GRADE-SPECIFIC CARBON FOOTPRINT STUDY

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Overview

- Within the North American Paper Industry, the focus of Carbon Footprint (CF) studies have centered on the analysis of individual mill carbon footprints based on the energy and greenhouse gas emissions (total global warming potential expressed in carbon dioxide equivalents) generated at the mill location. Several speakers will address the details of these calculations today.

Overview

- However, the vast majority of our common retail customers are interested in determining the carbon footprints of the items that they use everyday, including magazines and catalogs. Publishers and Catalogers need to know paper CFs by grade to provide printed product values.

Overview

- Since the amount of public research available on determining the carbon footprint of paper by grade is very limited, I was asked to initiate a study to establish a methodology to calculate the CFs of the paper grades in our product portfolio.

Overview

- It became apparent early in our study that to accomplish our objective, we needed to adopt an acceptable methodology to complete a full life cycle (cradle-to-gate) carbon footprint for each of our grades.

Overview

- Although the mill carbon footprint data is at the core of a life cycle analysis, a great deal of work was required to assign the correct portion of the mill CF to each grade and to incorporate all of the CF quantities assignable to the individual grades from materials purchased by the mill and incorporated in the final product.

Carbon Footprint by Grade

- A working group was formed with members from Product Development, Manufacturing and Sustainability to define the carbon footprint (CF) of Verso production by product.

- We chose 30 lb. Advocate HB manufactured at Bucksport as our initial product to profile. We included a separate study for the product at 10% and 30% recycle content.

Carbon Footprint by Grade

- As stated, the CF of each mill site was limited to data generated from energy use statistics and fuel sources using the NCASI model. We worked with our vendors to add the required coating material and purchased pulp CF manufacturing data to our footprint by product calculations.

- We determined that we did not have the in-house expertise and data needed to complete a full life cycle analysis (LCA) of the entire production chain of each of our products so we engaged Franklin Associates as a consultant on the project.

Carbon Footprint by Grade

- Access to the Franklin life cycle inventory (LCI) database was required to determine the carbon footprint of materials such as recycled pulp and to add the required transportation and forestry footprints based on a recognized LCA methodology.

- Franklin engineers also constructed a model for our use that allows us to recalculate the carbon footprint as mill inputs are optimized.

Methodology

- **Protocol**

  The carbon footprint study follows the Green House Gas (GHG) Protocol published by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). In addition, Franklin Associates' life cycle inventory (LCI) methodology for product systems is used extensively.

- **Recycled Content**

  No GHG emissions are associated with the manufacture of the original paper. The GHG emissions for the recycled pulp begin with the collection of post-consumer waste paper.

Methodology

Inventory Boundary:

- The carbon footprint for the 30 lb HB paper is a cradle-to-gate estimate of carbon dioxide (CO2) equivalents, beginning with the acquisition of raw materials and ending with the production of 30 lb HB, ready to ship.

- No standards exist for setting inventory boundaries – Verso's study could be one of the most complete in the industry.

Inventory Boundary

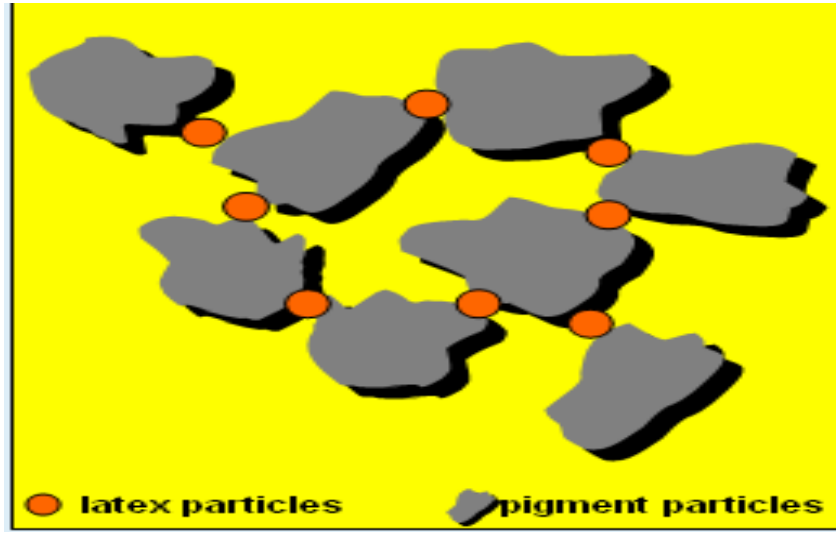
- The study includes the planting and harvesting of trees
- Woodlot and sawmill operations from which wood chips are obtained
- The transportation footprints of wood and pulp shipments to the mills in the study

Inventory Boundary

- The energy and CO2 emissions from the pulp and paper mills involved in the study
- Collection and processing of waste paper used to produce recycled pulp
- Pre-combustion footprints of energy sources

Inventory Boundary

- All the steps in the manufacture of different coating components, including raw material acquisition and transportation from point of origin
- We even included transmission line losses within the grid

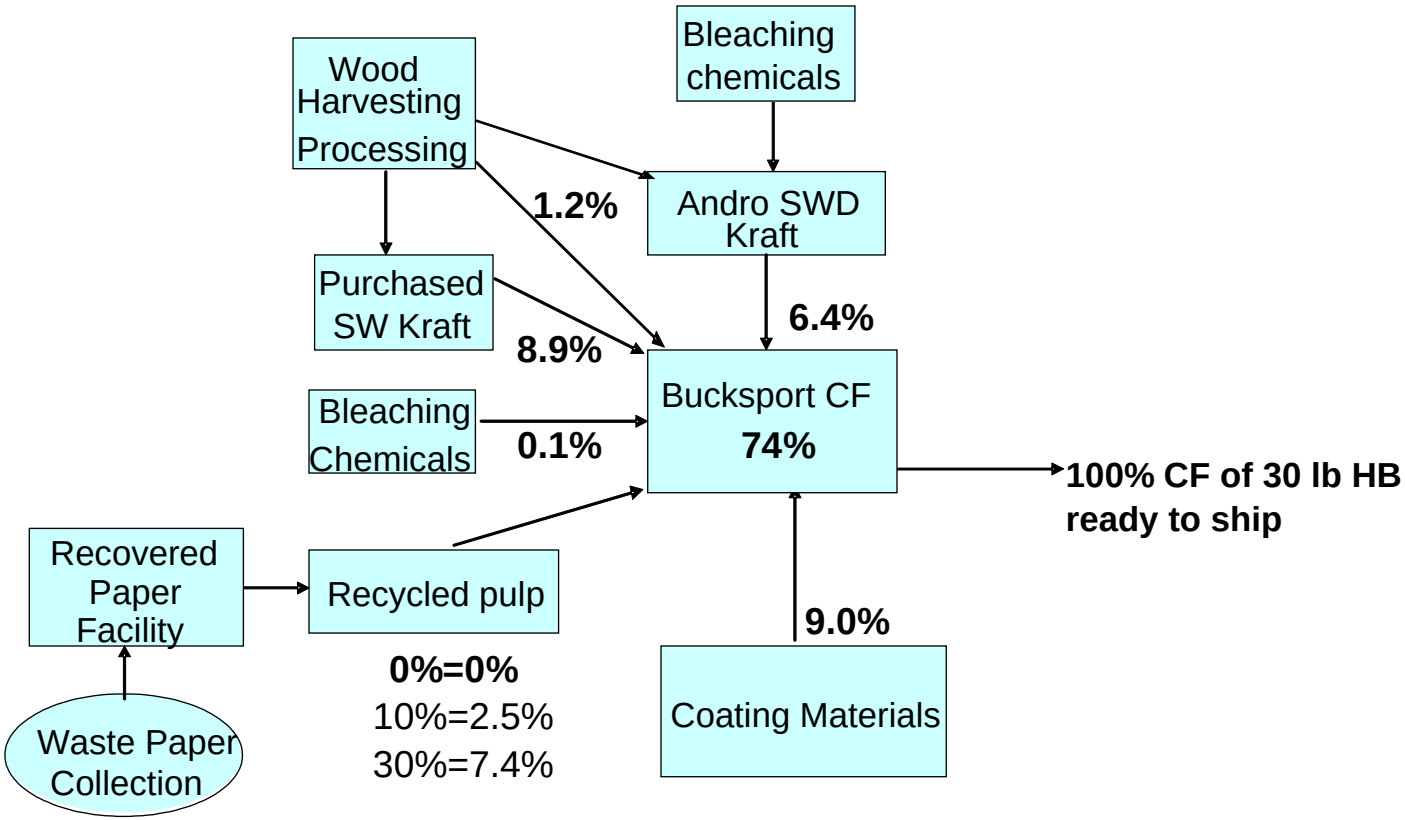


Findings

- At this time, we elected not to publish specific data from the study since a universally accepted protocol has not been established for determining paper product CFs.
- However, 2 predominate LCA footprints for magazine papers are widely used in the industry and their published values range from a low of approximately 1 ton CO2-eq/ton of paper to 3.2 ton CO2-eq/ton of paper at 0% recycle.
- Our results for Bucksport 30# HB were lower mid-range using our methodology.

Component Contribution

Time 30 lb HB – 0% recycle
by % CO2



Effect of Recycle Pulp Usage

- The end-of-life methodology used for this report calculates the net greenhouse gas (GHG) credit associated with avoided office paper disposal when recovered paper is used to produce recycled pulp as an input to Verso paper.

- Study results presented include a global warming potential (GWP) credit for the recovery of paper used to produce recycled pulp compared to the CF results calculated without the credit.

Effect of Recycle Pulp Usage

- The basis for this credit is avoided disposal of office paper with 80% to landfills and 20% to waste-to-energy facilities.

- The estimate for GWP credit for recovered paper is based on the methane produced from maximum degradation of office paper (based on landfill simulation experiments), the average methane recovery rate for U.S. landfills, the average waste-to-energy use of landfill methane, and carbon sequestration in paper that does not decompose.

Recycle Pulp Impact W/WO Landfill Credit

%RECYCLE	0	10	30
#CO2/ton paper			
without methane			
% INCREASE	--	0.7	2.5
w/methane credit			
% DECREASE	--	-4.4	-12.8

Other Recycle Considerations

- For the cases of 10% and 30% recycled fiber content, all other pulps and additives were decreased proportionally.
- No adjustments were made to compensate for possible strength and optical losses, paper machine efficiency drops or energy requirement changes from the use of recycled pulps.
- While these changes may be somewhat minor at 10% recycled fiber content, they could be significant at 30% recycled fiber content, requiring increases in softwood Kraft, refining, and coating changes.

Other Recycle Considerations

- The GWP credit associated with recycled content paper assumes that the recycled fiber would not have been diverted from the landfill otherwise.

- Given the state of high demand for recycled fiber globally, it is quite likely that paper not diverted for the purpose of being part of a coated paper product would find beneficial use elsewhere, and not be landfilled.

- Therefore, the key goal we should address is the overall recovery rate in the U.S., which is hampered more by supply constraints (consumer education and behavior, municipal infrastructure and budgetary concerns) than by lack of demand.

Discussion

- Carbon reporting standards for LCA analysis are in the “Wild, Wild West” phase of development. How do we reconcile various protocol assumptions used by EPA, NCASI, Franklin, WRI, EDF, & Heinz?

- The lack of detailed information on some methodologies makes comparisons to our results difficult.

- Obviously, mill fuel sources and grid profiles still account for the bulk of the carbon footprint values.

Discussion

- External pulp and coating component data is “self- reported”. We have few resources to audit this data. High cost coating components tend to have the highest CFs.
- Protocols for calculating and reporting landfill methane credits for recycle pulp use are even more controversial than those used for calculating manufacturing carbon footprints.
- Landfill rates of decay vary greatly depending on moisture content and the type of paper in the landfill. Regional methane gas recovery rates vary dramatically in North America.

Acknowledgements

- Verso – Craig Liska, Nehl Aldridge, Steve Brooks, Mike Chwan, Jim Contino, Monica Garvey, Brad Nurmela

- Franklin Associates – Bill Franklin, Bev Sauer, Terrie Boguski

Appendix

Franklin Associates

- Staff includes original developers of life cycle methodology in the U.S.; senior staff have 17 years or more of LCA experience.

- Most experienced Life Cycle Inventory practitioners in the U.S. with the most extensive U.S. LCI database in the world.

- Over 35 years of practice; have conducted hundreds of life cycle studies on a wide variety of products and packaging systems.

Methodology

- **Co product**

  Franklin Associates follows the guidelines for allocating co-product credit (e.g. exported power) shown in the ISO 14040 series.

- **Reporting Period**

  The reporting period for the inventory is the calendar year 2006. Where data for 2006 is not available, the best estimate is used.