WOOD RESIDUE – DEVELOPING A MANAGEMENT STRATEGY

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ABSTRACT

A significant fraction of material entering landfills or being open-burned is wood. Limited landfill capacity and concern over air quality is forcing many local governments to develop new strategies and beneficial uses when handling wood waste. This paper broadly discusses the three stages required in developing a sound wood residue strategy: a wood residue inventory; a preliminary assessment of handling options; and a detailed assessment of alternative management options. It specifically focuses upon the first two stages. These stages are discussed as they were applied to a recent study commissioned by the Regional District of the Central Okanagan.

Air quality and waste diversion are two topics that have received a great deal of attention in the Central Okanagan Regional District in recent years. Wood residue and its subsequent method of disposal impact both concerns.

Wood residues are defined as all woody material that does not serve a useful structural purpose. Wood residues result from primary and secondary breakdown facilities, construction & demolition, landclearing, agriculture, and landscaping. Currently, a portion of the wood residue within the Regional District (primarily yard waste and construction and demolition waste) is brought to the two landfills within the Central Okanagan: Glenmore Landfill and Westside Landfill. While some wood residue is landfilled, we are aware a significant quantity of waste wood remained in the community. Much of this remaining material is being open-burned, particularly in the agricultural and land development sectors.

Our solid waste and air quality technical committees determined that the implementation of a management strategy for the collection and disposal/beneficial reuse of this material would benefit the Regional District in the following ways:

- *collection and disposal of waste wood would assist in reaching and maintaining the goal of 50% waste diversion from landfilling.*
- *a reduction in burning will improve the air quality in the region*

To develop a wood residue management strategy, the Regional District recognized the need to identify the volumes of wood residue within the community and their current methods of disposal for the residential, commercial, agricultural, industrial and forestry sectors. Once these volumes

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were identified, collection and disposal/reuse alternatives and cost estimates for each sector could be established.

Background data required for developing the management strategy was available through a number of sources, but had never been compiled. Therefore, a consultant was retained to compile this information and provide a report on the volumes of wood available in the various sectors of the Regional District and develop alternatives and cost estimates for its end use.

Introduction

Residue management is becoming increasingly important for solid waste managers as environmental expectations increase and availability of conventional disposal options decrease. The background information discusses a common problem facing many jurisdictions throughout North America. We would like to weave the example of the RDCO into a paper that discusses a common approach that could be adopted by all jurisdictions. This model uses three phases to help focus and clarify the information required to produce a management strategy to deal with wood residues. The phased approach allows the opportunity to review information collected from each phase with respect to management goals, allowing for a mo re refined scope in the subsequent phase for more detailed assessment (see Figure 1).

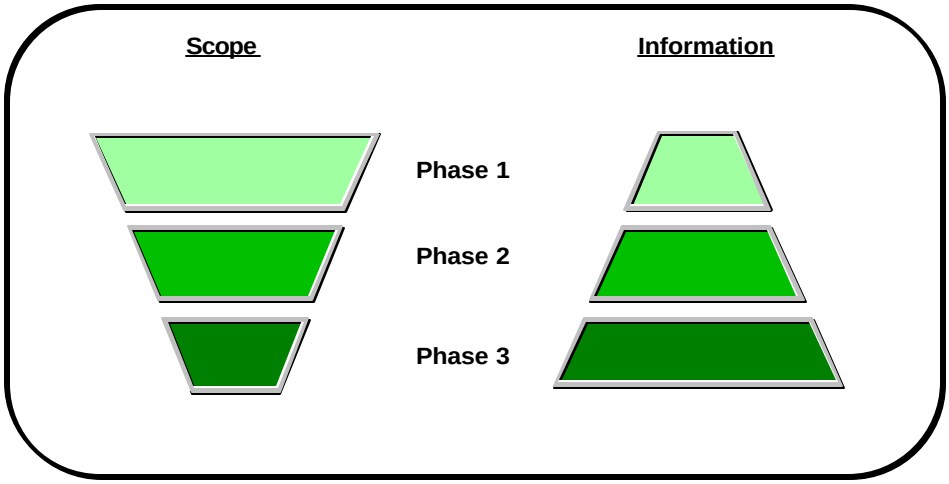

Figure 1 - Relationship of scope and information detail through the three phase process.

Wood residues in particular comprise a significant fraction (30%) of material entering landfills. In many jurisdictions, wood residue that does not enter the landfill is open-burned. Limited landfill capacity and concerns over air quality are forcing many local governments to develop new strategies and beneficial uses when handling wood waste.

Large investments into alternative management operations such as co-generation and composting operations require a good understanding of available wood residue supply and collection systems. These must be capable of capturing the sufficient volumes of material in order to justify the capital expense.

Phase 1 – Wood Residue Survey

An important first step toward developing a regional wood residue strategy is to conduct an inventory of wood residue sources within the geographical region. The information to be collected would include parameters such as location, volume, physical characteristics and the nature of production (i.e. seasonal, continuous, etc.). The wood residue profile for different communities and regions will vary considerably depending on land-use and economic activities but overall wood residue production would be expected to be fairly stable In addition to wood residue sources, the inventory should gather information regarding existing end-uses or disposal options for each wood residue stream. End-uses for wood residues vary considerably depending on the quality and consistency of the wood residue stream. We found more useful information can be obtained by tracking the wood residues from the source rather than surveying end-users or disposal site managers.

In order to compile a comprehensive inventory cost-effectively, surveys of the residential, commercial, agricultural, and industrial sectors are conducted using a variety of techniques depending on whether the wood residue volumes are tied to economic activity (i.e. industrial, construction and demolition, etc.) or land-base (i.e. agricultural, residential or land-clearing). All wood residue sources are inventoried regardless of final end-use to determine the role of landfilling and open-burning relative to the overall wood fibre flow in the region.

The industrial sector is comprised of the primary (sawmills), secondary[3] (re-manufacturing facilities), and tertiary manufacturing operations (cabinetmakers) associated with the breakdown of wood. Industrial players are identified through industry association membership lists, yellow pages and word-of-mouth referrals. This sector is surveyed using a simple survey form and telephone follow-up. The survey includes information regarding the type of operation, the geographic location, and volumes of common wood residue forms (hog fuel, bark, sawdust, shavings, cut-ends, slabs, etc.) and their potential end-uses (pulping, co-generation, horticultural, agriculture, landscaping, composting, etc.) Information provided regarding wood residue production is compared with the more accurate information regarding incoming wood volumes to identify potential inconsistencies with industry recovery standards. Any discrepancies are clarified with a follow-up telephone call to the participating company.

Land-based sources of wood residue such as agriculture, residential or landclearing use geographic information combined with anecdotal or referenced information to derive wood residue volumes. The geographic information for these sectors can come from local government GIS systems, economic development information and Statistics Canada. For example, the number of hectares of orchards or vineyards and number of single family residences could be identified for the overall region and sub-units of the region using queries from a GIS system. Discussions with key members of the agricultural community identified approximate volumes of wood residue per hectare resulting from pruning and orchard replacement activities allowing estimates of total wood residue generated from each activity. Wood waste volumes from residences are an estimated 100kg/household. The amount of land subject to landclearing can be derived from building permits issued for the past five years for new construction and average lot size. Volumes of wood residue are estimated from typical biomass volumes (from Ministry of Forests) expected on undeveloped land in that geographic region multiplied by the landcleared

[3] In the forest industry re-manufacturing uses the products produced from primary breakdown facilities. These include re-saw operations, finger jointing etc. The tertiary manufacturers utilize a variety of materials however they focus upon finished products for direct sale to the consumer.

area minus the typical volume of recoverable timber. Typical end-uses for these wood volumes can be gathered through key members of the industry.

Wood residue from construction and demolition activity was best tracked by surveying end-users because of the diverse sources but relatively few disposal/recovery places for this material. Most landfill operations in B.C. track different waste fractions including C&D. Wood comprises approximately 25% of C&D waste. To further breakout the construction waste, a review of building permits can provide the basis for estimating the wood residue generated from construction.

At the completion of Phase 1, the local government will have a good understanding of the overall wood residue flows within the region. Based on this information, decision-makers can compare the results to their initial objectives. This comparison will allow the decision-makers to determine priorities for subsequent work in Phase 2, which evaluates alternative management options.

Phase 2 – Alternative Wood Handling Options

The second phase, a preliminary assessment of handling options, builds on the inventory carried out in Phase 1. Based on local government goals, wood residue streams are identified for further review of alternative handling options. This phase lays out current handling practices for each targeted wood residue stream and develops possible alternative handling configurations.

To achieve a better understanding of handling options, each option is broken down into operating steps. Using a common set of assumptions (for comparison purposes), costs for each operating step can be derived. Combining the cost of each operating step for each handling option provides an overall cost of the different options for comparison. In some cases, the handling option will target the wood component associated with a mixed waste stream (i.e. construction waste). In these cases, the costs for handling both the wood fraction and the non-wood fraction need to be included in the cost comparison exercise for the different handling option.

Some discretion is required when reviewing the costs from Phase 2. Some points to consider include:

- assumptions were made to apply to the 'median' sources of wood residue (some costs will change for specific circumstances);
- the costs are 'ideal' costs which do not incorporate the vagaries of business transactions;
- true incremental costs for adding or diverting wood residues to different disposal/end-use options are not often readily available or may not exist (i.e. costs or revenue from composting, co-generation or landfilling). These costs (or revenues) will affect the comparison of alternative handling options.

At the completion of Phase 2, the local government will have a good understanding of the basic costs of present and potential handling configurations for different wood residue streams within the region. Based on this information, decision-makers can compare the results to their initial objectives. This comparison will allow the decision-makers to determine priorities for subsequent work in Phase 3.

Phase 3 – Detailed Assessment of Specific Wood Residue Handling Options

The information collected in Phase 1 and 2 should provide decision-makers sufficient information to determine whether certain changes to the collection and handling operations will assist with meeting their original goals. Phase 3 includes carrying out a more detailed assessment of specific options to determine if pursuing the option(s) will accomplish the original goals in a fiscally and environmentally responsible manner.

An overall benefit-cost analysis should be carried out before committing to a certain new management strategy. The analysis should include:

1. a full cost accounting of present and proposed practices;
2. a market survey of proposed wood residue end-uses;
3. an impact study on other waste management operations and businesses;
4. identification of specific infrastructure, capital and operating requirements;
5. an economic feasibility evaluation to determine wood volumes required to break-even;
6. a more detailed review of the targeted wood sources and the geographic distribution within the region and reasonable participation rates to expected; and,
7. a sensitivity analysis should be carried out on key assumptions and parameters to guard against unexpected outcomes.

Following the benefit-cost analyses, an implementation strategy should be outlined for options showing an overall benefit. The implementation strategy would provide decision-makers with an opportunity to review the requirements for implementing to determine whether the political will is there to make them happen. Several different implementation strategies could be explored including publicly funded programs versus private sector agreements, or changes in legislative tools (i.e. landfill bans) or policy.

Conclusion

We have outlined here a three-phase approach to developing a wood residue management strategy. Applying this approach provides the local government a cost-effective study with opportunities throughout the process to review the information and set the direction of the next phase. As the study progresses, the focus of the study becomes more refined and the level of information becomes more detailed and accurate.

The information from this process will assist decision-makers with making educated decisions to which they can be held accountable. The compilation of this information may result in third party opportunities developing without significant input by local government. Otherwise, new management programs can be funded with a good understanding of potential capacity, financial requirements, and impacts on other aspects of solid waste management.