Letter to the Editor

Denison, R. 1998. Letter to the editor responding to T. Pento's letter regarding L. Blum and colleagues' (Summer 1997) "A Life-Cycle Approach to Purchasing and Using Environmentally Preferable Paper: A Summary of the Paper Task Force Report," *Journal of Industrial Ecology* 1(3): 15–46.

The answers to Tapio Pento's questions are to be found in the very sentences he has omitted from the paragraph of our paper that he selectively quotes in his response. These sentences (restored in italics below) contain the key justification for, and important caveats to, our decision to separately model and compare 100% recycled fiber and 100% virgin fiber systems:

"By examining entire systems -- rather than limiting its comparison only to the recycled vs. virgin manufacturing processes or the recovery vs. waste-management systems alone -- the Task Force was able to assess the full range of environmental consequences engendered by the choice between producing recycled-content paper and recovering and recycling used paper on the one hand, and producing virgin paper, disposing of it and replacing it with new virgin paper on the other. (The Task Force recognized that paper often contains recycled content at levels lower than 100%, and that a steady influx of virgin fiber into the overall system is essential. Use of this basis for comparison, however, allows an assessment of the relative energy use and environmental releases of each type of fiber arising from its acquisition, manufacture, use and post-use management by various means. Environmental attributes of paper containing intermediate levels of recycled content would fall between the estimates provided in the Task Force's study for the 100% virgin and 100% recycled products.)"

All too often, paper recycling has been evaluated after considering only a subset of the activities associated with acquiring, processing, using and managing (after use) recycled or virgin fibers. For example, studies frequently compare the energy required to collect paper for recycling to that required to collect waste for disposal (the former is usually higher); or they compare the amount of sludge generated by recycled vs. virgin pulp and paper mills (again, the former is higher for most grades of paper). Only by examining all analogous activities in both systems do the benefits of recycling become apparent: For example, the increase in recycling collection energy is not only relatively small to begin with, it is dwarfed by the reduction in the energy required to make paper from recycled relative to virgin fiber; and the increase in sludge from recycled mills is more than offset by the amount of paper diverted from landfills by recycling.

Pento's main objection, however, is to our decision to analyze 100% virgin and 100% recycled fiber systems in isolation from each other, rather than characterizing the myriad inter-linked systems that comprise the "full lifecycle of fibers." Our analysis was appropriate and necessary to achieve the goal of the Paper Task Force: to develop purchasing recommendations for business users of paper in the area of recycling (as well as source reduction, manufacturing and forest management). Such purchasers are specifically interested in answering the following question: From an environmental and economic standpoint, does it make more sense to collect discarded used paper and use it as a raw

material for new paper production, or to dispose of that same paper in a landfill or incinerator and make new paper wholly from virgin fiber? We fully agree with Pento (and stated so in our study) that inputs of virgin fiber are and will always be necessary to maintain the overall fiber system. We also acknowledge that our systems, while providing a consistent and comprehensive basis for comparison, are also idealized (as any modeled system is), including in their isolation from each other. Such a construct, however, is necessary to answer the question we set out to answer.

Finally, let us address Pento's claim (echoed frequently by the paper industry) that in a proper analysis a major part of "the environmental load of virgin paper should be assigned to the recycled papers." This argument follows from the questionable notion that used paper ought to be considered a "co-product" of new paper production. In fact, new and used paper are generated though wholly different means and at different times and places, and hence are not "co-produced." Moreover, unlike a true co-product (such as the natural gas collected in the process of petroleum extraction), used paper has in fact been used; indeed, it is not a product at all, but rather -- once recovered - is a raw material for papermaking, analogous to the trees that provide virgin fiber. Finally, to be consistent, Pento's allocation would have to be applied in reciprocal fashion: Some of the impacts of recycling would have to be allocated to virgin paper, given that a significant fraction of it is clearly destined to be recycled, and hence is part of its full lifecycle. Following this approach to its logical conclusion eventually leads to assigning essentially the same impact to all paper, which, after all, is all part of one big fiber system. Doing so, of course, entirely obscures any answer to the fundamental question the Paper Task Force posed: Does paper recycling make environmental sense?

Contrary to Pento's assertion that the results of our analysis are "fuzzy," they are in fact remarkably clear: For each of five grades of paper as produced in the U.S., with few exceptions across a broad range of environmental parameters, a system that recovers used paper as a raw material for new paper production has significant environmental advantages over a system that disposes of used paper in landfills and incinerators, and replaces it with new paper made wholly from virgin fiber. Such results should provide assurance to all those in a position to direct used paper toward recovery, or to purchase and use new paper containing such recovered fiber, that their actions do in fact produce environmental benefits.

We agree with Pento, who uses theoretical calculations, that there is a point beyond which there will be diminishing environmental and economic returns to paper recycling, just as there are for any industrial activity. However, the Paper Task Force found that we are far from approaching these limits in the U.S. (the focus of the Task Force's study), where one-third of the world's paper is consumed and only about 40% of that paper is recovered. (Indeed, Pento himself notes that "fibers are seldom recycled more than once even when recovery rates are over 65 percent.") Moreover, the market-based approach of the Paper Task Force is designed to provide feedback on the economic and practical status of recycling as the industry grows and matures in the coming decades.

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