

# 1 SETTING THE STAGE FOR PURCHASING ENVIRONMENTALLY PREFERABLE PAPER

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# SETTING THE STAGE FOR PURCHASING ENVIRONMENTALLY PREFERABLE PAPER

To set the stage, this chapter describes:

- The origins of the project and its purpose.
- The types of paper examined (and not examined) by the Task Force.
- The scope of our research and the thoroughness of our research process.
- The methodologies we employed in assessing paper performance, environmental issues and economic considerations.
- The nature of activities involved at each stage in the lifecycle of paper.
- Key findings concerning functional requirements for the various grades of paper examined by the Task Force.
- An overview of the structure of the pulp and paper industry.

## I. INTRODUCTION

The goal of the Paper Task Force's recommendations is to integrate environmental criteria into paper purchasing decisions on par with traditional purchasing criteria, such as cost, availability and functionality. The Task Force's recommendations offer organizations that purchase and use paper the means to work within purchaser-supplier relationships to enhance environmental quality in ways that are also cost-effective and make good business sense. By demonstrating demand for paper products that are produced using environmentally preferable methods, paper purchasers can also directly reinforce and accelerate the positive changes in practices and technological investments that are already underway in the pulp and paper industry.

This chapter provides the context and introductory information needed to understand and act on the Task Force's recommendations. To set the stage, the chapter describes:

- the origins of the project and its purpose
- the types of paper examined (and not examined) by the Task Force
- the scope of our research and the thoroughness of our research process
- the methodologies we employed in assessing paper performance, environmental issues and economic considerations
- the nature of activities involved at each stage in the lifecycle of paper
- key findings concerning functional requirements for the various grades of paper examined by the Task Force
- an overview of the structure of the pulp and paper industry

Beginning in late 1992, the Environmental Defense Fund (EDF) began contacting private-sector organizations that purchase and use paper to gauge their interest in participating in a voluntary, private-sector initiative for the purpose of identifying ways to reduce the environmental impact of paper use. The project sought to assemble organizations that represented leaders in a diversity of paper-intensive business sectors, and that purchased significant amounts of paper in a sufficient variety of grades to encompass most types of paper used in the United States. The project offered an opportunity for Task Force mem-

bers, working in partnership with other leading organizations, to respond proactively to environmental concerns related to their own and others' use of paper.

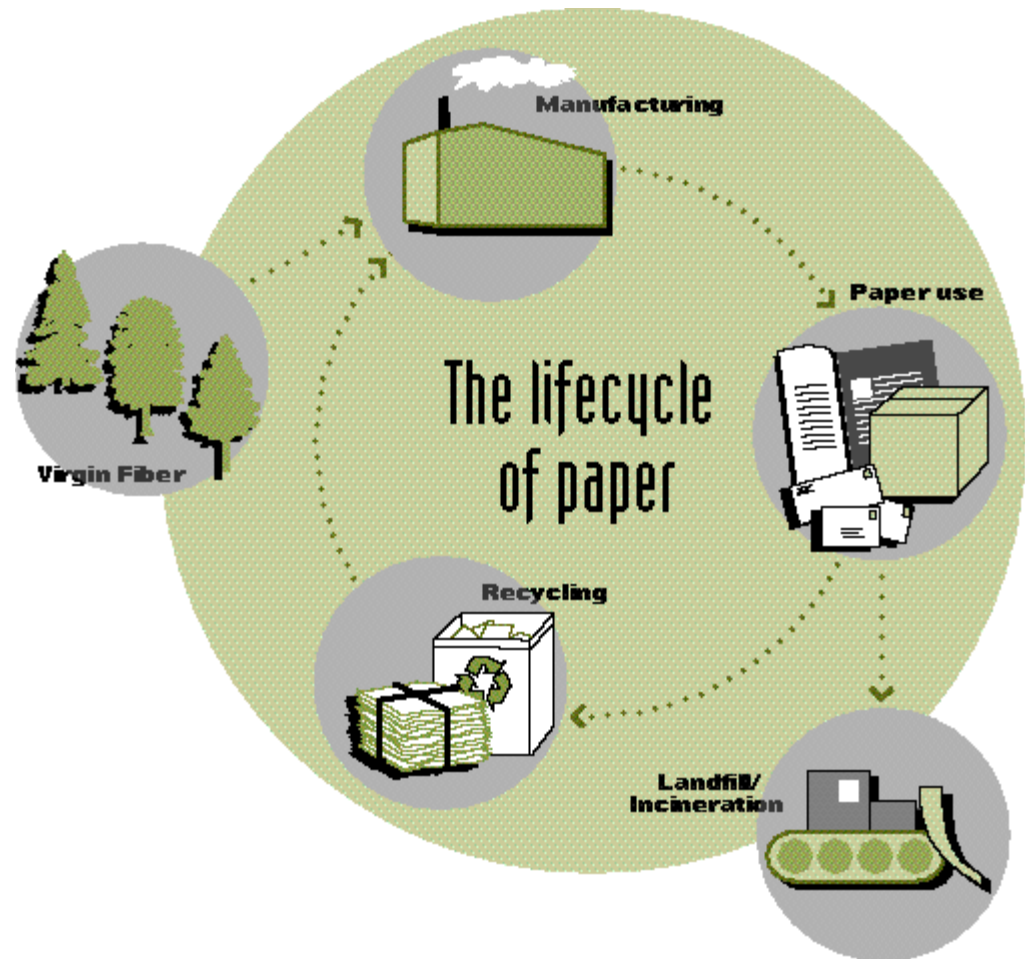
At the outset, the Task Force developed a workplan that ensured a thorough process with ample opportunity for input from other stakeholders. As described in more detail in the next section, the Task Force's research was conducted in the context of a full and open dialogue with experts from the pulp and paper industry and affiliated businesses, and from the environmental, academic and financial communities. Task Force members worked closely with their paper suppliers throughout the process.

The Paper Task Force was specifically designed as a voluntary, private-sector initiative; our aim was to develop a body of information and a model that organizations that buy and use paper could employ to identify opportunities for environmental improvement. For this reason, the Task Force intentionally did not take positions on public policy matters and did not seek to influence the content of government policy or regulations. We recognize that many of the issues which we have addressed are matters of considerable public discussion and debate, and that they are subject to public policy and regulation. In seeking to apply information derived from the Task Force's work, however, readers should be aware that there are fundamental differences between the voluntary, multiple-options approach encompassed in the Task Force's recommendations and a regulatory process that carries the force of law.

At the same time, because our intent is to increase demand for environmentally *preferable* paper, we have identified attributes of products, and of the technologies and practices used in making them, that by definition represent advances that extend beyond compliance with regulatory requirements. While we have crafted our recommendations to operate independent of the environmental regulatory system, we consider those controls and other expressions of public policy as providing the minimum level of environmental protection with which we expect all of our suppliers to comply.

Senior managers at each Task Force member organization signed a Memorandum of Agreement that established the Task Force, set out its purpose and scope of work, and delineated operating guidelines to ensure a substantive process and product.

Among the key parts of the agreement were provisions stating that all members of the Task Force would pay their own expenses for the project and that the Task Force's recommendations would be implemented individually by the Task Force members. A copy of the memorandum is attached as **Appendix A**.



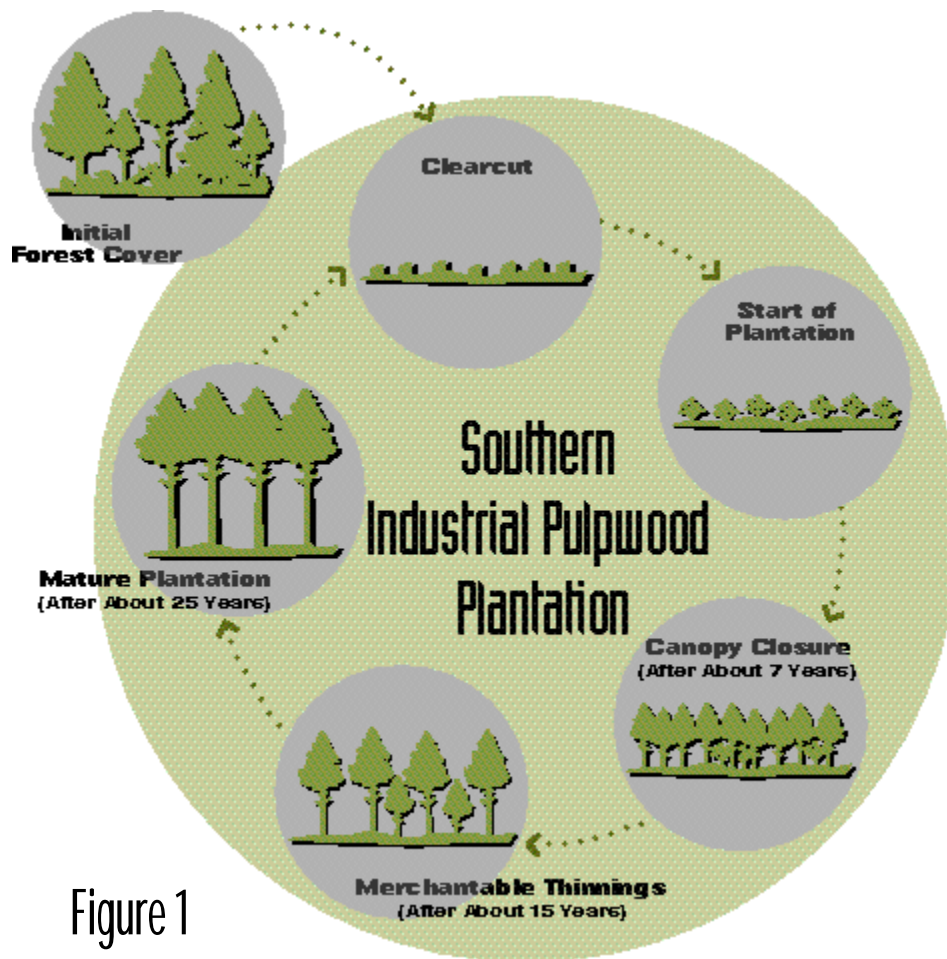


Figure 1

## II. SCOPE AND PROCESS OF THE PAPER TASK FORCE

### Types of Paper Examined by the Task Force

The recommendations of the Paper Task Force cover three major categories of paper products: printing and writing papers, corrugated shipping containers and folding cartons used to package consumer goods for retail sale. Many different specific types of paper fall within these broad categories, which represent approximately 70% of all the paper used in the United States.

The Paper Task Force's recommendations do not cover newsprint, tissue and toweling products and certain highly specialized uses of paper. We chose this approach at the outset for several reasons. The Task Force does not include any major newspaper publishers. Moreover, several other groups have examined environmental issues associated with newsprint, especially in the area of recycling;<sup>1</sup> partly in response to these efforts, there has already been significant recent investment in recycling capacity by newsprint manufacturers in North America.

While all of the Task Force members buy tissue and toweling products for their businesses, 60% of the U.S. tissue market is in the residential sector and therefore outside the Task Force's primary emphasis on commercial paper use. Commercial and residential tissue products tend to have different performance properties, and the vast majority of the tissue used in commercial establishments already contains recycled fiber, often at the 100% total recycled content level.

The research that provides the foundation for the Task Force's recommendations does analyze the totality of U.S. paper use where appropriate. For example, the Task Force's analysis of the economics of recycling considers the role of recovered paper by recycled newsprint and tissue manufacturers in the overall paper recycling system in the United States. Research on the environmental aspects of paper recycling versus conventional solid-waste management also considers the environmental aspects of collecting newspapers and manufacturing newsprint

with recycled content, because these activities are a major part of the current recycling system.

While we caution against applying the Task Force's recommendations in the areas of recycling and manufacturing to the grades of paper that we did not examine, the recommendations on forestry are broadly applicable to any conventional wood-based paper produced in the U.S. For the truly ambitious paper purchaser, the full research and evaluation methodology developed by the Paper Task Force could be used to develop purchasing recommendations for paper grades we did not cover.

## Basic Steps in the Paper Lifecycle

This section provides a brief overview of the activities involved in acquiring virgin fiber from forests, transforming that fiber into pulp and paper products, and managing these materials after they are used. The intent is to familiarize the reader with the basic practices and technologies, as well as the associated terminology, in order to facilitate understanding of the Task Force's recommendations.

### Virgin Fiber Acquisition: Forest Management

Forest management, or *silviculture*, for the purpose of producing fiber can be viewed on two different scales. The first involves the specific activities carried out on a specific *stand* of trees over the course of a specific time period, called a *rotation*. The second involves the spatial and temporal distribution of silvicultural activities across the many stands that may occur in an area of managed forest. Two major types of silvicultural systems can be distinguished. *Even-aged management* involves stands where virtually all of the trees are of basically the same age, reflecting the fact that all the trees in the stand were harvested, and all of the trees in the new stand were established, or *regenerated*, at approximately the same time. *Uneven-aged management* involves harvesting and regeneration that are spread both spatially and temporally over the stand, thereby resulting in a stand of trees covering a wide range of ages and sizes.

In most silvicultural systems, activities conducted in a given stand over the course of a given rotation may include road construction, maintenance and use; harvesting; site preparation; regen-

eration; stand tending and protection; and thinning. At the end of the rotation, the stand is harvested and the cycle begins again. For each activity, a variety of methods may be used, depending on the character of the specific site, the tree species and other values being managed for, and the overall intensity of management. **Figure 1** illustrates the stages of a typical southern pine plantation rotation. More detail on these activities and their associated impacts is provided in Chapter 4 and in White Papers Nos. 4 and 11.

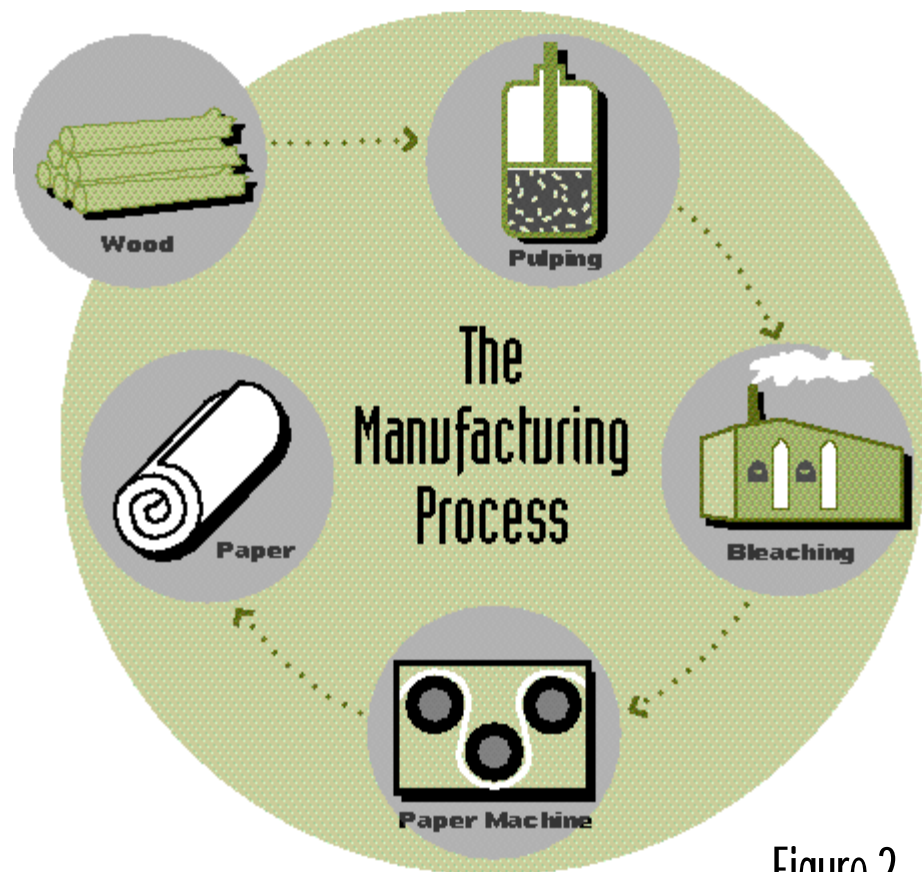


Figure 2

### Pulp and Paper Manufacturing

Transforming cellulose fibers (whether from wood or other plants, or from recovered waste paper) into paper consists of three basic steps. First, the raw material is *pulped*. Pulp mills use mechanical or chemical processes, and sometimes a combination of the two, to break up the fibers and separate them from unwanted materials. In mechanical processes, the fibers are physically separated from each

other, while in chemical processes, the fibers are also separated from lignin (the “glue” that holds the fibers together in wood). Second, if needed to produce a white pulp used in many paper products, the pulped fibers are chemically *bleached* in a multi-step process. A variety of chemicals may be employed in bleaching, including the elemental form of chlorine or other chlorine compounds such as chlorine dioxide, and oxygen-based chemicals such as hydrogen peroxide or ozone. Finally, the bleached or unbleached pulp is spread in a thin layer, pressed and dried on a paper machine to make paper.

Each of these steps is illustrated in **Figure 2**. While cellulose fibers account for the bulk of paper, some paper products also incorporate coatings, fillers or other additives to impart desired qualities. Water is an important component at all stages of the papermaking process because it carries the fibers through each step.

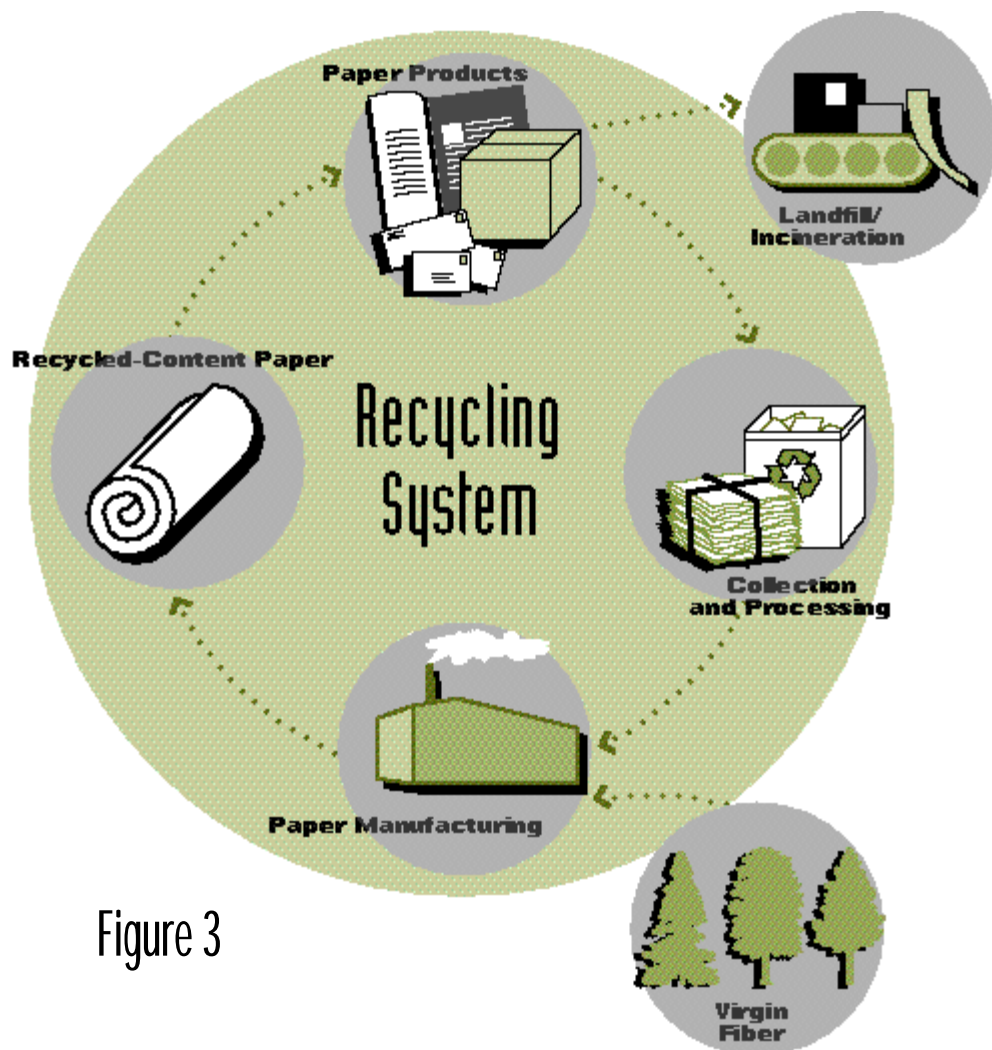


Figure 3

### Recycling and Waste Management

Depending on one’s perspective, the practice of recycling represents both an alternative source of fiber for making paper, and an alternative to traditional means of solid-waste management, such as landfilling and incineration. The paper recycling process has several steps, illustrated in **Figure 3**. First, used paper must be segregated and *collected* separately from solid waste. This step is usually the responsibility of the business or household that generates the used paper and other recyclable items. In some cases, recycling collectors or solid-waste haulers will pull recyclable paper from clean loads of mixed commercial waste, typically from offices. The next step is *processing*, which usually means some form of sorting of loose paper to remove obvious large contaminants, and then baling the paper for efficient transportation and storage. Finally, the recovered paper is cleaned and processed at a mill and made into pulp suitable for *manufacturing* new paper products. The nature of this fiber-cleaning stage depends on the type of paper being made. For example, recovered paper used in making new printing and writing paper, tissue and newsprint is deinked, while recovered paper used to make paperboard usually undergoes less extensive processing.

Managing discarded paper as solid waste instead of recycling it involves collecting refuse in conventional “garbage trucks,” sometimes transferring the waste to larger trucks or railcars at a trans-

fer station for shipment, and landfilling or incinerating the material. Landfilling generates by-products such as landfill gases and leachate, while combustion in an incinerator produces a variety of air emissions and ash residue, which must be landfilled.

## The Task Force's Research Process

Over the course of more than two years of research, the Task Force assembled a body of information that is unique in its depth and scope. We spent roughly equivalent amounts of time and effort examining three issues related to paper use, including:

- The key *performance characteristics* of various grades and uses of paper, and how such functional properties can be affected by changes in the fiber source or the processes used to make the paper.
- The *environmental impacts* associated with all parts of the life-cycle of paper, literally from the forest to the landfill.
- The *economics* of paper use, including the cost of producing wood, recovered fiber, pulp and paper products, and the dynamics of market pricing for these various commodities.

By carefully integrating information on functionality, environmental issues and economics, the Paper Task Force sought to maximize the likelihood that our recommendations will be implemented, thereby effecting environmental gains.

From the beginning the Task Force's approach to developing its recommendations was grounded in thorough technical research. In January 1993, the Task Force held its first meeting which included a basic overview of pulp and paper manufacturing provided by the Department of Pulp and Paper Science at North Carolina State University. The Task Force's second meeting, in February 1993, included a tour of a major printing and writing paper mill.

After the Task Force was formally announced to the public in August 1993, we conducted a series of introductory and technical visits with more than a dozen pulp and paper companies that are major suppliers to Task Force members, as well as universities and other research institutions. Many of these meetings also encompassed visits to pulp and paper mills, recycling centers, experimental and working forests, and laboratory facilities. Technical discussions and dialogue were held that covered the full range of research topics being examined by the Task

Force. In many cases, follow-up meetings and telephone conversations provided the Task Force with additional information.

In its research process, the Task Force gathered data from a very broad range of sources. We actively solicited information from experts in the pulp and paper industry, consulting firms, the environmental and financial communities, graphic designers, office equipment manufacturers, printers, forms converters and university research institutions. The Task Force also reviewed a wide range of published literature, including trade publications, analyses provided by individual paper companies and trade associations, consultants' reports, government documents, technical manuals, conference proceedings and peer-reviewed scientific papers. Finally, we tapped the considerable experience and expertise of Task Force organizations themselves.

In order to hear directly from experts and identify areas of agreement or controversy, the Task Force convened 10 expert panel discussions, in which four to six individuals representing different organizations responded to questions posed by the Task Force. For each of these expert panels, the Task Force developed an "issue paper" to provide key background information. These issue papers were circulated for external expert review. Panel members and expert reviewers were selected to cover the full range of expertise and perspective on a given issue and to ensure balance. The members of each panel and the topics they discussed are listed in **Appendix B**.

The Task Force then integrated all of the information gathered through the research meetings, site visits, expert panels and comments on issue papers into 16 more detailed, fully referenced White Papers on specific topics. The White Papers identified key findings of our research, and these findings served as the foundation for our recommendations to purchasers.

The Task Force distributed the White Papers for expert review and solicited written comments from a range of individuals and organizations with expertise on given topics. Task Force working groups carefully reviewed all the comments and revised the papers to reflect new information received. In many cases, Task Force members engaged in further dialogue with reviewers to ensure a full understanding of issues they had raised or new information they had submitted. The Task Force's White Papers, listed on the next page, comprise Volume II of the Task Force's final report.

## White Papers

### Paper Task Force White Papers Listed by Topic Area

- **Paper Performance**
  - Functionality Requirements for Uncoated Business Papers and Effects of Incorporating Postconsumer Recycled Content (White Paper 1)
  - Functionality Requirements for Coated and Uncoated Publication Papers and Effects of Incorporating Postconsumer Recycled Content (White Paper 8)
  - Functionality Issues for Corrugated Packaging Associated with Recycled Content, Source Reduction and Recyclability (White Paper 6A)
  - Functionality Issues for Folding Cartons Associated with Recycled Content, Source Reduction and Recyclability (White Paper 6B)
- **Recycling and Used Paper Management**
  - Economics of Recycling as an Alternative to Traditional Means of Solid Waste Management (White Paper 2)
  - Lifecycle Environmental Comparison - Virgin Paper and Recycled Paper-Based Systems (White Paper 3)
  - Economics of Manufacturing Virgin and Recycled-Content Paper (White Paper 9)
- **Forest Management**
  - Environmental Issues Associated with Forest Management (White Paper 4)
  - Economic Considerations in Forest Management (White Paper 11)
- **Pulp and Paper Manufacturing**
  - Environmental Comparison of Bleached Kraft Pulp Manufacturing Technologies (White Paper 5)
  - Economics of Kraft Pulping and Bleaching (White Paper 7)
  - Environmental Comparison - Manufacturing Technologies for Virgin and Recycled-Content Printing and Writing Paper (White Paper 10A)
  - Environmental Comparison - Manufacturing Technologies for Virgin and Recycled Corrugated Boxes (White Paper 10B)
  - Environmental Comparison - Manufacturing Technologies for Virgin and Recycled Coated Paperboard for Folding Cartons (White Paper 10C)
  - Comparison of Kraft, Sulfite and BCTMP Pulp and Paper Manufacturing Technologies (White Paper 12)
  - Non-wood Plant Fibers as Alternative Fiber Sources for Papermaking (White Paper 13)

As the Task Force began to develop its recommendations, we again convened meetings with key stakeholders and experts drawn from members' suppliers, the American Forest & Paper Association, academic researchers and environmental organizations. These meetings were designed to provide additional guidance and perspective on the form and content of the Task Force's recommendations before we began to draft them. The Task Force then drafted its recommendations independently.

Overall, the Paper Task Force held approximately 400 meetings with representatives of over 120 different organizations. In this process we visited over 50 manufacturing, recycling, forestry and research facility sites. The success of the Task Force is due in large part to the extraordinary cooperation and effort of a wide range of parties. We have listed the organizations we met with and their contribution to the process in the Acknowledgments, at the beginning of this report.

## Research Approach for Functional, Environmental and Economic Issues

### Approach to the Functionality Research

Purchasers must be confident that the paper products they buy will meet a range of performance requirements, including print-quality standards and runability in equipment such as photocopy machines, printing presses and package-filling lines and distribution systems. Understanding the functional requirements of various paper and paperboard grades was therefore a critical element of the Task Force's analysis.

In one of the first steps in the Task Force's research process, members gathered qualitative and quantitative information on their organizations' purchasing and use of paper, and on their used paper recycling or disposal practices. These *paper use inventories* provided an information baseline to help Task Force members identify the specific uses and quantities of paper in their organizations, performance requirements, existing purchasing specifications and relevant supplier information.

The Paper Task Force's goals in researching the performance requirements associated with various grades of paper were to: (1) identify the attributes of certain paper grades that enable them to perform as intended; (2) analyze the relationship between the

raw materials used to produce paper and the requirements of the papermaking process; and (3) understand how equipment specifications drive a given product's specifications.

The Task Force defined paper "functionality" as the ability of a sheet (or roll) of paper to meet the purchaser's expectations for running in required equipment and machines to create the desired end product. In particular, the Task Force examined how the incorporation of recycled content affects the performance of specific grades of printing and writing paper, corrugated boxes and folding cartons. The specific performance requirements and physical properties of business communication papers, publication papers, corrugated boxes and folding cartons that are critical to meeting the needs of end users are described below in Section III. The Task Force's findings on the performance of recycled-content grades are summarized in Chapter 3 of this report; further detail can be found in White Papers Nos. 1, 6A, 6B and 8.

#### Approach to the Environmental Research

In identifying environmental preferences, the Task Force adopted a broad, systematic view of the issues involved, rather than considering only a single or a few attributes of paper — its recycled content, for example, or how it is bleached. The Task Force constructed a set of analytical tools that allow different types of paper to be compared on an environmental basis across their full lifecycle, including: (1) how the fiber used to make paper is acquired, whether from a forest or a recycling collection program; (2) how that fiber is manufactured into a range of paper products; and (3) how those products are managed after their use, whether in landfills or incinerators or through collection for recycling. In using this approach, the Task Force has provided a way for purchasers to address all of the major environmental impacts of their paper use.

The decision framework set out in the Project Synopsis that opens this report reflects the comprehensive scope of the Task Force's environmental research. In sum, reducing the use of paper generally provides major environmental benefits, but even after aggressive use-reduction measures, businesses will still use significant quantities of paper. Using paper with recycled content also provides comparative environmental benefits in the

areas of forest management, pulp and paper manufacturing, and solid-waste processing and disposal. However, there are ultimately functional and economic limits to the amount of recycled material that can be used in paper on an aggregate basis. It is important to examine opportunities to reduce the environmental impacts associated with the acquisition of virgin fiber through forest management and with the manufacturing of virgin pulp and paper. The research of the Paper Task Force provides paper purchasers and users with the capability to investigate and make progress in all of these areas.

The basic research of the Task Force on environmental issues is contained in White Papers Nos. 3, 4, 5 and 10 A, B and C, and the results of these analyses are summarized in Chapters 3, 4 and 5.

The inclusion of *forest management* activities in our overall analysis — and its direct linkage to purchasing considerations — is an example of the thoroughness of our approach. Most other studies of paper products, including virtually all lifecycle assessments conducted to date, draw the "upstream" boundary of their analyses *after* the forest: In essence, they assume a given quantity of wood as an input into the product system being studied, without considering the environmental and economic consequences of activities required to produce that wood. The biological and ecological character of the impacts of forest management activities does not allow a direct or quantitative comparison to other measures of environmental impact — for example, energy use or releases of air emissions from a manufacturing facility. To omit such impacts entirely from an assessment of paper products, however, produces a greatly distorted picture. Instead, we have included a full assessment and description of such impacts, and through our recommendations have given paper users the means to use this information in their purchasing decisions — whether in considering the relative merits of recycled vs. virgin fiber content or in identifying preferences among different management practices used to produce virgin fiber.

In the area of *pulp and paper manufacturing*, the Task Force undertook two types of comparative analyses. First, we compared the environmental profiles of a range of existing pulping and bleaching technologies used to produce virgin pulps and paper products. These technologies include mechanical as well as chemical pulping processes and, among the chemical processes, those

yielding unbleached pulp as well as pulp bleached using a range of different bleaching agents. Second, for several different grades of paper, we compared the environmental profiles of manufacturing processes using virgin fiber to those that use recycled fiber.

Both types of analysis base the comparison of technologies and products on the relative magnitude of the following parameters:

- energy use, including both total energy requirements and those met by the purchase of fuels or electricity<sup>2</sup>
- water use or quantity of effluent discharged
- emissions of several major categories of air pollutants
- releases of several major categories of waterborne wastes
- quantity of solid-waste output.

In the area of *managing paper after it is used*, the Task Force compared the environmental profiles of the major methods employed in the United States today: landfilling of municipal solid waste (MSW) containing used paper (employed to manage 53% of used [postconsumer] paper); incineration of MSW containing used paper in waste-to-energy facilities (13%); and collection and processing of used paper for purposes of recycling (34%).<sup>3</sup> The same parameters (excluding water use) described above served as the basis for comparison of the three methods.

Finally, for the purpose of providing a comprehensive view of the comparison between virgin and recycled fiber, the Task Force assembled a quantitative model that combined the data for manufacturing virgin and recycled paper in various grades with the data for the various methods employed to manage used paper. In this way, three essentially complete “systems” can be directly compared:

- *Virgin production plus landfilling*: acquisition of virgin fiber<sup>4</sup> and manufacture of virgin paper, followed by landfilling.
- *Virgin production plus incineration*: acquisition of virgin fiber and manufacture of virgin paper, followed by incineration.
- *Recycled production plus recycling*: manufacture of recycled paper, followed by recycling collection, processing and transport of used paper to the site of remanufacture.<sup>5</sup>

The Task Force assembled such data for each of several grades of paper: newsprint, uncoated freesheet printing and writing papers, corrugated boxes, and coated paperboard used to make folding cartons.

The Task Force’s environmental comparison of different paper manufacturing and disposal/recycling systems is based

primarily on estimates of the *quantities* of energy used by, or environmental releases from, certain processes or facilities. In these comparative assessments, the Task Force has not attempted to assess the magnitude of environmental *impacts*—for example, effects on the health of humans or wildlife—that arise from the associated energy use and environmental releases. Actual environmental impacts caused by the release of specific chemical compounds, for example, depend on site-specific and highly variable factors such as rate and location of releases, local climatic conditions, population densities and so on, which together determine the level of exposure to substances released into the environment. To conduct such an assessment would require a detailed analysis of all sites where releases occur, a task well beyond the scope of this project and virtually any analysis of this sort.

In a larger sense, reducing the magnitude of energy use or environmental release will represent a genuine environmental improvement in the vast majority of cases. Indeed, the widely embraced concept of *pollution prevention* is based on the sound tenet that the avoidance of activities linked to environmental impacts is far preferable to seeking to moderate the extent of impacts after the fact. In the absence of definitive evidence to the contrary, purchasers can feel confident that expressing a preference for technologies or practices that reduce the magnitude of environmental releases or energy use will benefit the environment.

In general, the data cited and presented in this report represent average (mean) values, or estimates otherwise intended to be representative of the facilities and activities being characterized. The environmental characteristics of individual pulp and paper mills, solid-waste management facilities, recycling systems, etc. will almost always vary from the average for a particular class of facilities. In most cases, however, average data are most appropriate for our purposes, because we are most interested in comparing *typical* activities and facilities, not best-case or worst-case ones. In some cases, the Task Force has selected subgroups of facilities where clear and definable differences exist in the average characteristics of the subgroups. For example, the Task Force’s analysis of energy use and environmental releases from bleached kraft pulp manufacturing processes is based on

several distinct subclasses of both modern and traditional bleached kraft pulp mills.

In cases where a paper user is purchasing through a distributor or retailer and does not have specific information about where the paper was made, the use of averages in an environmental comparison is not only appropriate, but is in fact the only approach to identifying environmental preferences. Purchasers in this situation who make decisions based on averages will, in the aggregate, select environmentally preferable paper products.

In other cases, large paper purchasers buy directly from manufacturers and potentially have access to much more specific data on the environmental attributes of individual facilities. While gathering and interpreting these data is not necessarily a simple exercise, the Task Force's recommendations and implementation options are designed to help major purchasers of paper get started, through an informed dialogue with their suppliers. In these cases, facility-specific data can be compared to the average or typical values provided in this report. Hence, the data presented here are useful as a starting point in indicating general or likely attributes, and can be subjected to further examination and confirmation if applied to a more specific situation.

As a final note, the approach adopted by the Task Force of comparing activities or processes based on the average magnitude of key environmental parameters is a widely accepted method employed in virtually all similar lifecycle assessments, including those conducted or commissioned by private companies in a broad range of business sectors (including pulp and paper manufacturing) and by government agencies.

#### Approach to the Economic Research

Economic considerations in paper purchasing and use were central to the Task Force's research and to the development of our recommendations. This research considered both the *cost* of manufacturing environmentally preferable paper, and the *price* of different grades of paper in the marketplace.

Several strategic goals are embodied in the Task Force's analysis of economic factors in paper purchasing and use. Prices for paper products rise and fall over time based on market supply and demand, but over the long term are also

related to manufacturing costs. While purchasers are concerned in the short term with paper prices, over the longer term it is to their advantage to align themselves with paper producers who employ environmentally protective and efficient practices and technologies. The Task Force's recommendations are also sensitive to the importance of the timing of investments by paper suppliers, the fact that these investments are usually long-lived, and the fact that paper-pricing cycles influence the ability of purchasers to implement some recommendations at certain times.

Major paper users will benefit over the long term if suppliers are financially healthy enough to be able to modernize their practices and technologies and invest in research and development on new practices, technologies and products. Paper purchasers also have an incentive to examine the specifications for their paper closely, in part to ensure that the type of paper being purchased is not over-specified for its true performance requirements. The Task Force believes that these steps are consistent with continuous improvement in environmental performance.

The basic research of the Task Force on economic issues is contained in White Papers Nos. 2, 7, 9 and 11, and the results of these analyses are summarized in Chapters 3, 4 and 5.

At the outset of this project, the Paper Task Force established a set of guidelines for conducting economic research that would allow for a detailed, insightful investigation, but would not raise concerns regarding the use of proprietary data or anti-trust issues. These guidelines were reviewed by specialists in anti-trust and business law retained by the Environmental Defense Fund, and by counsel within Task Force member organizations, and were followed by the Task Force throughout the process.<sup>6</sup> There are a number of additional factors inherent in the design and composition of the Task Force that significantly reduce anti-trust concerns.<sup>7</sup>

To eliminate or reduce the need to use proprietary information, the Task Force's research guidelines placed a priority on using the following types of data sources:

- Public reports such as paper industry technical papers and

Economic considerations in paper purchasing and use were central to the Task Force's research and to the development of our recommendations.

government documents.

- Data provided by trade associations (which have access to data that they aggregate from individual companies for public use).
- Models provided by consulting firms that aggregate data from empirical sources or provide estimates based on engineering and economic calculations.
- Models developed by the Task Force that can be reviewed by paper manufacturers or others to verify their accuracy without requiring disclosure of information on the part of the reviewer.
- Historical market price information provided by public sources (for example, industry newsletters).
- General cost estimates developed by equipment suppliers.
- General or aggregated cost estimates developed by individual paper suppliers or Task Force members; these are expressed in any of three forms: (1) to indicate the direction and magnitude of a change from a baseline case, (2) to express a range or (3) as estimates for a “generic” case.

In its economic research, in addition to using data from all of these types of sources, the Task Force worked with two leading paper industry consulting firms, to obtain data on recovered paper market price forecasts, market pricing for new paper products and paper manufacturing costs.<sup>8</sup>

In several cases, the Task Force developed detailed hypothetical models that estimated changes in paper manufacturing or wood production costs under different scenarios related to the Task Force’s recommendations. The assumptions and calculations in these models were reviewed by a wide range of industry experts during the White Paper review process, and were modified based on reviewers’ comments. In several cases, the Task Force also compared the results from the scenarios expressed in the models to historical and/or known data from actual forest management practices and paper mills.

The models developed by the Task Force often produced estimates for “average” facilities. The use of an average estimated cost for employing a specific practice or investing in a particular type of technology, such as a deinking plant, implies that there are producers who, in making actual investments, will spend either more or less than the projected average. The Task Force’s recommendations fundamentally differ from regulations that automatically apply to all paper producers regardless of cost or

timing of investment. Therefore, continuing the deinking example, individual paper mills for which the installation of recycling equipment would be higher than the average would likely not be the first to respond to the Task Force’s recommendations. Indeed, a large paper producer who operates numerous mills would most likely respond to market demand by adding recycling systems at mills where the costs to do so would be *below* the average — which could be due, for example to the presence of existing equipment. Discussions of “average” or “typical” costs as affected by the Paper Task Force’s recommendations should be seen in this light.

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### III. KEY FINDINGS ON FUNCTIONAL REQUIREMENTS FOR VARIOUS GRADES OF PAPER

The specific findings from the Task Force’s research on environmental and economic issues in the areas of source reduction, recycling, forest management and pulp and paper manufacturing are summarized in the Project Synopsis and expanded upon in Chapters 2 through 5, as are several specific issues in the areas of functionality. However, most of the findings from the Task Force’s research on functionality apply to the whole body of the recommendations and supporting material. These findings are summarized below.

The performance requirements of the different types of paper products studied by the Task Force vary substantially among different grades, and are summarized in the following sections.

#### Business Communication Papers

The functional specifications for business communication and publication papers are driven by customers’ expectations, the end use of the product, limitations of the papermaking process and the requirements of office machines (particularly photocopiers) and printing presses in which they will be used. Critical

to these grades is runability, which refers to the paper's ability to withstand the stresses of copiers, printing presses and subsequent binding and converting operations. Only a few rigorous, systematic photocopier runability tests have been conducted for business and publication papers. Therefore most of the information presented on the performance of recycled-content paper in office machines and offset printing presses is based upon the experience of major equipment manufacturers, paper manufacturers and end users.

Copy paper is designed to perform in high-speed copy machines that subject it to intense heat, pressure, friction, mechanical decurling, electronic charges and contact with other parts of the equipment (sorting bins, binders, etc.). Copier equipment may perform various finishing operations such as folding, stapling, stitching and punching. Color copiers also demand paper durability and performance. This is largely due to the four-pass process, which subjects the paper to toner four times. Electronic (laser) printers and ink-jet printers are common in offices. Mechanically their processes are similar to, though simpler than, those of photocopiers: Laser printers have shorter paper paths and fewer belts and rollers; ink-jet printers have fewer moving parts than photocopiers, and color can be applied in a single pass. Business papers used for envelopes, labels and forms must withstand the stress associated with being transported through high-speed converting operations.

To meet these performance demands and print-quality standards, the most important physical properties for uncoated business papers are strength, stiffness, proper moisture content, smoothness, dimensional stability, ink/toner receptivity and absence of lint.

## Publication Papers

In researching the functional requirements of publication papers, the Task Force primarily focused on lithographic offset printing because it is the dominant method used to print magazines, books and other commercially printed products. In 1993, 76% of the magazines published in the United States were produced via offset printing.<sup>9</sup>

Publication paper grades must withstand the tensions of rollers, pressure of the blanket, moisture added by the applica-

tion of fountain solution and ink, and heat applied during the drying phase. Put more graphically, in a typical offset press, paper is stretched and contracted, moistened with water and ink, heated from room temperature to 300° F in less than three-quarters of a second, and then cooled to below 100° F in less than a second. Publication papers must also withstand subsequent finishing or postpress operations such as binding, gluing and converting. An advantage to offset printing is that less wear and abrasion occur to the equipment than with other processes (such as photocopying) because paper does not contact the plates.

The most important paper properties for runability in offset printing equipment and converting operations are: tensile and tear strength, cleanliness, smoothness, pick resistance and consistency from roll to roll. Essential to in-line finishing operations (for example, folding, binding, die-cutting, cutting, trimming, scoring, gluing and perforating) are burst strength, uniform caliper and basis weight, and stiffness. Printers also seek consistency in paper from roll to roll so that they can plan for and predict how a project will perform on press.

The important properties for print quality are opacity, porosity, flatness, cleanliness, shade and a smooth surface. Brightness is a major specification for many publication papers, and is the primary method of classification for coated paper grades. Brightness, gloss and type of finish are particularly important in multi-color printing on coated paper. Bulk, an important specification for book papers, is driven by the product's end use for two reasons: Bulk contributes to the "feel" of book paper and also affects opacity; and for some books, the publisher prefers high-bulk paper to give the appearance of more pages. Permanence is usually an important property, especially for archival books.

Some specifications for uncoated publication papers are less stringent than those for the base stock of coated papers. Paper that is not coated is subjected to less contact with water in the manufacturing process than coated grades are, which means that the specifications for tensile and tear strength may not be as stringent. In addition, brightness specifications may be lower for uncoated groundwood than for uncoated and coated freesheet because the high percentage of mechanical pulp in groundwood papers lowers their brightness capability. The requirements for

cover papers may vary because cover papers can be uncoated or coated; some may have color or various finishes.

The requirements for the surface properties of the base stock usually are more stringent for coated than for uncoated papers. For both virgin and recycled-content paper, the coating process presents challenges. Coaters operate at very high speeds. Any defect in the base sheet or loose contaminants on the surface can cause a web break on the coater or streaks and scratches, resulting in downtime to clean up and restart the machines.

The paper properties most important in determining the nature and uniformity of the coating layer are the surface properties (for example, smoothness, finish, ink absorption), strength and optical properties (for example, opacity, brightness) of the base stock. Other factors that affect the coating process are the composition of the coating, the method of coating, the method of drying and the extent of supercalendering.

## Corrugated Boxes

To determine functional requirements for corrugated boxes, the Paper Task Force considered two types of distribution systems: shipments in corrugated boxes in bulk and single-package shipments. In the first environment, a set of boxes typically is transported from a manufacturer to a warehouse or a point of sale by truck or rail. In the second environment, single boxes are transported from a manufacturer to individual destinations by a small parcel carrier. The types of box specifications used are similar in both environments. However, when boxes are shipped in bulk by rail or third-party trucking companies, box purchasers must adhere to more specific and detailed box performance criteria as outlined by the American Trucking Association (National Motor Freight Classifications) or the National Freight Railroad Committee (Uniform Freight Classifications).

In both distribution environments, major functional requirements for boxes are box strength, runability on automated packaging machines and/or automated parcel-processing systems, consistency of performance and box appearance. The last requirement is gaining importance, because more products packaged in corrugated boxes have reached the end consumer.

Among the above criteria, box strength is clearly the most

important. Boxes must hold goods and bear up during transportation and when stacked during warehousing. Basis weight and burst strength were the traditional box strength specifications. While these are still important, many box purchasers have shifted to compression strength as an alternative measure (either Edge Crush Test [ECT] for the corrugated board or box compression for the entire box). This shift is a result of new product developments in the containerboard industry. High-performance containerboard has been developed to add compression strength while increasing recycled content and/or reducing the weight of the board. The shift has also been facilitated by an adaptation of the box strength characteristics in the National Motor Freight Classifications.

## Folding Cartons

Folding cartons are paperboard boxes that are creased and folded to form containers that are generally shipped and stored flat and then erected at the point where they are filled. Folding cartons are designed to contain and present products in a retail setting, and are generally small enough to hold in one hand.<sup>10</sup> The three major grades of paperboard used to make folding cartons are solid bleached sulfate (SBS), coated unbleached kraft (CUK)<sup>11</sup> and clay-coated recycled paperboard. These three types of paperboard differ in their manufacturing processes, functional properties and price. The Paper Task Force has focused its recommendations on folding cartons that do not come into direct contact with fatty or aqueous foods, due to the much larger market share for packaging that does not have direct contact with food.

Users of folding cartons are generally concerned with three criteria for the boxboard: appearance, strength and machinability (the ability of the carton to set up and run smoothly and quickly through packaging filling lines). Folding cartons must meet performance requirements through their entire use cycle, including converting and printing, filling and gluing, distribution, retail presentation and use by the final customer. Packaging buyers tend to specify performance criteria for the overall package, rather than for the paperboard used to make the package.

Because folding cartons are used to present products to the consumer, appearance is critical. The most important visual cri-

teria for finished folding cartons relate to its printability, and include smoothness, ink receptivity, ink holdout, rub resistance, coating strength, ink and varnish gloss and mottle resistance.<sup>12</sup> Brightness, cleanliness, gloss and the absence of debris or loose fiber are also important attributes.<sup>13</sup> Not all criteria are important for every printing technique.

The most important measurement of strength for folding cartons is usually stiffness.<sup>14</sup> Other measures of package strength include tear strength, compression strength, burst strength and moisture resistance. Strength *per se* is not as critical for folding cartons as it is for corrugated boxes.

Machinability depends on the type of filling and gluing machines being used as well as on the boxboard. Machinability is most critical in a challenging filling environment (for example, beverage filling lines tend to create wet and humid conditions) or when the speed of the filling line is a critical factor in determining the overall production-line speed for the product. Conventional filling machines are fairly flexible and can be tuned to compensate for the properties of different types of board.

## IV. THE ECONOMIC STRUCTURE OF THE PULP AND PAPER INDUSTRY AND ITS RELATION TO PAPER PURCHASING

Paper users will be better equipped to make purchasing decisions that help the environment and to reduce costs or maintain cost parity if they understand the economic consequences of their actions and the economic structure of the paper industry. A fundamental part of the Paper Task Force's research was consideration of the basic economic features of paper production and use, and these are summarized in this section. Additional information on economics is integrated throughout both volumes of this report.

### Capital-intensive Manufacturing

Selling paper is a commodity business. Although paper manufacturers strive to differentiate themselves through quality and service, price remains a dominant factor in paper users' purchasing decisions. As purchasers know well, paper pricing is highly cyclical. When the Paper Task Force began its work in 1993, nominal prices for major grades of paper were at a postwar low. In mid-1995 the situation was completely different; by late 1995, however, prices for some grades had begun to soften.

These features of paper markets have their roots in several specific aspects of the economics of paper production and use. Demand for paper is strongly correlated with general economic growth, and it fluctuates with the business cycle. In percentage terms, paper shipments decline further than overall economic activity during recessions.

Paper manufacturing is also the most capital-intensive major manufacturing industry in the United States. For example, it takes twice as much investment in real estate, plant and equipment to produce one dollar's worth of paper as it does to produce one dol-

Paper manufacturing is the most capital-intensive major manufacturing industry in the United States.

lar's worth of cars. With an increased pace of technological development, the capital intensity of the paper industry has grown over time.<sup>15</sup> Capital expenditures in the paper industry in 1991 were \$9.0 billion, or 8% of net revenues.<sup>16</sup>

A long-term trend in the U.S. paper industry is that production of commodity-grade paper in particular is moving to larger and larger mills located in the southern United States. Two-thirds of the growth in U.S. paper production from 1970 to 1992 occurred in the South. By 1992, 74.8% of pulpwood consumption, 35.6% of recovered paper consumption and 55.1% of total paper and paperboard production was based in the South.<sup>17</sup>

Paper producers have also been making ongoing and continuous investments to make their mills more productive. For example, between January 1983 and January 1993, paper manufacturers installed new paper machines or significantly renovated existing machines accounting for 57% of overall U.S. manufacturing capacity. Among paperboard mills, the total new or renovated capacity installed in the same period was even higher, especially for linerboard and solid bleached sulfate.<sup>18</sup> As a result of all this investment, manufacturing costs have fallen in real terms since the early 1970's. As mills have reduced their real dollar costs, competition has driven the average price of paper through the cycle downward in real terms.

The investments required to build pulp and paper mills are enormous. In the mid 1990's an integrated bleached kraft pulp and paper mill making 1,500 tons per day of white paper will cost roughly \$1 billion. Renovations of 1,000-ton-per-day kraft pulping and bleaching lines now cost on the order of \$500 million, and 300-ton-per-day recovered-paper deinking plants cost \$100 million or more. Paper manufacturers compensate for these high capital costs through economies of scale — that is, production in large volumes. New machines currently being installed in the United States to make uncoated freesheet paper will produce more than 360,000 tons per year (tpy), enough paper to supply well over one million office workers.<sup>19</sup> As paper mills have become larger and more complex over the last 25 years, the ratio of fixed (capital) costs to variable and semi-variable costs at the average mill has risen. Paper companies have also taken on more debt in order to build new facilities, renovate existing mills or finance acquisitions.<sup>20</sup>

The overall push to replace more expensive variable cost factors with less expensive and more predictable capital equipment has reduced labor costs substantially. Throughout the U.S. pulp and paper industry as a whole, consolidation of companies and a trend toward larger paper machines eliminated 20,800 manufacturing jobs from 1980 to 1989, while overall production increased 27%.<sup>21</sup> At the same time, the 623,000 remaining manufacturing jobs in the pulp and paper industry are generally positions that require highly skilled workers, and that pay on average 25% more than the average manufacturing job.<sup>22</sup>

## Capacity and Price Cycles

Papermakers tend to build new manufacturing capacity in cycles, after accumulating cash reserves in profitable periods. The very large size of modern pulp and paper mills and the cyclical nature of capital spending means that new production capacity tends to arrive in waves. For major expansion of virgin pulping facilities or the addition of new paper machines, the period of planning through construction takes roughly five years. Over the last 25 years, this has meant that large increments of new capacity tend to arrive well after the peak of the price cycle has passed, and often during recessions. This is especially true for virgin market pulp.

These combined factors — capital intensity, general swings in the economy, capacity building cycles, the tendency to add capacity during recessions and the fact that new production capacity comes on in large blocks while changes in demand can be more gradual — produce wide fluctuations in the market price of paper, in cycles lasting roughly seven years.<sup>23</sup> For example, four large virgin uncoated freesheet (UCFS) machines with a total annual capacity of 1.1 million tpy, or 8.8% of total existing capacity, came on line in 1990 and 1991. This capacity was being planned in 1987 and 1988 when UCFS prices were rising and operating rates hovered around 93-94%. With the introduction of so much new capacity from September 1990 to September 1991, operating rates dropped to 88% and prices fell dramatically.<sup>24</sup>

At high operating rates, paper mills have declining marginal costs for some factors of production. For example, in the case of labor, it takes roughly as many people to run a machine at 95%

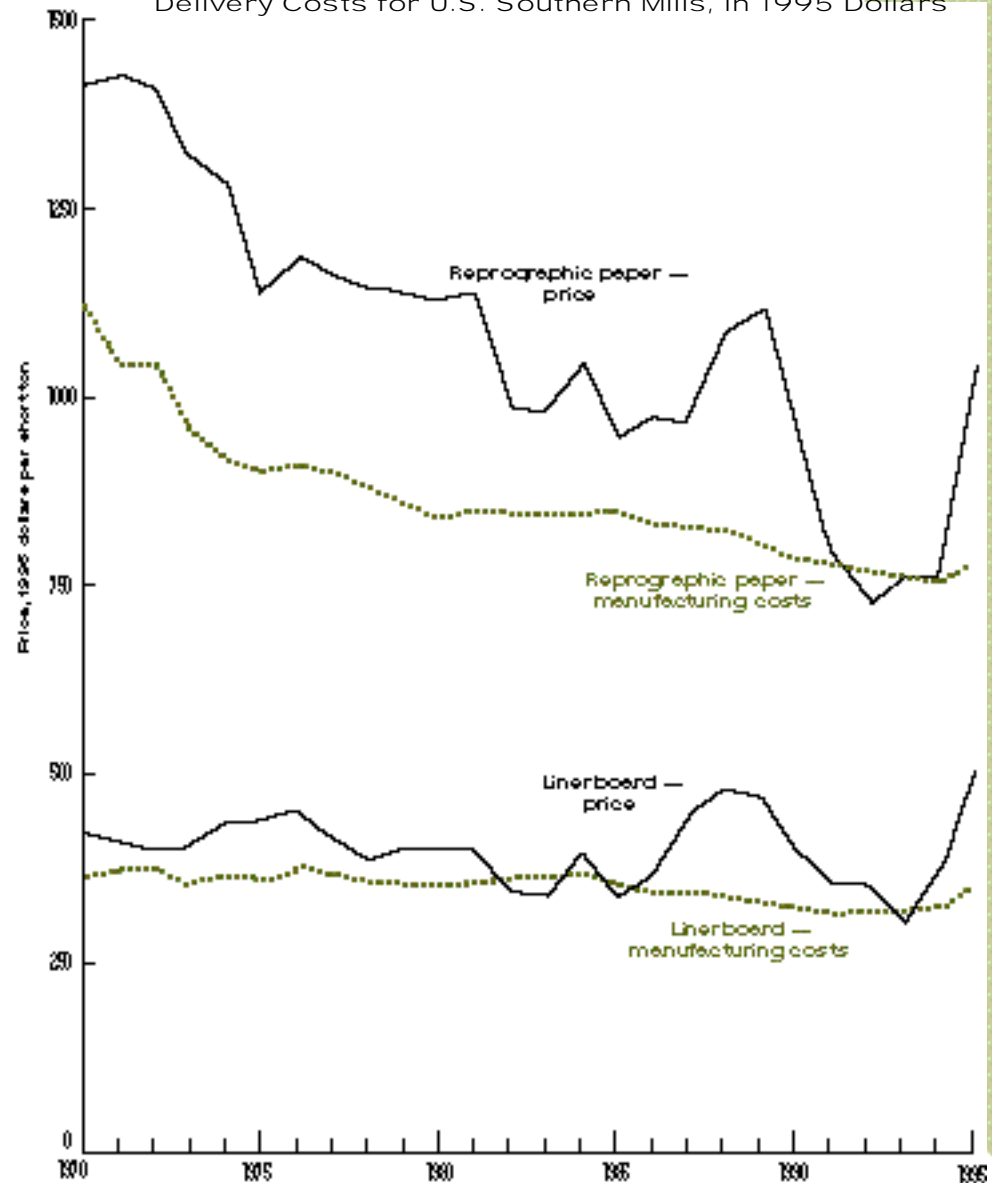
of capacity as it does at 85%, but at the higher operating rate, the same labor costs are spread out over more tons of production. Energy costs per unit of output for pulp and paper dryers also decline somewhat as production increases. Combined with high capital costs, which do not vary with operating rates, these factors create an incentive for paper mills to run their pulping systems and paper machines at full-capacity; as a general rule, integrated virgin pulp and paper mills must run at or above 90% capacity on average to make a profit.

As prices head downward at the beginning of a decline, mills behave differently depending on their cost structures. In general, large, low-cost producers cut prices in order to maintain market share and keep their machines running at full capacity. If necessary, they will drop prices all the way down to the level of their variable costs. In this situation they will maintain cash flow in order to cover their variable costs and make some contribution toward their fixed costs. As prices get very low, the high-cost producers take machines out of production. When market prices are lower than mills' variable costs, it does not make economic sense to operate. In the severe downturn of 1991-1993, numerous high-cost market pulp mills and newsprint machines took extended furloughs. In this way, production is ultimately balanced with demand, and the stage is set for a recovery in paper prices.

Upturns in paper pricing tend to lag behind the general economy, but if the previous down period has been especially extreme and if a good deal of capacity has been furloughed or retired, or if expansions have been deferred, the rebound in prices can be very pronounced. The effect of increasing capital intensity and the concentration of production at large, modern facilities with generally similar costs means that the difference between the peaks and valleys in the pricing cycle is becoming greater over time. During periods when the supply of paper is greater than demand, a greater fraction of the industry will compete and drive prices down to very low levels in order to keep running. When growth in the economy catches up with paper production and demand begins to exceed supply, there is little extra capacity that can be brought on-line quickly. Paper is often allocated among different users essentially based on their willingness to pay higher prices for it, or based on past customer history.

## Figure 4

20-pound Cut-size Reprographic Paper and 42-pound Standard Linerboard; Average U.S. prices and Average Manufacturing plus Delivery Costs for U.S. Southern Mills, in 1995 Dollars



Source: Resource Informations Systems, Inc., 1995

The trend toward greater volatility in paper pricing is clearly illustrated in **Figure 4**, which shows market pricing and average total manufacturing costs for U.S. southern mills making uncoated freesheet photocopy paper and 42-pound linerboard. As the figure also shows, manufacturing costs gradually declined or remained stable, in real terms, from the early 1970s until 1994. The sharper decline in manufacturing costs for photocopy paper in the early 1970's was due in large part to the installation of more efficient systems for cutting rolls of paper into sheets. As these systems were installed, competition forced paper prices downward. The increase in manufacturing costs in the last two years is largely due to increased expenditures on fiber.

### Paper Manufacturing and Forest Management

The need to keep mills operating at or near full capacity has important implications for forest management. Because the costs of mill shut-downs are high, fiber shortages must be avoided. Consequently, when wood supply is constrained, forest products companies may be willing to pay elevated prices for pulpwood on the open market and to increase harvests from their own lands. Moreover, in order to avoid shortages, pulp mills often maintain a several-weeks supply of pulpwood, either at the mill or at satellite storage facilities. Wood storage can be costly, as measures must be taken to prevent wood decay and maintain fiber quality.

The forest-products industry has significant capital investments in timberland. In fact, the industry owns nearly 25% of all U.S. lands classified as timberland. On average, roughly 25% of the forest-products industry's virgin fiber requirements are met by trees grown on industry land, although this varies among companies and even from mill to mill; some mills may not own any land, while others may satisfy almost all of their supply needs from company-owned lands. However, in most cases the majority of a mill's fiber requirements are met with pulpwood grown on non-industry lands,

The upside of the paper pricing cycle is in fact a key time for purchasers to express preferences for environmental improvements in the paper they buy.

most of it purchased on the open market.

Timberlands owned by the forest-products industry are often managed using intensive, high-input forest management practices in order to maximize fiber yields. Such capital-intensive management regimes are a means for the forest-products industry to reduce pulpwood procurement costs, given that wood not produced on company land must be purchased elsewhere. Because most pulp mills must meet at least a portion of their fiber needs from company lands, management intensity and land are economic "substitutes."<sup>25</sup> The company can choose to invest in increased production on its current land base or, alternatively, in increased land holdings.

### What the Pricing Cycle Means for Purchasing Environmentally Preferable Paper

When paper prices are at their peak, suppliers have the power to set prices, and small buyers in particular are placed "on allocation." During the down part of the cycle, negotiating power shifts to buyers and paper producers will go to greater lengths to provide custom products and a level of service that can differentiate them from their competitors. Within established relationships between sellers and large buyers in particular, both parties can emphasize quality and service in any market conditions. Given this reality, it would appear that a period of high paper prices would not be the ideal time for paper buyers to ask their suppliers about environmentally motivated changes in their products. However, this concept is valid only if the situation is viewed from a short-term perspective.

The upside of the paper pricing cycle is in fact a key time for purchasers to express preferences for environmental improvements in the paper they buy, because they are doing so at a time when paper manufacturers are accumulating large amounts of available cash and are planning their next round of investments. The suggestion by the purchaser that environmental issues will be important over the long term is also very important. Most major equipment at a pulp and paper mill lasts for 15 to 30 years, and the economic penalty for retiring

equipment before it reaches the end of its useful life is large. Furthermore, forest management decisions may have implications of substantially longer duration, as standard rotation ages can vary from 20 to as many as 60 years. Signaling the direction of long-term demand is therefore a major goal of the Paper Task Force's recommendations.

In addition to these factors, management among many companies that make or use paper is taking a longer view of supplier-customer relationships, with "strategic alliances" becoming more common. Within such relationships, paper users and papermakers can more confidently work together to develop innovations and new products that cut costs and produce greater stability and value for both parties through the market pricing cycle. This consideration is built into many of the implementation options that support the Task Force's recommendations.

Finally, a short-term pricing perspective also overlooks the important role that large paper purchasers in particular offer to paper manufacturers. While supply and demand forces set the market price for paper at any given time, individual customers may contribute differently to an individual paper mill's profit structure. For example, even at the same price for the paper, mills would prefer customers who buy in large quantities so that they can dedicate their machines for longer runs, which in turn lowers operating costs. Because paper manufacturers usually pay the freight for delivering their products, they prefer customers located near their mills over distant customers. Customers with growing demand for paper over time or those who buy steadily through recessions are also desirable. All of these factors can lead paper manufacturers to increase earnings not only by lowering their manufacturing costs, but by successfully competing for the most desired customers. Gaining a competitive advantage through environmental improvements can be part of this strategy.

## The Global Perspective

Papermakers in the United States have been endowed with several factors that, combined with extensive and continuous reinvestment, have created an industry that is competitive on a worldwide scale. Major assets to U.S. producers include abundant forests, good growing seasons and ready access to the largest market in the world — U.S. consumers, who use roughly one-third of all the paper produced worldwide.

Pulp and paper products are commodities that are increasingly traded in international markets. According to the American Forest & Paper Association (AF&PA), the North American Free Trade Agreement and the Uruguay Round of the General Agreement of Trade Tariffs are expected to have positive impacts on the long-term export potential of the U.S. paper industry.

One forecast is that between 1990 and 2000, worldwide demand for paper will grow from 264 million short tons to 369 million short tons. Of this growth in demand, 49% is projected to occur in Asian markets.<sup>25</sup>

In dollar terms, the United States remains a net importer of paper products (largely Canadian market pulp and newsprint), while in tonnage terms the United States became a net exporter in 1989. This is because the major net export products are unfinished commodities like recovered paper and virgin market pulp and the major net import product is finished paper, which has a higher value; also overall exports have been growing faster than imports. Finished paper in the United States is still produced primarily for the domestic market. Over the longer term, international markets offer the U.S. industry a potential opportunity to expand output of finished paper beyond what the domestic market can absorb.

## APPENDIX A: PAPER TASK FORCE MEMORANDUM OF AGREEMENT

(Generic version of the memorandum signed by all Task Force members)

### Memorandum of Agreement

MEMORANDUM OF AGREEMENT BETWEEN  
THE ENVIRONMENTAL DEFENSE FUND  
AND \_\_\_\_\_  
TO ESTABLISH A JOINT TASK FORCE ON  
INCREASING DEMAND FOR ENVIRONMENTALLY  
PREFERABLE PAPER PRODUCTS

The Environmental Defense Fund (EDF) and \_\_\_\_\_ agree to establish a joint task force to investigate and prepare a report on opportunities for increasing institutional and consumer demand for environmentally preferable, competitively priced paper products. The primary focus of the task force will be on the potential to reduce the adverse impacts of pulp and paper production and to support large-scale recycling programs by increasing demand for recycled, unbleached, chlorine-free, and other environmentally preferable papers as determined by the task force's investigation. The final report of the task force will contain recommendations on purchasing environmentally preferable papers, including recommendations for specific uses of paper. These recommendations will reflect consideration of functionality, cost, availability and other factors relevant to business paper purchasing. Specific means of implementing the task force's recommendations will be determined individually by each of the organizations that make up the task force.

Composition of the Task Force:

The task force will be composed of EDF, \_\_\_\_\_ and several other organizations that are major users of paper. These organizations are \_\_\_\_\_.

Each organization will appoint at least two representatives to the task force.

Areas of Discussion:

The specific topics that may be addressed by the task force are set forth below. Additional topics may emerge as the work of the task force progresses.

- The technology and economics of pulp and paper production.
- The environmental impacts of paper production and use, and opportunities to reduce those impacts through alternative technologies.
- The types and quantities of paper products used by task force members, and the performance specifications of those products.
- Potential shifts toward the purchase and use of environmentally preferable papers that can be made by task force members and similar organizations.
- The benefits of purchasing environmentally preferable paper products, and the cost and availability of such products in the marketplace.
- Consumer preferences as they relate to environmentally preferable paper products.
- Task force members' source reduction and recycling programs and the relationship of their paper purchases to those programs.

Work of the Task Force:

The task force will require priority efforts and time commitments from its members over the course of a year to eighteen months. The task force will proceed according to a mutually agreed upon schedule, with meetings anticipated to be held every four to eight weeks. Task force members will convene for the purpose of detailed discussion and analysis of selected topics relevant to the subject matter areas set forth above. The task force may establish working groups to carry out specific investigations.

To the extent possible, task force members will rely on expertise within, or accessible to, their organizations, but they may draw upon additional outside expertise where necessary. The allocation of costs for retaining outside expertise or for substantial research and analytical activities will be made on a case-by-case basis by mutual agreement of the task force members.

EDF and \_\_\_\_\_ agree to make available to one another information regarding their paper purchases and use, including information about paper types, quantities and suppliers; provided, however that all exchange of information that may raise any sensitive competitive or commercial issue is conducted pursuant to guidelines satisfactory to all participants. Where any information on paper use is considered proprietary in nature, it shall be provided subject to appropriate restrictions, mutually agreed upon in advance, to ensure that the confidentiality of the information is protected.

Each organization will pay independently all of its own expenses incurred as a result of its participation in the task force. Neither organization will accept support, monetary or in-kind, direct or indirect, from the other at any time. Each organization shall be free to use the research and information generated by the task force in its subsequent work unless restrictions, based on the disclosure of proprietary matters, are mutually agreed upon. Each organization may withdraw from the task force at any time. In the event that \_\_\_\_\_ withdraws from the task force, we agree to manage the announcement of this action jointly. In no event will information regarding same be released without \_\_\_\_\_'s consent.

*Reports, Communications, and Publicity:*

One goal of the task force will be to produce information regarding paper products and their use that has broad applicability to businesses and other institutions. Toward that end, the task force expects to produce a final report available to the general public. Dissemination to the public of specific results or agreements growing out of the task force will be by mutual consent. If task force members significantly disagree on data interpretation or particular conclusions drawn in any task force report, the report may contain separate statements written by each organization.

During the work of the task force, each organization will continue to carry out its business and advocacy activities with complete independence. During the course of these discussions and at the conclusion of the task force, each organization shall be free to state its own views, and pursue its own interests and goals, with respect to any matter or activity included in, or

related to, the task force.

Each organization may communicate with its directors, shareholders, members, employees and, for non-profit organizations, potential funders, about the task force, subject to any restrictions on proprietary information. Each organization shall be permitted to submit information about the task force in response to any request for information from any governmental, judicial, administrative or regulatory body. With the exceptions just noted, neither EDF nor \_\_\_\_\_ shall refer to the other's participation in or activities in connection with the task force, in any marketing, advertising, promotional material, point of sale material, or any other material directed at customers, the general public or the media unless expressly authorized by the other party.

Participating staff of each organization shall be available to provide up-to-date information on the activities of the task force. Written releases and media briefings conducted by the task force will make the public aware of significant developments or outcomes, if any, in the course of, and/or at the conclusion of, the task force.

_____ Fred Krupp, Executive Director Environmental Defense Fund	_____ Officer of Member Organization
_____ Date	_____ Date

## APPENDIX B: LIST OF EXPERT PANEL TOPICS AND PANELISTS

### The Paper Task Force Panels and Individual Panelists

Panel 1:  
Functionality Requirements for Uncoated Business Papers and Effects of Incorporating Postconsumer Recycled Content

**Panelists:**

Carol Butler, International Paper  
Gary Chapin, Xerox  
Jobe Morrison, Cross Pointe  
Kevin Nuernberger, Moore Business Forms  
Steve Semenchuk, Superior Recycled Fiber

Panel 2:  
Economics of Recycling as a Solid Waste Management Alternative

**Panelists:**

Jerry Ashby, Weyerhaeuser  
Everett Bass, City of Houston Solid Waste Management Department  
William Ferretti, New York State Department of Economic Development  
Reid Lifset, Yale University  
George Sanderlin, Browning Ferris Industries  
Lynn Scarlett, Reason Foundation

Panel 3:  
Environmental Comparison: Recycling vs. Other Solid Waste Management Methods

**Panelists:**

Marge Franklin, Franklin Associates  
Howard Levenson, California Integrated Waste Management Board

Mary Sheil, New Jersey Department of Environmental Protection  
Daniel J. Kemna, WMX Technologies  
Joseph Visalli, New York State Energy Research & Development Authority

Panel 4:  
Environmental Issues Associated with Forest Management

**Panelists:**

Gregory Aplet, The Wilderness Society  
W.D. "Bill" Baughman, Westvaco  
Derb Carter, Southern Environmental Law Center  
Marshall Jacobson, International Paper  
Neil Sampson, American Forests

Panel 5:  
Environmental Comparison of Bleached Kraft Pulp Manufacturing Technologies

**Panelists:**

John Carey, Environment Canada  
Gerard Closset, Champion International  
Roland Lövblad, Södra Cell  
Dale Phenicie, Georgia-Pacific  
Peter Washburn, Natural Resources Council of Maine

Panel 6:  
Functionality Issues For Corrugated Packaging and Folding Cartons Associated with Recycled Content, Source Reduction and Recyclability

**Panelists:**

David Etzel, Georgia-Pacific  
Roger Hoffman, Hoffman Environmental Systems  
Ralph Locke, Inland Container  
John Schwann, Packaging Systems  
Guyton Wilkinson, Stone Container

Panel 7:  
Economic Comparison of Bleached Kraft Pulp Manufacturing Technologies

**Panelists:**

Jerry Crosby, Weyerhaeuser  
Neil McCubbin, N. McCubbin Consultants  
Samuel W. McKibbins, Champion International  
Wells Nutt, Union Camp Technologies  
Jean Renard, International Paper

Panel 8:  
Functionality Requirements for Coated and Uncoated Publication Papers and Effects of Incorporating Postconsumer Recycled Content

**Panelists:**

Kathleen Gray, Green Seal  
Jim Kolinski, Consolidated Papers  
Tina Moylan, P.H. Glatfelter  
Cliff Tebeau, R.R. Donnelley & Sons

Panel 9:  
Economics of Manufacturing Virgin and Recycled-Content Papers

**Panelists:**

Don McBride, Rust Engineering  
Richard Venditti, Union Camp  
Arthur Verveka, Jaakko Pöyry Consulting  
Frank Murray, Georgia-Pacific

Panel 10:  
Environmental Comparison: Virgin and Recovered Fiber Manufacturing Technologies for Paper

**Panelists:**

Bill Clarke, Fletcher Challenge Canada  
Jack Firkins, Boise Cascade  
Norman Shroyer, for Union Camp  
Allan Springer, University of Miami (Ohio)

## ENDNOTES

- <sup>1</sup> An example in the recycling area is a dialogue between state officials who are members of the Northeast Recycling Council (NERC) and major newspaper publishers. Michael Alexander, *Northeast Publishers' Commitments to Purchase Recycled Newsprint: A Status Report*, Brattleboro, VT: NERC, November, 1994.
- <sup>2</sup> *Total energy* is that generated from combustion of all types of fuels, including fuels derived from wood by-products (bark, pulping liquors and paper), as well as fossil fuels and electricity purchased from utilities. *Purchased energy* represents only energy generated from combustion of purchased fuels (excluding combustion of wood-derived materials) and purchased electricity. Because a substantial amount of energy used in pulp and paper manufacturing (about 55%, industry-wide) is *self-generated* — i.e., derived from wood by-products rather than fossil fuel — the difference between total and purchased energy can be considerable, depending on the grade of paper, the processes used and the particular mill involved.
- <sup>3</sup> The values reported here are for 1993, calculated using data from Franklin Associates, *Characterization of Municipal Solid Waste in the United States, 1994 Update*, prepared for U.S. Environmental Protection Agency, Municipal and Industrial Solid Waste Division, Washington, DC, Report No. EPA/530-S-94-042, November 1994.
- <sup>4</sup> Except for some aspects of energy use, the environmental effects associated with obtaining virgin fiber from trees have not been considered here, due to their largely qualitative nature. Nonetheless, as discussed in detail in Chapter 4, intensive management of forests for fiber (and solid wood) production can have significant biological and ecological consequences (e.g., effects on biodiversity, wildlife habitat and natural ecosystems). Such consequences are an important difference between recycled fiber and virgin fiber-based systems.
- <sup>5</sup> The Task Force has compared energy requirements and environmental releases from 100% recycled fiber-based and 100% virgin fiber-based systems that include the analogous activities in each system involved in the acquisition of fiber, production of paper and disposal of residuals. By examining entire systems

rather than limiting our comparison only to the recycled vs. virgin manufacturing processes or the recovery vs. waste-management systems alone, we can better assess the full range of environmental consequences engendered by the choice between producing recycled-content paper and recovering and recycling used paper, as opposed to producing virgin paper, disposing of it and replacing it with new virgin paper. We recognize 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 us to assess 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 this study for the 100% virgin and 100% recycled products.

- <sup>6</sup> The Paper Task Force's "Guidelines on Data Collection" are available upon request.
- <sup>7</sup> For example, Task Force members are not competitors, and generally purchase different kinds of paper for different uses. The Task Force's recommendations and their supporting rationale are published in this final report, which is available to the public. Decisions on the implementation of the recommendations are being made individually by each of the organizations that make up the Task Force; the Task Force is not a joint purchasing group. The paper industry is generally characterized by a low concentration of both buyers and sellers (i.e., there are large numbers of both). The combined paper purchasing of all of the Task Force members is far below the typical threshold for raising an anti-trust concern for joint purchasing groups. Finally, educational projects like the Paper Task Force are generally recognized as enhancing, not reducing, competition.
- <sup>8</sup> The firms are Jaakko Pöyry Consulting, Inc. and Resource Information Systems, Inc.
- <sup>9</sup> *Folio*, Special Sourcebook Issue, Magazine Publishers of America Annual Survey, 22(18), 1993.
- <sup>10</sup> Joseph Hanlon, *Handbook of Package Engineering*, 2nd edition, Lancaster, PA: Technomic Publishing Co., 1992, p. 62.
- <sup>11</sup> Coated unbleached kraft (CUK) paperboard is also known as solid unbleached sulfate (SUS) and coated natural kraft

- (CNK) paperboard; the latter two names have been trademarked by Riverwood International Corp. and Mead Coated Board Corp., respectively.
- <sup>12</sup> Marilyn Bakker, editor-in-chief, *Encyclopedia of Packaging Technology*, New York: John Wiley & Sons, 1986, p. 147.
- <sup>13</sup> James River Corp., written response to questions asked by Johnson & Johnson staff, Paper Task Force meeting, June 2, 1995.
- <sup>14</sup> American Forest & Paper Association, *A Buyer's Guide to Recycled Paperboard*, Washington, DC: AF&PA, 1994, pp. 4-12; Joseph Hanlon, *Handbook of Package Engineering*, 2nd edition, Lancaster, PA: Technomic Publishing Co., 1992, Chapter 2.
- <sup>15</sup> Between 1970 and 1991, annual net revenues increased on average by 8.3%, while annual capital expenditures increased on average by 9.3%. American Forest & Paper Association, *Paper, Paperboard & Wood Pulp, 1994 Statistics - Data Through 1993*, Washington, DC, 1994, pp. 62 and 66.
- <sup>16</sup> American Forest & Paper Association, *Paper, Paperboard & Wood Pulp, 1994 Statistics - Data Through 1993*, Washington, DC, 1994, pp. 62 and 66.
- <sup>17</sup> In 1970, total U.S. production of paper and paperboard was 53.4 million tons; production in the South was 25.6 million tons, or 48% of the total U.S. production (regions as defined by the U.S. Census). In 1992, total U.S. production was 89.5 million tons, and production in the South was 48.3 million tons (54%). American Forest & Paper Association, *Paper, Paperboard, and Wood Pulp; 1994 Statistics - Data Through 1993*, 1994, pp. 41 and 44.
- <sup>18</sup> American Forest & Paper Association, *35th Annual Survey: Paper, Paperboard, Pulp Capacity and Fiber Consumption, 1993-1997*, 1994, p. 23.
- <sup>19</sup> Based on estimates from waste-sorting studies that found that (in the absence of recycling programs) office workers discard approximately 0.7 to 1.6 pounds of white paper per person per day, depending on the type of business.
- <sup>20</sup> In 1993, long-term debt as a proportion of total capital assets for the U.S. paper and allied products industry stood at 54%. In 1983, the same proportion was 33%. American Forest & Paper Association, *1994 Statistics: Paper, Paperboard and Wood Pulp*, Washington, DC: AF&PA, September 1994, p. 67.
- <sup>21</sup> In 1980, there were 203,000 workers in pulp and paper mills and 65,000 workers in paperboard mills. *Statistical Abstract of the United States*, 1989, Table 657. In 1989, there were 194,300 workers in pulp and paper mills and 52,900 workers in paperboard mills. *1992 North American Pulp & Paper Factbook*, San Francisco: Miller-Freeman, 1991, p. 56, from U.S. Bureau of Labor Statistics data.
- <sup>22</sup> Projections of total employment in the pulp and paper industry, 1994. Roughly 32% of total employment is in primary pulp, paper and paperboard mills; the remainder is in converting operations. U.S. Department of Commerce, *U.S. Industrial Outlook 1994*, January, 1995, p. 10-1.
- <sup>23</sup> While large integrated pulp and paper mills can produce large quantities of paper at very low costs, they “sometimes have negative market consequences if too much capacity comes online, as in the 1990-91 period, which also coincided with the economic recession.” *1992 North American Pulp and Paper Factbook*, San Francisco: Miller-Freeman, 1991, p. 186.
- <sup>24</sup> John Chrysikopoulos, Uncoated Free Sheet Paper Markets, Goldman Sachs Investment Research, June 16, 1993, p. 2.
- <sup>25</sup> Thomas J. Straka and James E. Hotvedt, “Timberland Ownership by Southern Companies.” *Southern Pulp and Paper*, Vol. 12, (1984), pp. 17-19.
- <sup>26</sup> Resource Information Systems, Inc. *RISI Long-Term Pulp & Paper Review*, RISI: Bedford, MA, July 1995, p. 227.