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SimplyGreen®

Straight talk on sustainability.

Verso believes a thorough life cycle assessment is the most effective way to identify greenhouse gas sources, quantify emissions and reduce carbon footprint.

Verso has reduced greenhouse gas emissions per ton of production (intensity) from our paper mills by 19% since 1998 and we are committed to continuous improvement.

Life Cycle Analysis and Carbon Footprint

Verso Paper Corp.'s Position

As worldwide debate continues over broad-based, long-term strategies to mitigate global climate change, we believe entities that use fossil fuel resources, like Verso, can and must take steps now to reduce greenhouse gas (GHG) emissions and shrink the carbon footprint we leave on the environment. To do this, however, we must first know the size of our footprint – how much carbon we're emitting – and where that carbon comes from. Verso believes a thorough life cycle assessment (LCA) is the most effective way to identify greenhouse gas sources, quantify emissions and reduce carbon footprint, and we've developed an LCA-based model to help us achieve these goals.

Background

Paper companies emit three primary greenhouse gases in the manufacturing process – carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). These gases are released when fossil fuels such as coal, oil and natural gas are burned as fuel. Beginning after the Rio Earth Summit in 1992, most paper manufacturers began measuring and reporting the GHG emissions resulting from their manufacturing operations. Overall, the paper and forest products industry has done a good job of reducing GHG emissions. According to the American Forest & Paper Association (AF&PA), the industry reduced GHG emissions per ton of product (intensity) from direct and indirect emissions by 14%% between 2000 and 2008. (Paper mills emit GHGs directly as a result of manufacturing operations and indirectly by purchasing pulp and by purchasing electricity from utilities). This improvement was the result of energy efficiency improvements, increased use of carbon neutral biofuels and reduced use of purchased fossil-fuel energy. Since 1998, Verso has reduced mill greenhouse gas emissions per ton of paper produced by 19%.

While most carbon emissions associated with paper products result from the manufacturing process, mill emissions tell only part of the story. To measure the complete carbon footprint of paper products, it's necessary to measure emissions throughout the paper life cycle, from the growing and harvesting of trees through final disposition. If a product includes recycled content, it's also important to include the recovery, de-inking and re-pulping processes, as well as methane emissions that are avoided when recovered paper is diverted from landfills.

Until recently, a consistent model for determining the carbon footprint of paper products was not in sight. A few organizations, like the Heinz Center for Science, Economics and the Environment, completed paper product carbon footprint studies that used real emission data across various parts of the supply chain such as tree harvesting, manufacturing, transportation, printing and final disposition. However, there were no set boundaries on what should and what should not be included in a carbon footprint assessment for paper, so there was no way to make valid, meaningful assessments across products categories.

Greenhouse gases have varying degrees of climate change potential. To provide a common frame of reference, the potential of GHGs such as methane and nitrous oxide is often expressed as the equivalent amount of carbon dioxide or CO₂-eq.

Our study, one of the most thorough carbon assessments of paper products to date, included a forest-to-gate estimate of CO₂-eq. for a 30-pound coated paper with post-consumer waste versus a similar product with no post-consumer waste content.

Carbon Calculators vs. Hard Data

In recent years, many Internet-based “carbon calculators” have gained popularity as those concerned about protecting the environment seek out ways to do their part. However, most of these are consumer-focused tools that deal with household energy use and personal travel and studies show that even when the same input data is used, results vary widely from calculator to calculator. More important, these consumer-oriented tools are very simplistic and have no capability to address the link between paper and GHG emissions.

There are a few paper-specific Internet-based carbon footprint calculators available, such as those developed by the U.S. Environmental Protection Agency and the Environmental Defense Fund (now managed by the Environmental Paper Network), and they can serve as a good starting point for companies interested in evaluating the environmental aspects of paper products. While these tools generate theoretical figures that can provide a useful environmental overview, they are no substitute for getting real numbers based on a thorough GHG accounting of the paper supply chain.

Verso’s Approach to Carbon Footprint Assessments

Driven by increasing customer demand for carbon footprint information on specific paper products and the anticipated wait for a standardized protocol to measure carbon footprint across the paper supply chain, we decided to move forward with our own comprehensive assessment program beginning in 2007. In 2008, we completed the first phase of this program to determine the carbon footprint of our paper products by grade.

Our study, one of the most thorough carbon assessments of paper products to date, included a forest-to-gate estimate of carbon dioxide equivalents (CO₂-eq.) for a 30-pound coated paper with post-consumer waste content – Advocate® Hi-Bulk™ produced at our Bucksport Mill – versus a similar product with no post-consumer waste content. Verso is an industry leader in manufacturing such lightweight paper products, which require less resources – energy, wood fiber, water and chemicals – to produce.

Verso worked with Franklin Associates, Ltd. (FAL), an internationally recognized life cycle inventory consultant, to help establish a methodology, guide the carbon footprint study and develop needed data. Our study followed the Greenhouse Gas Protocol developed by the World Resources Institute and the World Business Council for Sustainable Development, as well as FAL’s life cycle inventory methodology for product systems, which is consistent with ISO 14040 and ISO 14044 life cycle assessment standards.

Assessment Boundaries

Using 2006 data, our life cycle analysis included the planting and harvesting of trees; sawmill operations from which wood chips were obtained; paper mill operations for producing the different types of pulp used in the product; collection of waste paper used to produce the recycled pulp in the product; paper recycling operations; and all steps in the manufacture of different coating components, including raw materials acquisition and transportation from the source. We didn’t audit data on coating components and purchased pulp, which was self-reported by suppliers. We also included energy transmission line losses and pre-combustion footprints in our energy statistics. For recycled content, no GHG emissions were associated with the manufacture of the original paper; GHG emissions for the recycled pulp began with the collection of post-consumer waste.

Results

The carbon footprint for Verso’s Advocate® Hi-Bulk™ 30-pound product with no recycled content measured 1.81 tons of CO₂-eq. per ton of paper produced. As would be expected when CO₂-eq. from fiber recovery, cleaning, de-inking, re-drying and delivery to the mill are added to the equation, the carbon footprint of the Advocate® Hi-Bulk™ 30-pound paper containing recycled content – both 10% and 30% – was slightly higher than that of the product with 100% virgin fiber. At 10% recycled content, the CO₂-eq. increased by 0.7%; at 30% recycled content, the CO₂-eq. increased 2.5%.

However, when we factored in avoided landfill emissions using global warming potential credits (based on avoided disposal of office paper with 80% going to landfills and 20%

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Verso collaborated with the National Geographic Society and commercial printer Quad/Graphics to measure the carbon footprint of National Geographic magazine. The partners are now using the assessment data to help identify opportunities for future environmental improvement.

to waste-to-energy facilities), the results shifted. The carbon footprint of the recycled-content product was lower than that of the 100% virgin product: 4.4% lower with 10% recycled content and 12.8% lower with 30% recycled content. It's important to note that while landfill credits can be useful in evaluating the overall carbon footprint of paper products, the protocols used for calculating and reporting them are very inconsistent, making them somewhat controversial.

Interpreting the Results

Many operational factors can affect carbon footprint results. For the purposes of our carbon footprint study, where 10% and 30% recycled content were used, all other pulps and additives were decreased proportionally. No adjustments were made for losses in paper strength or optical qualities, drops in paper machine efficiency or changes in overall energy requirements from the use of recycled pulp. While these changes may be minimal at 10% recycled fiber content, they could be potentially significant at 30%, requiring increases in softwood kraft, refining and coating changes.

When considering global warming potential credits associated with the avoided disposal of a particular recycled content paper, it is often assumed that the recycled fiber in that product would not otherwise have been diverted from the landfill. In a typical market where demand for recovered paper is high, that's not the most likely scenario. Paper not diverted from the landfill for use in a specific paper product would likely be diverted for beneficial use elsewhere. While this was not the case in late 2008 and 2009 because the global financial downturn created a surplus of recovered fiber, the demand for recovered paper is on the rise as a result of economic recovery and continued tightening of the world market for recovered fiber is expected as demand increases.

Sharing Our Expertise

When the National Geographic Society (NGS) wanted to measure the carbon footprint of their flagship magazine, they found a ready and enthusiastic partner in Verso. After we completed the life cycle assessment outlined above, refining and expanding our model to help NGS reach their goal was a logical next step. Verso customer Quad/Graphics, which prints and distributes the magazine, also participated in the study. The *National Geographic* LCA included a cradle-to-grave approach that estimated greenhouse gas (GHG) emissions from NGS operations, the harvesting of trees to make the magazine's paper, the paper manufacturing and printing processes, distribution, recycling and disposal.

For the paper portion of the LCA, we completed a forest-to-gate estimate of our 50-pound National Geographic Gloss paper with and without recycled content. We evaluated GHG emissions beginning with raw materials acquisition and ending with the product ready to ship. Results indicated that GHG emissions – expressed as carbon dioxide equivalents (CO₂-eq) – were virtually the same for paper with zero percent, 5% and 10% recycled content, or approximately 1.57 tons per ton of paper. This translates to about 1.28 pounds of CO₂-eq. emitted for an average 12.3-ounce copy of *National Geographic* magazine. For all three paper grades, mill fuel sources and power grid profiles accounted for the bulk of emissions.

The results of the complete life cycle assessment showed that an average *National Geographic* magazine is responsible for emitting 1.82 pounds of CO₂-eq. About 70% of that total (1.28 pounds) comes from the paper manufacturing process, 26% (0.47 pounds) results from printing and distribution of the magazine, and 4% (0.07 pounds) results from other activities, including NGS operations, packaging and landfilling. To put this in perspective, the same amount of CO₂-eq. is emitted when someone drives just under two miles in a car that gets 20 miles per gallon of gas.

Using LCA to Enhance Environmental Performance

In addition to enabling carbon footprint measurements for specific products, life cycle assessments are helping us identify opportunities to reduce greenhouse gas emissions at each stage of the paper supply chain. For example, we've identified opportunities for improving transportation efficiency by converting shipments of some raw materials from truck to rail transport. Rail is 70% more fuel efficient, which translates into reduced GHG emissions.

We're also working with our supply chain partners to find ways to ship dry chemicals to locations closer to our mills before they are mixed with water to create slurries needed for paper production. For chemicals that are 25% solids and 75% water, transporting in dry versus wet form significantly reduces freight. Reducing the tons of water transported over longer distances reduces CO₂ emissions and the carbon footprint of our products.

The World Resources Institute Protocol

Over the last several years, the World Resources Institute (WRI) has been developing product and supply chain GHG accounting and reporting protocols. In 2009, Verso was among a select group of 60 companies invited to participate in a road test of WRI's Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard. Our participation in the road test included the completion of a comprehensive magazine life cycle assessment using the WRI standard. We were extremely gratified to find that the new standard is so closely aligned with Verso's carbon LCA model described above. The final WRI standard is expected in the fall of 2011.

Conclusion

The WRI protocol will provide a single standard that incorporates a comprehensive life cycle approach – using CO₂-eq. data from across the paper supply chain – to provide greater transparency on which metrics are included in footprint evaluations and which are not. This consistency will enable the development of more effective carbon footprint tools and calculators, give paper buyers the information they need to make valid assessments across product categories and ultimately, give paper manufacturers like Verso the best data available to set future greenhouse gas emission reduction goals.

For more information on life cycle assessments, carbon footprints or other sustainability topics, please contact Verso's Office of Sustainability at 901-369-4154 or visit www.versopaper.com/sustainability.