wood
- o potential users are remote from urban areas
- o lack of markets
- o lack of R&D on urban waste wood utilization

We realized that the long term success of the project very much depends on the establishment of a Research and Development program that will utilize the information gathered through the processing facility to determine what value added will be required to get the processed material to market for its highest and best economic value. To assist in developing marketable waste wood products, WCI has established a Research and Development program involving the University of Toronto Forestry Department and National Research Council.

The primary product category identified for intensive research and development for WCI's urban waste wood recycling plant is mulch and compost products which would enable us to achieve maximum diversion from landfill in the shortest time.

For the long-term higher value markets for urban waste wood products, WCI is developing the following:

- 1) wood composite markets
- 2) wood flour and fillers
- 3) activated carbon and chemicals

These higher value markets require considerable effort and money to develop and once developed are limited in size and will be dependent on the economy. We consider wood fuel to be a limited market for urban waste wood products and of questionable long-term viability.

An interesting option for use of treated waste wood is to process it and make new composite treated wood products such as ties, fence posts, etc. In the meantime, the treated wood is processed separately and taken to landfill.

PLANT PERFORMANCE

The plant has received waste wood every single day, six days/week (save holidays) since it was opened December 1, 1989. On several days in May and June the plant processed up to 180 tonnes/day. Approximately 25,000 tonnes of waste wood has been diverted from landfill since the start of operations.

Markets have been developed for clean, sized wood product in the following areas:

- particle board manufacture
- roofing felt manufacture
- sod growing
- animal bedding
- mulch
- road base
- composting operations

BUSINESS ASPECTS OF THE PROJECT

To ensure smooth and reliable operation, the project requires an extraordinary amount of senior management time to deal with such matters as:

- public and press
- government agencies
- market development
- transportation of product
- staff training

Additional capital expenditures are constantly being made to improve operations and to provide reliable waste disposal service and waste wood product quality.

CONCLUSION

WCI is successfully demonstrating that an urban waste wood recycling facility is viable and that 100% diversion of waste wood from landfill is achievable. Compared to other waste recycling activities, the diversion of waste wood or 10% of the total waste stream from landfill is relatively inexpensive to accomplish.

The urban waste wood recycling system and approach demonstrated with The Regional Municipality of Peel can be applied to many other municipalities throughout North America. There is no excuse for wood to be buried in any landfill.