The Carbon-Paper Link: How Simple Choices Reduce Emissions

Maryruth Belsey Priebe

April 28, 2009

Stacks of paper wait to be recycled. **(stock.xchng / MrTim20)**

Gone are the days of pressing words through powdery sheets of black and red carbon paper. Yet the association of carbon to paper has perhaps never been more intimate than it is today. We're referring, of course, to the relationship between paper consumption and the production of that oh-so-prevalent greenhouse gas--carbon dioxide.

Root concerns: making the carbon connection

The carbon-to-paper connection may seem obvious given paper's reliance on carbon-sinking forests. After all, forests are one of the **largest land-based sources of carbon sequestration**-they capture more CO_2 than they emit, making them carbon-positive.

That said, paper's climate influence goes well beyond forestry management due to two factors: energy intensive manufacturing and anaerobic decomposition.

The production of paper is the **third biggest energy consumer in the US**, requiring more than 10 percent of all energy consumed in the industrial sector. And at the end of a paper's life, if it's thrown in the trash and left to decompose in an oxygen-deprived landfill environment, it releases methane gas, a greenhouse gas that's 20+ times more efficient at trapping heat in the atmosphere than carbon dioxide.

To put this in perspective, consider the combined greenhouse gas emissions released by the catalog industry. The equivalent carbon dioxide emissions released from mills and by land filled paper is approximately equal to **driving 1.7 million cars 200 miles weekly** (figures from 1999).

No doubt, from start to finish, using paper is a climate matter, and one that universities are taking seriously in their efforts to curb their overall carbon emissions.

Solution one: secondhand content

Post-consumer waste (PCW) recycled content paper is top shelf for any university or college seeking ways to make better paper purchasing choices. According to the US Environmental Protection Agency (EPA), manufacturing paper from recycled materials rather than virgin tree pulp requires **60 to 74 percent less energy**. And for every ton of paper saved from the waste bin, **15-17 mature trees are preserved**. Using secondhand fibers also produces less wastewater, solid waste, and particulate air pollution.

The University of Oregon (U of O) has recognized the importance of responsible paper purchasing since 1996. According to Steve Mital, director of sustainability, their estimated annual paper consumption is approximately 35,380,000 sheets. But since their policy recommends a minimum of 50 percent recycled content (30 percent PCW), their average CO_2 production (when plugged into the **Environmental Defense Fund's Paper Calculator**) is about 492,319 lbs less than the equivalent virgin paper.

They have, however, faced several challenges since their policy was first established, not least of which is the issue of a decentralized purchasing scheme. Although at the policy's inception, paper purchasing was coordinated out of one office, they now permit departments to place their own direct orders. This makes tracking and enforcement of the policy difficult and has prompted the formation of a team to reconsider the guidelines.

Solution two: sustainable forestry

Beyond PCW, many institutions are looking to **Forest Stewardship Council (FSC)** certification to ensure sustainability for both recycled-content and virgin fiber paper products. As the only international forestry certification program recognized by all major environmental organizations, FSC endorses the sustainable (read: carbon-conscious) management of certified forests and maintains a secure **chain of custody** to safeguard their finished products.

FSC certifies a variety of items, making it possible to purchase environmentally preferable options for every paper product requirement, including those that, for performance reasons, cannot contain recycled fibers.

Homboldt State University, for example, has a robust paper purchasing policy that includes both 100 percent PCW and virgin-fiber FSC-certified paper. According to David Lawlor, web editor, and Matthew Brunner, printing supervisor, the institution undertook an extensive vetting process to determine the best paper alternatives, studying stability of individual sheets, production of dust and wind, and performance in various print machines. "We knew it was going to cost us more money to purchase the paper," commented Brunner, "but we didn't want it to increase labor costs with increases in machine jams and personnel frustration."

Although the conclusions of different testers were somewhat varied, Humboldt was able to settle on a couple of paper options. The earliest choices proved to have some performance issues, and so in time new brands were chosen: **OfficeMax 100% Recycled** and **Gray's Harbor 100** are now regular and reliable choices.

Price was also a factor in Humboldt's considerations. As part of the evaluation phase, the team consulted students, asking them in particular whether they'd be willing to pay an extra $1 per semester for the purchase of eco-friendly paper. Although there has been a slight increase in paper costs and though the majority of students agreed in principle to the extra fee, it was never imposed. Instead, the school went through a bidding process to ensure they'd receive competitive pricing

In all, Humboldt's efforts have netted some satisfying results. In 2006, for instance, they purchased 2,900 cases of paper, which gave them a savings of 1,200 trees, 349,000 gallons of water, 3,000 pounds of air pollution, 104,000 pounds of greenhouse gases,

from their suppliers. Humboldt's negotiated discounts are now available to any state institution, resulting in a wider acceptance of recycled paper purchasing among the region's businesses.

204,000 kWh of electricity, and 215 cubic yards of landfill space.

But not all green paper purchasing choices have to cost more. Princeton's paper suppliers, for instance, recently raised the prices of virgin and 30 percent PCW paper, but not that of 100 percent PCW paper, making their choice of 100 percent recycled paper essentially cost-neutral.

Solution three: limiting toxicity

Humboldt isn't the only institution leading the way in responsible paper purchasing. Purchase College (Purchase, NY) announced on an unlucky Friday, February 13, 2009 that they would be the 13th university to join a growing movement of higher education institutes **removing Kleenex products** from their campus (a brand that uses primarily virgin fibers despite continued pressure to do otherwise from organizations such as Greenpeace).

But this isn't Purchase's first foray into environmental activism. They already have a solid paper procurement policy that requires the use of 100 percent post-consumer content paper. This includes not only copy paper, but also napkins, paper towels, facial tissue, toilet paper, and janitorial paper supplies, of which they purchased over 50 tons in their 2007-08 school year.

Purchase also requires that all paper products be whitened without the use of chlorine bleach to the largest extent possible. Traditional paper whitening techniques use chlorine, which contributes hazardous dioxins to waterways adjacent to pulp and paper mills. Dioxins are **considered likely carcinogens by the EPA**, and research suggests they damage human endocrine, immune, and skeletal systems. According to the Responsible Purchasing Network, **60 percent of bleached pulp produced in the US** is used for copying, printing, and writing paper products.

But here, too, there's a climate connection. Whitening paper **with chlorine is actually more energy-intensive than other, less toxic whitening techniques**, so opting for bleaching alternatives, of which processed chlorine-free [PCF] is preferred, further reduces the embodied energy in paper.

Table 1: Hierarchy of paper bleaching technologies:

	ocess	**Advantages**
Elemental Chlorine	Uses elemental chlorine	Elemental chlorine was phased out in the US in 2001
Elemental Chlorine Free (ECF)	Uses chlorine dioxide instead of elemental chlorine	Since 2001, this is required by the EPA
ECF with extended or oxygen delignification ("enhanced ECF")	By removing more lignin before bleaching, less energy and fewer chemicals are required (chlorine dioxide still required in final stages)	Energy consumption is reduced by 30%, wastewater quality is improved, and wastewater quantity is reduced by 50%
Enhanced ECF with ozone or hydrogen peroxide	Uses hydrogen peroxide or ozone during initial whitening stages (chlorine dioxide still required in final stages)	Wastewater quality improvements over enhanced ECF, and since most wastewater is recoverable, the quantity is reduced by 70% over traditional ECF
Processed Chlorine Free (PCF) or Totally Chlorine Free (TCF)	Uses oxygen-based compounds instead of chlorine	Wastewater can be almost entirely reused. PCF contains recycled

		fibers where TCF is made from virgin paper.

Source: **Environmental Defense Fund - Copy This!**

Solution four: shrinking waste

Perhaps one of the best ways to reduce paper-related carbon emissions is to reduce the amount being consumed altogether. **Thirty-two percent of the US municipal waste stream** in 2007 consisted of paper, 72 percent of which was recycled.

Both Homboldt and Purchase have taken measures to reduce the quantity of paper consumed on campus with source reduction measures that include:

- Encouraging the use of electronic over paper communications
- Charging students for computer lab and copier printing, with a reduced rate for duplicated copies
- Distributing instructive materials to encourage efficient paper-use habits
- Providing reusable inter-institution envelopes for internal communications
- Permitting students to hand in assignments electronically or double-sided
- Switching from paper to electronic versions of course catalogs and registration materials
- Turning paper milled-scraps into scratch pads which are given free to anyone on campus

Stemming the flow of waste paper is a simple, low-cost way to reduce supplies, printing, and disposal costs, and can have a significant impact on overall climate calculations.

Making the carbon-paper correlation stick

Despite convincing evidence and growing green paper selection, many responsible paper purchasing policies are still in their infancy. Some institutions are struggling with price issues, made more urgent by a tough economic climate. Others, like the U of O, are grappling with coordination in a decentralized purchasing scheme. Still others, like the University of Alberta, have a **movement of students pushing for eco-friendly disposable paper products**, but change by upper management is slow to come.

Institutions that have already cleared the path can make recommendations to those exploring responsible paper purchasing policies for the first time. **Humboldt State**, **Princeton**, and the **University of Oregon** have uploaded their policies to the Web for others to use as models. But sometimes even these schools can learn from alternative approaches. "We believe our program is pretty good," comments Steve Mital, Director of Sustainability at the U of O, "but we think we can learn from what other institutions are doing, too."

See More:

The New Kind of Forestry: ClimateEdu

Paper Selection Guide: **Conservatree**

The Paper Consumer's Guide to Climate Change: **Metafore & Gagliardi Group**

Copy Paper Purchasing Guide: Responsible Purchasing Network

Campus Ecology...It takes a big step to make a smaller footprint.