
BUSINESS GUIDE TO PAPER REDUCTION

A Step-by-Step Plan to
Save Money by Saving Paper

*Including Case Studies of Bank of America, AT&T,
Nike, Alameda County, and the Moore Foundation*

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FORESTETHICS

Preface

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Introduction

High quality vision, efficiency, and creativity are key ingredients to a successful business. While much emphasis is placed on how these factors affect a business' product, companies are also seeking ways to improve their internal operations. Increasingly, they are finding that reducing paper consumption can improve efficiency and reduce costs. Additionally, it can earn them a reputation for being environmentally conscious.

This report is a tool kit for building a paper reduction¹ campaign. The first section contains educational background information: statistics and trends in paper use, which has been increasing steadily with great access to the internet and printing capabilities; an explanation of the different ways that paper dependence costs companies, including purchasing, storage, lost documents, postage, waste, and labor inefficiency; and the environmental impact of forest extraction and the production and disposal of paper.

The second section is a step-by-step guide to implementing a paper reduction campaign in a company. While every company will implement paper reduction in a way that is most appropriate to its culture and organization, in general most or all of the steps outlined in this guide will be necessary for a comprehensive reduction campaign. These steps include getting started, dedicating adequate support, auditing paper consumption, identifying and prioritizing ways to reduce paper consumption, encouraging involvement, tracking improvements, and sustaining efforts over time.

The third section presents the case studies, which inspired and informed the step-by-step guide. The guidelines were developed from case studies conducted on Bank of America, Nike, AT&T, Alameda County, and the Moore Foundation. All of these organizations are involved in paper reduction, but are at different stages in the process. These case studies include an overview of how each organization is pursuing paper reduction, some of the successes they have had, and challenges specific to their process.

Many companies² have documented savings of thousands or even millions of dollars through their paper reduction efforts. Some approaches, such as duplex (double-side) copying or printing, may address the everyday ways that people use paper. Other efforts, such as implementing online billing, have the potential to save companies millions of dollars through reduced paper, postage, and processing costs. An initial audit of paper use will often reveal numerous cost-saving ways to dramatically reduced paper without loss of performance.

As this report demonstrates, with dedication and planning there is significant potential for a successful paper reduction campaign. Additionally, based on the cost-savings potential, there is little economic justification *not* to initiate such an effort. And the environmental benefits of paper reduction confirm that what is good for business can be good for the environment.

Many companies have documented savings of thousands or even millions of dollars through their paper reduction efforts.

I. Background Education About Paper Use

A. Trends in Paper Consumption

As many people who work in an office can attest, paper is ubiquitous. While buried under piles of memos, reports, to-do lists, order forms, and staff manuals, paper's services seem indispensable, yet the paper itself seems to be a great burden. Quite likely, both impressions are true.

The ability to document processes, place or fill orders, manage human resources, communicate between employees, store information, edit documents, bill customers, and legally protect oneself or the company can be the core of business operations. Historically, providing these services required the use of paper. Without this important tool, it would be very difficult to conduct business.

Yet for many of these services, there are new tools or methods available that could replace the use of paper and *provide the service more efficiently and/or cost less*. As explained in the following sections, there are significant economic and environmental concerns related to sustained paper dependence. To fully understand these concerns, it is important to understand the magnitude of current paper consumption:

Paper Consumption Statistics

- The average American office worker is estimated to use a sheet of paper every 12 minutes—a ream per person every two and a half working weeks—and to dispose of 100-200 pounds of paper every year.³
- The number of pages consumed in U.S. offices is growing by about 20 percent each year.⁴
- The introduction of email into an organization resulted on average in a 40 percent increase in paper consumption.⁵ A worldwide growth of 600 percent in printer accessibility between 1988 and 1993⁶ is in part what contributes to this.
- The U.S. is by far the world's largest producer and consumer of paper.⁷ Per capita U.S. paper consumption is over six times greater than the world average and about 25 percent greater than Japan, the world's second largest per capita paper consumer.⁸
- According to the Food and Agriculture Organization, global paper products consumption has tripled over the past three decades and is expected to grow by half again before 2010.⁹

This report focuses on ways to improve business efficiency by reducing paper use. Many of the suggestions for paper reduction entail investing in new technology.¹⁰ While some of the information above indicates that introducing more technology—such as the internet or printers—into the workplace can result in increased paper use, this is not the only possible outcome. As documented throughout this report, numerous companies have had excellent success in reducing

paper consumption by focusing on the appropriate use of technology. As part of the same effort, they focus on eliminating wasteful practices and training employees on the benefits of paper reduction. This approach can have significant financial benefits and serve their company better than previous paper-dependent processes.

B. Business Efficiency: The Argument for Paper Reduction

Paper is something that virtually every business uses in large quantities. Currently 90 percent of all information in businesses is retained on paper.¹¹ Its use is so familiar that it generally goes unquestioned. This tendency, however, can lead companies to stay dependent on wasteful systems. The financial costs of paper extend far beyond just purchasing the paper. There are also costs associated with storage, lost documents, postage, document obsolescence, and labor inefficiency. For example, a study of the Alameda County, CA Social Services Department found that, in distributing a memo to all employees, only 11 percent of the cost was related to purchasing. Thirty-three percent was for copying the memo (this includes expenses for the copy machine and the labor to make the copies), and 56 percent for was the labor of processing and distributing it.¹² Below are some of the other less-obvious ways that paper use can negatively impact a company's bottom line:

How Paper Over-Use Hurts the Bottom Line

Storage Space: To store 2 million paper documents, an organization can expect to spend between \$40,000 and \$60,000 on filing cabinets alone. Those same files could fit on fewer than ten CD-ROMs.¹³ Adding the cost of floor space required to house the filing cabinets, and considering that for many companies 45 percent of files stored are duplicates,¹⁴ paper storage is both inefficient and expensive. An effective electronic network and storage system could help cut costs dramatically.

Lost Documents: Despite the best intentions and even the best filing systems, documents are lost on a regular basis. In fact, approximately three percent of all paper documents are filed incorrectly, and almost eight percent of all paper documents are eventually lost.¹⁵ A study of managers in the U.S. found that they spend an average of three hours per week looking for paper that has been misfiled, mislabeled, or lost. Overall, the cost of misfiled documents is upward of \$120 per document.¹⁶ An effective electronic storage system combined with a well-developed organization system could dramatically reduce this loss.

Postage: Distributing documents by electronic rather than regular mail can significantly reduce postage costs. This is especially true for larger documents. A 1996 case study found that because of shipping costs, producing and delivering five thousand 1,000-page documents on CD-ROM cost less than half as much as producing and delivering the documents on paper.¹⁷ Savings can also be significant for lighter weight but higher volume mailing. AT&T, for example, found that paper and postage together account for 72 percent of the cost of billing their corporate customers.¹⁸ Online billing can reduce the costs of rendering bills dramatically. Using lighter weight paper,¹⁹ for example 20-pound instead of 24-pound, can also reduce postage costs.

Wasted Forms: Outdated forms are a considerable source of waste for many companies. In the U.S. alone, businesses spend \$1 billion a year designing and printing forms, \$25-35 billion a year filing, storing, and retrieving those paper forms, and \$65-85 billion over the entire life cycle of those documents maintaining, updating, and distributing them. While approximately 83 percent of all business documents are forms,²⁰ one third of the printed forms become outdated before they are used.²¹ With a well-developed internet system, forms can be downloaded and printed as needed, and this waste can be reduced.

Labor Inefficiency: A Lawrence Berkeley Labs study estimates that the cost per ton of handling paper is 20 times the cost of purchasing it and 200 times the cost of throwing it away.²² Automated processes can increase productivity by 50 percent or more.²³ The Superior Court in Cobb County, GA, for example, reduced their real estate processing time from 46 days to 3 hours by implementing a scanning system with electronic document access.²⁴

Fortunately, there are numerous other opportunities to reduce these inefficiencies. Technology is becoming an increasingly useful tool to reduce paper dependency. Additionally, there are many ways to reduce paper use without technology. By simply beginning to examine and question the way that paper is used within a company, numerous ways to reduce paper consumption and expenses can be found.

C. Environmental Impact: The Argument for Paper Reduction

In the same way that using paper has hidden but negative effects on business efficiency, its full environmental impact may also not be obvious. All the steps involved in creating paper—wood extraction, processing, production, transportation, use, and disposal—contribute to significant environmental challenges. Recycling paper and using recycled paper can help alleviate concerns associated with much of the process, though it is difficult to quantify its effect on reducing demand on forests. Likely, it is happening at a scale that helps abate the impacts from increasing demand, yet does not create a net reduction in the rate of forest extraction.²⁵ Reducing paper use is the most effective way to reduce some of the following impacts:

How Paper Over-Use Hurts the Environment

Forest Loss: Though paper can be made from a wide array of materials,²⁶ the U.S. depends almost exclusively on wood. Approximately 70 percent of this comes from the southeastern U.S., which has become the largest pulp-producing region in the world. With an estimated 1.2 million acres of forests cleared every year in the region,²⁷ the impact on forests is significant. Loss of habitat and species endangerment, reduced climate regulation and erosion control capabilities, and weakened air and water cleaning potential all result from such large-scale logging.

While approximately 83 percent of all business documents are forms, one third of the printed forms become outdated before they are used.

Production Pollution and Resource Use: To create pulp for office paper, generally a kraft pulping process is used. This dissolves the wood chips and removes lignin, a resinous binding that gives structure to the cells of the wood but will ultimately cause yellowing in the paper if not removed. Overall, in this pulping process only about half the tree is actually used to make the paper.²⁸ Pulp and paper mills in the U.S. produce approximately 245,000 metric tons of toxic air pollutants every year, which may include volatile organic compounds, sulfur, absorbable organic halides, chloroform, dioxin, and furan. All of these toxins have known health risks.²⁹ Worldwide, pulp and paper is the fifth largest industrial consumer of energy, accounting for four percent of the world's energy use,³⁰ and the processes use more water to produce a ton of product than any other industry.³¹ Overall, producing one ton of paper uses 98 tons of various resources.³²

Disposal Pollution: Paper, including paperboard,³³ is the single largest component of municipal solid waste, constituting 38 percent of all materials.³⁴ As of May 2001, approximately 46 percent of the office paper generated in the U.S. was recovered.³⁵ Thus, despite long-term educational efforts, more paper is still going into landfills than is being collected for recycling.³⁶ Once at the landfill, the carbon present in wastepaper decomposes to produce methane,³⁷ a potent greenhouse gas. The paper also has toxic printing inks on it. While printing inks have become less toxic over the years, many of the color pigments are still made with heavy metals, which can eventually leach out of the paper and contaminate groundwater through leaks in the landfill.³⁸

This description of environmental problems is not comprehensive. To understand the total environmental impact of paper, a full life-cycle analysis would be needed, including factors such as the transportation of trees to the mills and paper to the end-use destination, the extraction involved in the development of the chemicals used in production processes and printing inks, and the pollution in the production of those chemicals; among other factors. Ecological degradation and potential health impacts from paper production should provide incentives to seek out better ways to meet the needs of business and society.

D. Efficient Paper Use: Where the Environment and Business Intersect

Regardless of whether a company approaches paper reduction from an environmental or economic perspective, the above-mentioned challenges can be addressed simultaneously. Even a cursory investigation of paper use will often reveal opportunities to reduce inefficiency. Possible approaches to these reductions vary in labor intensity and potential initial investment; some are simple, some are significant. Either way, businesses frequently find a high return on investment for their paper reduction efforts. As the examples below demonstrate, any scale of effort can result in worthwhile savings:

Overall, producing one ton of paper uses 98 tons of various resources.

High ROI from Paper Reduction Campaigns

- General Electric estimates an up to \$10 billion cost reduction in the coming years through digitizing many of its processes. This effort has already helped GE identify approximately \$1.5 billion in potential cost-savings for 2001.³⁹
- Public Service Electric and Gas Company saved 100 tons of paper and \$320,000 through the use of electronic communications.⁴⁰
- Legacy Health Systems saved \$279,000 in reduced paper consumption by centralizing files, reducing distribution lists, and consolidating forms.⁴¹
- Lockheed Martin estimates savings of eight million sheets of paper and \$250,000 by putting a 100-page manual on the Internet.⁴²
- Bell Atlantic saved 29 tons of paper and more than \$60,000 by expanding the use of electronic purchasing orders and invoices.⁴³

In natural systems as in business operations, efficient, minimally wasteful processes are significant factors in long-term stability. As these examples indicate, there does not need to be a distinction between paper reduction efforts that are good for the environment and good for the bottom line. The two even amplify each other – while cost-savings will be the most tangible benefit, a reputation for being environmentally conscious can also be good for business.

II. Step-by-Step Guide for Reducing Paper Consumption

Understanding the value of reducing paper is only the first step. Actually implementing a course of action requires good planning and an understanding of how to pursue your goals. Every company has its own organization and culture, and thus will take a unique path in its paper reduction efforts. There are, however, some guidelines that can be applied from observing other companies' experiences.

Case studies were done on five companies or organizations—Bank of America, Nike, AT&T, Alameda County, and the Moore Foundation—at different stages in their paper reduction campaigns. From these, the following guidelines were developed to guide other companies through their process. The order that these steps are taken in may change based on the unique circumstances of each company. For example, whether an individual approaches management or management instructs the staff about paper reduction efforts may change when each step is emphasized. In general, though, most or all of these steps were followed by the organizations that were studied. The case studies are in the sections that follow.

A. Start with a vision.

Anyone can introduce the idea of a paper reduction campaign into their company. In some organizations, high-level executives may give the edict. In other organizations, it may come from the environmental affairs division. Government agencies may have to comply with measures passed by voters. Or an individual in any type of department may decide to find ways to reduce paper use. Where the vision originates may have an effect on how the process is carried out, but all are equally viable options. The important part is that one person or a group of people have a vision and take steps to make that vision come to fruition.

B. Do an initial assessment of inefficient paper use.

If an individual is initiating a paper reduction effort without management's directive, doing an initial assessment of paper inefficiencies may help build an argument for proposing the idea to the key company leaders. Eventually a thorough audit of paper use will be needed, but an initial list of obvious inefficiencies in paper use can be helpful in making the initial case. An individual may perform this, or a survey could be sent out to people asking about the waste that they see in their department.

C. Get buy-in from top leadership.

The greater the support for paper reduction at the highest levels of a company, the greater the chances are of success. This level of support can be critical in obtaining the funding and approval for various initiatives. Initiatives that address industrial scale paper reduction, such as online billing or electronic forms distribution, often can save the most paper and money, but will require an initial investment. These initiatives may be difficult to get approval for without the endorsement of key leadership. Taking the following steps to get buy-in should prove helpful:

Steps to Getting Buy-In

Identify allies: Identify top management people that will be supportive of the proposal. There will be some people that are enthusiastic about paper reduction and others that may be more resistant. Finding the most supportive managers or executives early in the

process can help build momentum. Initial conversations with these people will help in understanding how to best make the case for a paper reduction campaign.

Make the case: The economic and environmental arguments for reducing paper use presented above, combined with specific examples of inefficient paper uses in your company, can make a strong case for paper reduction. If the idea did not originate from top leaders in a company, it will be key to present this information to them when proposing the idea. Start by approaching managers and executives that will most likely support these efforts. Gain their interest and confidence in the idea and then determine who else needs to be involved to adopt a policy.

Develop a policy that fits with the organization: An explicit paper reduction policy can help you concretize goals and measure your progress. Investigating existing, related policies within the company can prevent developing a policy that conflicts with a pre-existing policy or creates a second tracking system that would double the work. For example, if there is already a waste reduction effort underway that measures success in terms of reduced weight of disposed items, it may be helpful to develop a paper reduction policy that parallels the policy by measuring reductions in weight. Or, if a company has signed on to an environmental initiative that requires certain methods of reporting progress, it will be useful to measure progress in ways that are compatible with their tracking system. See Figure 1 for sample policies.

Figure 1: Sample Paper Reduction Policies

Nike’s Policy: Nike will give purchasing preference, where price and availability allow, to wood and paper products that originate in forests that have been independently certified as being well managed. Nike will eliminate from its purchasing practice those materials derived from wood or pulp originating in native old growth or frontier forests. Nike will benchmark its paper consumption to determine paper usage, types and origins. Targets will be set for reducing per-capita paper usage and increasing, where feasible, the use of tree-free papers.

Bank of America’s Policy: Bank of America will reduce paper consumption throughout the company by 25 percent over three years.

Alameda County’s Policy: The County will reduce the weight of purchases of paper and products by 10 percent by January 1, 1995 and by 15 percent by January 1, 2000.

Dedicate adequate support and empower a champion: Perhaps the most critical factor in a successful paper reduction campaign is finding a person who will champion the process. Paper reduction efforts are about creative problem solving and sustained efforts. Without someone at the helm, it is very difficult to identify significant areas for reduction, implement the process, and track progress. Companies that are most successful

at paper reduction efforts are those that empower an individual to drive the process. Who that individual is will depend on the culture and organization of that company. The person may work in the environmental affairs, procurement, technology, or other departments. It is important that this person have ongoing support for their efforts from top management.

As with any company policy, successful implementation depends largely on ensuring that there is adequate support to see it through. This support extends beyond just endorsing the effort. Proper implementation of significant paper reduction campaigns will likely require additional staff and financial backing. The greater the investment in dedicating staff time to the effort, however, the more likely there will be a high return on investment. For example, a large company can benefit from multiple staff people tracking paper consumption, proposing changes, testing theories and implementing the final initiatives. If these people are not empowered to pursue these goals, it will be far more difficult to see changes come about.

Inform key personnel of the change in policy: **Once top executives have endorsed the policy and approved financial and staff dedication to the effort, it is important to inform people throughout the company of the changes. A message from the Board of Directors, President, or other top executives to management or the entire staff introducing the company's support for the initiative can send a clear message that paper reduction efforts are to be taken seriously.**

Once the initial groundwork is done of getting a paper reduction campaign adequately endorsed and supported at the top levels, the champion can lead implementation efforts.

D. Organize a team of people to support the work.

The champion will need the help of others to successfully reduce paper use. Depending on the way a company is organized, it may be useful to develop a team of people from various departments that meet to develop and carry out implementation plans. In other companies it might be better to consult directly with the people whose work will be affected. In some companies, a grass-roots team of environmental educators can help teach other employees about paper reduction. This grass-roots approach can also be important to avoid to a sense of top-down mandates, which could be met with resistance and prove counter-productive.

If a team approach is most relevant, be sure that the group has representatives from as many departments that will be affected as possible, but limit the group size to one that will be able to work effectively together. Start by educating people on what has been learned thus far, developing a meeting schedule (every two to three weeks in the beginning will help sustain momentum), organizing roles and responsibilities, and assigning action items for each person to do in the interim between meetings.

E. Audit paper consumption.

In order to understand how to target reduction efforts and how to measure and communicate success, an understanding of how much and what types of paper a company uses is needed.

Appendix A is a worksheet that can be used to start organizing information about paper use. Since every company is different, these are only guidelines to initiate an audit process. Below is an explanation of the questions in the worksheet:

Questions to Ask in an Audit

How is paper purchased throughout the company? Some companies have centralized procurement departments for multiple offices, some have buyers for each branch, some purchase by department. Sometimes secretaries simply order when they see supplies are running low. The more centralized procurement is, the easier it will likely be to audit paper use. Understanding who makes what decisions in a company is the first step in understanding paper use.

Whose approval is needed to change the paper for each commodity group? Each commodity group (i.e. the various uses of each type of paper, such as report printing, photocopies, faxes, letterhead, etc.) may have a different set of people responsible for making purchasing decisions. Some paper purchasers may be empowered to make choices; others may need approval from the Board of Directors. Marketing materials can have very precise requirements for their appearance, be highly specialized, and require sign-off from numerous people to change them. Copy paper may not have as rigid appearance requirements but have specific performance requirements for each use. Tracking who needs to approve changes will help in organizing strategies to make changes in each commodity group.

How much of each type of paper is purchased? A centralized procurement department may be able to measure purchase quantities for all commodity groups, whereas decentralized purchasing will likely require more effort to determine volumes. However, even centralized procurement departments may not have this information compiled in standardized units. This step may require gathering invoices, aggregating data, and converting it to a single unit that matches the reduction goals set in the company's policy (i.e. weight versus volume).

How much paper is used per commodity group? Each type of paper may be used for multiple purposes. Tracking how the paper is used within a company can help focus on where there are inefficiencies. Some procurement departments have well-developed systems for tracking how much of each type of paper is used for various purposes; others may only track what was purchased. The more centralized and organized the procurement department is, the easier it will be to benchmark how each type of paper is used. It may also be useful to track paper use from counters on machines such as photocopiers, faxes, and printers.

As each type of use is recorded, make notes on any obvious inefficiency or waste. For example, often companies find that a large amount of paper is used to print reports. Many of the reports are distributed, yet never read. By identifying the quantity of paper used for reports, it will be easier to determine ways to eliminate waste through eliminating unneeded reports, distributing them through print-on-demand only, or via the intranet.

What is the paper weight of each type of paper purchased? Many paper needs can be met with lighter weight paper with no reduction in performance or quality. Understanding the weight of each type of paper will help determine if there are readily available, lighter-weight substitutes or if a lighter-weight version could be manufactured to meet the company's needs. Copier/printer paper is a good example where reductions could be made. In recent years some companies have migrated toward 24-pound copy paper, yet 20-pound is readily available and performs to the necessary standards. Thus with no loss of performance, the weight of the paper could be reduced by almost 17 percent, saving valuable tree fiber and often reducing costs.

What is the fiber content of each type of paper? To reduce the environmental impact of paper use, different strategies can be used. One of those strategies is to reduce the amount of virgin paper used. There are several websites with information about different types of environmentally preferable paper, (See Appendix B) which can be helpful in understanding the environmental tradeoffs and benefits of each type. In an initial paper audit, identifying the percentages of paper a company buys that are virgin, recycled (which includes postconsumer⁴⁴), and non-tree fiber will help identify areas to target for improvements in environmental performance. This information may be available in the procurement department's records, or it may require calling the different paper suppliers to determine the amounts.

How much does each type of paper cost? Identifying the cost of different types of paper will help document cost-savings in the long run. This will also help to make forecasts of cost-savings that may prove important when educating other employees about the benefit of reducing paper use.

From the information gathered above, paper use can be benchmarked, allowing progress to be tracked over time.

F. Identify and prioritize paper reduction efforts.

From the data gathered, strategies can be developed for paper reduction. Appendix C provides ideas of different ways to reduce paper consumption.

Identifying where to begin can be challenging. Each company must find its own best areas to focus on, but the tips in Figure 2 can help in strategic planning.

Additionally, there are some tasks that, for many people, are still best served using paper. For example, many people prefer editing printed reports. While some find that online editing suits their needs, studies have found that editing paper versions of reports was most useful in part because of the interactions around the handoff between people.⁴⁵ Thus, while an innovative corporate culture may embrace online editing, it may not be well met in all companies. Thus, targeting reduced printing for editing as a first effort might not be the most strategic area to focus on.

Figure 2: Prioritizing Paper Reduction Activities

Aim for easy successes early on.

This can encourage buy-in and participation. One example could be changing to printing reports only on demand rather than mass distribution.

Identify at least one effort that will involve widespread staff participation and education.

Often companies begin by encouraging duplex copying or printing, which can take a sustained effort to become embedded in the office culture, but engages nearly all employees in learning about paper reduction and developing a culture that supports ongoing paper reduction efforts

Identify at least one effort that will significantly reduce paper use and costs.

Such efforts may entail a greater initial investment, but will likely have a greater return. Examples include making forms available on the internet instead of pre-printed or providing online billing to customers.

The greatest environmental gains can be reached by reducing the number of sheets used by the maximum amount possible and transitioning as much of the remaining paper used to the highest level of recycled (especially postconsumer) content available with the lowest paper weight possible to still meet the necessary performance standards. This will likely reduce costs from reduced paper used and lower weight paper. If there is any increase in cost from buying recycled paper, the costs can be offset by these savings.

G. Start with a pilot project.

Once a company has identified areas to focus on for a paper reduction campaign, pilot projects can be an important factor in its success. If, for example, a company changes the weight of the paper for a specific use, the paper should be tested thoroughly before high-volume contracts are signed. Additionally, some companies found it important to introduce default duplexing on a limited number of copiers before making the transition throughout the company. Making notes about how people or machines respond to new initiatives will help determine how to introduce them on a larger scale.

H. Encourage involvement.

Encouraging people to reduce their paper dependency will take a sustained effort. Developing a well-targeted education campaign with motivational incentives is key to encouraging staff participation. Below are suggestions for motivation and education strategies:

Motivation and Education Strategies

Promoting the campaign: Providing signs throughout the office can continually remind people to participate. This may involve developing an easily recognizable symbol or design for posters near all areas where paper is used (for example, by the printers, copiers, and fax machines) or throughout the building as a general reminder. This may also involve providing instructions for how to perform some of the paper reduction tasks, such as instructions on how to duplex photocopies at the copier.

Distributing educational materials to individuals: Giving people tangible ideas for participation is a good place to start. A basic list of ideas of what they can do will encourage participation. Some sample educational tools have been provided (Appendix D). It is best to find ways to distribute this information without printing an individual copy for every employee. For example, it could be posted on the company website, followed by an email to all employees informing them of how to find the information. Reminder emails could be sent every few months. Or, if a company website is not available, it could be posted in centralized areas and followed up with a voicemail to all employees.

Assigning point people in each department: While a champion will be driving the process, and will preferably be working with a team of people, it can be useful to have contacts that are easily accessible to all employees. Having one or more people in each department that are trained in how to best use the technology available for paper reduction or to answer questions about paper use can support the process. This person can also serve as a liaison to give feedback on what is working and what needs more improvement.

Providing training: Training the point people in how to support paper reduction goals is an important investment because they can then train other people in their department. Trainings may focus on general education such as why reducing paper use is important, or specific skills, such as how to use the intranet to its fullest potential, or both. Training is an ongoing process that should grow as new ideas are incorporated into operations. Additionally, new employees need to be educated to sustain momentum.

Creating incentive programs for staff participation: Incentives can encourage greater participation and creativity in problem solving. Tying bonuses to paper reduction performance can be a strong motivator. A company could adopt a policy such as “Anyone who reduces company costs by \$100,000 or more through reducing paper consumption will receive a bonus of 10 percent of the savings.” Participation may also be incorporated into job descriptions. For example, form designers may be required to find ways to reduce paper use by specific percentages, or the information technology team may be required to implement an intranet in a timely fashion. Not meeting these goals could result in reduced job performance evaluations.

Encouraging involvement is an ongoing process. Because paper habits are deeply ingrained in many people and institutions, long-term commitment to education and developing a culture that encourages paper reduction will have a significant impact in the success of a paper reduction campaign.

I. Educate paper vendors of relevant changes in policies.

Changes in paper-use policies will have an impact on a company's paper vendors. It is important to inform them of the changes and make any necessary requests. This may involve obtaining information from them for tracking purposes, reducing the weight of paper purchased, or eliminating specific purchases.

J. Track results over time.

Developing a system to account for changes in paper use over time is critical in any sustained paper reduction campaign. Developing a tracking system will help in articulating successes, learning how to improve performance, and planning for further reductions. A system of feedback loops such as this can facilitate boosting a paper reduction campaign from a series of scattered efforts to an embedded, company-supported approach to successful business.

Because of the many variables in each company's operations discussed above, there is no prescriptive method for tracking paper use. Walking through the initial audit will provide useful information about how to appropriately organize tracking efforts for each company. Additionally, the following tips should prove useful:

Tips for Tracking Paper Use and Reduction Over Time

Track on a scheduled basis: Consistent reports, preferably quarterly or semi-annually, will allow adequate time to gather information and see measurable results. Reporting less frequently will create too great of a lag time between implementation and assessment, and important opportunities will be lost. Additionally, maintaining support throughout the company will be best supported if there is a sense of ongoing improvement and activity. Otherwise, momentum could be lost.

Dedicate adequate staff time to the task: In the early phases of tracking, adequate staff time will be needed to develop the best system for tracking. As the efforts continue, adequate staff time will be needed to assess the multiple efforts underway. At any time in the process, a paper reduction campaign—specifically tracking paper reduction—requires adequate labor to drive it. Dedicating the appropriate resources to tracking early in the campaign, however, is key to increasing the return on investment, as this is where the lessons are learned and the opportunities can be identified. Some companies dedicate a full-time staff person just to tracking.

Report in appropriate units: As discussed above, some companies set goals in terms of reduced weight, others in reduced volume, others in impact to forests. Matching the way reductions are reported to goals will help demonstrate success. Sometimes, however, it is appropriate to introduce new ways of measuring consumption and reductions. For example, if a company re-organizes or merges, the number of employees could change.

Thus reporting in per capita consumption or reduction can provide more accurate information.

Include both paper savings and financial savings: Including both types of savings in the tracking process will help in continuing to make the case for paper reduction and will be useful in being able to address different audiences with the tangible success the company is having. Initially, financial savings may be counted in terms of reduced paper purchases, but some companies have found that studying how paper affects employee efficiency is also useful. For example, distributing a memo by email instead of paper versions may save several hours of labor, which over time could save the company a substantial amount of money.

K. Communicate success to participants and the public.

Promoting successes will encourage employees to continually reduce their paper use. Additionally, it is a way to improve a company's public image. Business magazines often cover stories about business' environmental initiatives; and county, state or federal government programs often recognize leaders in such efforts. ForestEthics is also interested in promoting success stories.⁴⁶

L. Continuously find ways to reduce number of sheets and/or paper weight, increase percentage of environmentally preferable paper choices, and eliminate waste.

Paper reduction campaigns are long-term undertakings. Beyond that, they are a learning process. Success will come as a result of continuously finding ways to reduce paper consumption. A company may also introduce new processes or products that increase paper use in certain areas. Thus, even the most successful paper reduction efforts need to be ongoing.

Following the steps above, but adapting them to fit your company's culture and organization, will likely result in significant improvements in efficiency and cost savings. Appendix B lists other organizations and resources that may be helpful in the process. While each initiative within a company may succeed to varying degrees, there is little reason to believe that a concerted effort would produce anything besides beneficial results.

III. Case Studies

Below are examples of four companies or organizations—Bank of America, Nike, AT&T, Alameda County and the Moore Foundation—that are in the process of reducing paper consumption. Each one has their own approach, focuses their efforts in their own way, and is at a different point in the process. These case studies were developed primarily from interviews conducted with the primary people involved in paper reduction in each organization.

A. Bank of America: Long-Term Commitment to Comprehensive Paper Reduction⁴⁷

Service Provided:

Bank services, securities, mutual funds, credit cards, mortgages, and corporate lending.

Company Size:

137,000 employees world wide, a national consumer banking franchise with 4,500 branches in the U.S., and 38 international offices serving clients in 190 countries. One of the 20 largest corporations in the world.

Overview:

Bank of America is a leader in reducing virgin paper and overall paper consumption. In 1994 they set a goal to reduce paper consumption by 25 percent over the next three years. They surpassed this goal and continue on with these efforts throughout the company. They co-founded the Recycled Paper Coalition and have been recognized by the Environmental Protection Agency's WasteWise Program.

History and Accomplishments:

Bank of America has pursued its paper reduction efforts for over a decade. Below are some highlights from this ongoing process.

1991

- Board of Directors approved Environmental Principles. This includes guidelines for appropriate materials to purchase and desired environmental practices on the part of the bank and its vendors and contractors.
- Begin efforts to increase recycled content in paper purchases. By the end of the year 18 percent of paper (by weight) purchased contained recycled content with at least 10 percent postconsumer content.⁴⁸

**Our efforts are successful because the motivation
behind the momentum is honest.**
**Bob Kee, Director of Supply Chain Management Division,
Bank of America**

1992

- Co-founded Recycled Paper Coalition in an attempt to create greater market access to recycled paper.

1993

- By the end of the year, 94.7 percent of paper purchases contained at least 10 percent postconsumer content.⁴⁹
- Postconsumer content went up from 7 percent of purchases in 1992 to 49.4 percent in 1993, with an average of 25 percent postconsumer content.⁵⁰

1994

- Set a three-year goal to reduce paper consumption throughout the company by 25 percent.
- Reached a 13 percent decline in photocopy paper purchases and 18 percent decline in computer paper purchases through reduction efforts.⁵¹
- Increased paper with postconsumer content to 61 percent of paper purchases.⁵²

1995

- Reached an 18 percent decline in photocopy paper and 32 percent decline in computer paper, resulting in a savings of \$1 million.⁵³

1996

- Endorsed CERES Principles.
- Required all new copiers to have duplex option.
- Reached 26 percent paper reduction from 1994 starting point by the end of the year.⁵⁴
- Established comprehensive intranet system, allowing for the publication of many reports online and improved internal communication.

1997

- Centralized procurement and reduced the number of vendors, which facilitated tracking efforts.
- Recycled Paper Coalition reached 253 corporate members.

1998

- Bank of America merged with NationsBank to form a new entity, Bank of America. The new Bank of America merged its paper tracking systems and adopted the former Bank of America's environmental paper practices.

1999

- Began including environmental principles as a component of purchasing contracts with paper vendors.⁵⁵
- Began transitioning east and west combined operations to meet environmental standards. Transitioned copy paper in all operations to 30 percent postconsumer content.

2000

- Began including quarterly reports as a contract requirement from all paper vendors, allowing Bank of America to re-establish baselines of paper use after the merger.⁵⁶

2001

- Finished networking all bank branches, allowing for improved communication and staging the ability to print forms directly, reducing wasted, outdated forms.
- Developed comprehensive paper tracking system that incorporates all sources in the company.

The Process:

Start with a good idea married to good leadership.

In the early 1990's, Richard Morris and Candace Skarlatos in the Environmental Policies and Programs department shared a vision for improved environmental practices at Bank of America. They also recognized that putting the vision into action would require a corporate policy with the Board of Director's endorsement. Gaining commitment to the goals at the top level has proven very significant in gaining approval and support for various efforts over the years.

Communicate the company's environmental commitment to people who are empowered to support and delegate responsibility to employees to pursue the goals.

After the Board of Directors approved the environmental policies, the CEO communicated details about the bank's commitment to departments and lines of business throughout the company. This communication also emphasized that the best environmental practices would be adopted. From this a culture has developed at Bank of America where paper-saving initiatives and other conservation efforts are encouraged.

House the ownership of decision making in the appropriate department.

The responsibility for implementing most aspects of Bank of America's paper policies falls within the Supply Chain Management division. The Document Management staff, which is lead by Bob Kee, closely tracks paper procurement needs and the potential impact of changing current practices in paper use. Additionally, they have the closest relationships with the paper and office equipment vendors and the bank's Finance department, which manages funding for the purchase of paper and other supplies.

Encourage and empower people throughout the organization to participate and educate themselves.

Before the paper campaign began, Bank of America already had Green Teams – or grass-roots environmental advocates – in place. Once the paper reduction campaign began, these people were able to support the initiative in their departments and throughout the company. Many of these people helped to encourage and educate people in their department about how and why to reduce their paper use. Additionally, Bank of America’s internal website has extensive information about the paper use reduction campaign (see Appendix D) so that employees can more easily participate in paper reduction efforts.

Track paper consumption so that decisions can be prioritized in paper reduction efforts and success can be documented.

In 1997, Bank of America centralized its procurement processes, allowing a more comprehensive and accurate assessment of their paper use. Their tracking efforts focused on both the tonnage used and the recycled content per commodity group. They began by requiring suppliers and vendors to provide environmental reporting data, including quarterly reports on paper usage and recycled content in products. The bank also requests a written description of how the suppliers’ policies, practices, and procedures support Bank of America’s environmental commitment. As their processes evolved over the years, their tracking became more developed and allowed them to identify how much and what type of paper was used for a variety of purposes throughout the company.

With the merger of Bank of America and NationsBank, guidelines for increasing postconsumer content are being extended across all businesses, east and west. This is occurring incrementally, both with the postconsumer content used and the products that are addressed.

Bank of America has also further evaluated paper consumption in the company. After the merger nearly four years ago, it was necessary to combine information into a single tracking system. Changes in baseline consumption had to be closely monitored to track percentages of reduction. Straight numbers alone would not answer the question of whether the processes were improving or the number of employees or accounts were shifting. To address this, reporting paper use in additional units—such as the ratio of paper to employee or paper to account—has been under consideration.

Tracking at Bank of America is an ongoing, evolving process. They have a full time employee responsible just for overseeing this process. The dedication of resources to this purpose continues to pay off, though, as Bank of America can continually find ways to use paper more efficiently by identifying inefficiencies. A comprehensive understanding of the impacts of paper use also allows Bank of America to explain to its employees how cost savings from paper reduction helps contribute to overall efficiency. Employees can then begin to see the economic benefits for each action they take.

Develop relationships with the suppliers and distributors of the paper the company uses.

As a large user of paper, Bank of America has an advantage. Their purchasing contracts are large enough that their forecast of future consumption allows the mills to make the capital investment

necessary to produce the paper to bank requirements. Additionally, their ties to the Recycled Paper Coalition allow them to join with other companies if need be to request greater levels of recycled fiber content at a competitive price. These types of relationships have allowed them to do things such as switch their paper for statements to an 18-pound, 20 percent postconsumer content paper that can be processed at high speed.

Through coordinated efforts and strategic partnerships with suppliers and mills, environmental paper requirements are being met in all operational regions. This was challenging, as the postconsumer market was not as well developed and the infrastructure was not as readily available to produce in all regions of the new Bank of America, and transportation costs make it prohibitive to ship paper long distances. These problems, however, have been solved.

Seek continuous improvements.

Bank of America has many things that contribute to their success in paper reduction efforts: good leadership, organizational structure that supports their efforts, economies of scale, and others. But their success stems largely from an ongoing commitment to the process of reducing paper consumption. Instead of trying to become a paperless office and giving up when that goal is not met, they continuously assess opportunities and pursue greater efficiency. Bank of America's success lies in its steady dedication to the vision.

Accomplishments:

Bank of America's commitment to striving for continuous improvements in all areas of paper use has resulted in numerous cost-saving improvements. Below are many of the efforts they have undertaken:

Letterhead

Bank of America switched their letterhead to 100 percent recycled, 30 percent postconsumer content. They also developed software that allows employees to print letterhead stationary on an as-needed basis. This step resulted in a 56 percent cost-savings and zero waste when the employee changed titles or addresses.⁵⁷

Copy Paper

In the first year of their paper reduction campaign Bank of America reduced its photocopy paper consumption by 18 percent by encouraging duplexing. Their success stemmed largely from the Green Teams educating co-workers and distributing posters, as well as senior managers encouraging participation. However, perseverance was needed to meet this goal. Bank of America's 1995 Environmental Report mentions that encouraging employees to consistently copy on both sides is a challenge.⁵⁸ By 1996, all new copiers in Bank of America had the option to duplex.⁵⁹ Recently, a new contract for desktop printers was signed, making it possible to default to duplex, which is being instituted company-wide. Through people at all levels of the organization consistently promoting the campaign, duplexing has become the expectation throughout the company.

Even with the success of their reduction efforts, copy paper still remains widely used. To address this, Bank of America made a comprehensive transition to using 30 percent

postconsumer content, 20-pound paper. The bank has resisted the trend to migrate to the higher weight, 24-pound paper that some companies began using in recent years. This paper meets their needs for general copying and most of their high-speed, high-volume copiers. In tests they have found no difference in appearance or performance between the postconsumer content and virgin paper of the same paper weight.

Internet/Intranet Access

Providing internet access throughout Bank of America has been a significant commitment, but is proving an important investment. Today nearly all areas of the bank, including all of the branches, are web-enabled. Making this commitment allowed Bank of America to provide the following:

Internal resources. Virtually all staff guidelines, policies, and environmental program education materials are available online. The paper savings are substantial, for example, changing to an online-only version of the corporate telephone directory eliminated 100 tons of directory paper annually.⁶⁰

Internal affairs processing. By adopting an online process for ordering and renewing subscriptions, developing an online expense reimbursement service, and redesigning travel itineraries to be one page instead of three, Bank of America saved 235,000 sheets of paper.⁶¹

Comprehensive banking center coverage. Bank of America established intranet access to all of its banking centers. Over the long run they expect significant savings from reducing costs by making banking forms down-loadable instead of requiring the branches to maintain inventories of forms that could become obsolete. This also allows a much faster time to market for materials used at the banking centers.

Information for the public. Beginning with the 2000 Environmental Progress Report, these reports are available only online. Bank of America now produces a one-page brochure and sends notification postcards to 900 external interested parties. This saved 180,000 sheets of paper and approximately \$20,000.⁶²

Forms

Making forms less paper intensive can provide substantial cost savings. Bank of America started by reformatting their forms to use less paper by changing margins, design or font size. In 1992 alone, the first year of the Forms Reduction Project, they reduced paper consumption by 565 tons.⁶³ They then centralized the forms production, which allowed greater control over reducing redundant forms, meeting brand standards, and complying with equipment processing standards. The document management group is a part of Supply Chain Management division, which is the focal point for driving paper reduction efforts. As a result, there is an expectation that each form will be justified as necessary. This also minimizes costs to the department. In addition, they are transitioning the type of paper that the forms are printed on. Currently, 60 percent of paper consumed is recycled

(with a minimum of 20 percent postconsumer content), and they are working to increase that to 90 percent of their total consumption.

Now that Bank of America has a comprehensive, national internet network, they are able to provide most of their forms online. In the first few weeks of implementing the Online Forms and Manuals Library, all registered forms – approximately 5,500 – were made available.⁶⁴ Currently the site registers over 100,000 hits per month.⁶⁵ This new system allows Bank of America to reflect changes in form design immediately and eliminates potential waste when forms are changed. For example, as a result of the merger, they had to obsolete \$5 million worth of forms. If current systems had been in place, this expense could have been avoided. The new system also allowed them to carve out \$10 million worth of inventory investment and reduce storage space needs by moving to print on demand, desktop delivery and innovative inventory methodologies. Shipping costs have also been significantly reduced.

There are still a number of forms that need to be produced and delivered in a traditional manner. The Bank continues to aggressively move any type of traditional document to a digital delivery systems as it becomes feasible to do so. Online forms are especially useful for less commonly used forms, which are more likely to become obsolete before they are used. While providing downloadable forms still means they are printed by the end user, eliminating wasted or outdated forms is a primary benefit. Bank of America has implemented ways for people to fill in forms online and route them electronically without needing to be printed at all. At present, 20 percent of forms can be filled and routed electronically.⁶⁶

ATM Receipts

With the largest ATM network in the world – over 15,000 machines – Bank of America uses approximately 140 million ATM receipts every month. While they have added the option to not receive a receipt, the quantity of paper used is still considerable. Inspired by the paper reduction efforts, a former Bank of America forms analyst decided to address this. For two years she lead the effort to reduce the weight of the ATM paper. After gaining initial approval to try different paper weights, Bank of America spent three months testing rolls of various paper. Ultimately they dropped from 20-pound to 15-pound paper, the lowest weight possible that would not result in tearing and jamming in the machine. This effort alone resulted in a savings of 228 tons of paper and \$500,000 annually.⁶⁷ As a result, the employee was awarded \$50,000 for her leadership and commitment to the effort.

Bank Statements

Many of Bank of America's 30 million customers have multiple accounts. Previously they received a separate statement for each account. In consolidating account statements, Bank of America found they could reduce an individual statement by a single to multiple pages. They have made a significant effort to continue providing consolidated statements and to move clients to electronic presentment as they desire.

Because of the high-speed, high-volume statement printing process, there are very precise needs for the paper used as well as precise calibrations for the printing machines. For over eight years Bank of America worked with International Paper to develop an appropriate environmentally preferable paper. Currently they use an 18-pound, 20 percent postconsumer content paper that has been made to perform as if it were thicker by fluffing the fibers. This allowed them to reduce the paper weight without losing the performance. This lighter paper is being used for a majority of printing centers, with 18-pound paper used in 50 percent of its statement centers today.⁶⁸ Bank of America is currently considering increasing the paper thickness to allow them to change to duplexing, which would allow a net decrease in paper consumption.

Online Billing

Online billing is a new frontier for most companies, and Security and Exchange Commission rules have only recently allowed financial statements to be sent online. In expectation of regulations allowing improved access to online billing, Bank of America established an online billing service, which is rapidly gaining popularity. Currently, approximately 3.5 million customers receive statements electronically. They also send security trade confirmations electronically, although the SEC requires financial institutions to send a statement if the email is not opened in five days. The bank anticipates that of their 30 million customers, in the next three to five years 50 percent will prefer to receive statements and notices electronically.

Eliminating unneeded reports

Printing unneeded reports is a hidden waste for many companies. Eight senior officers at Bank of America attached a survey to month-end and week-end reports to determine if they were needed and more efficient ways to distribute them. The responses indicated that several reports could be revised or eliminated. This one exercise will result in a savings of 9 million pieces of paper a year, or 45 tons. Paper savings alone is over \$70,000 per year and savings in transport, handling, and storage multiply that amount.⁶⁹ Increasingly reports that are needed are disseminated through the intranet.

Office Equipment

Recognizing that easy access to printers is one of the forces driving up paper consumption, the bank is implementing an aggressive demand-management plan related to print devices. They have removed the majority of desk-top printers and are replacing them with multi-functional devices (i.e. machines that print, copy, and fax). They are also providing printing devices only where printing is justified from a business perspective with an aim to significantly reduce the number of pages produced. This change alone reduced impression cost (the cost to print each page) by two-thirds, the number of pages printed overall, energy consumption, office space, and toner consumption. Even in early phases the bank has already saved millions of dollars. They are currently installing software that tracks printing usage by bank staff. This will allow them to best respond to the printing needs and make decisions about allocation of printers.

Challenges:

The major challenges for Bank of America in carrying out its environmental paper commitments include making changes that do not increase costs or impact performance. These challenges are not unique to them, but because the bank is a substantial paper user, this compels the Supply Chain Management division to be innovative in its approaches. In order to keep costs stable, they focus on ways to cut costs in one area to allow for cost increases in other areas. They may accomplish this by buying at high enough volumes to create an economy of scale. Or they may offset the increased cost of recycled content in their ATM receipts by lowering paper weight, which lowers costs. Or, in the case of forms, they can increase the recycled content by reformatting the forms to use less paper and making more forms available online.

Meeting performance standards also poses challenges. Insuring that a new type of paper processes at acceptable standards can be labor intensive. For example, producing lighter weight paper for bank statements required extensive testing to ensure that the paper could be processed at high speeds, and printing machines had to be re-calibrated to process a lighter weight paper. This process had to be replicated at multiple printing centers across the country. As was noted in the example of ATM receipts, it took several months just of testing to find a paper that fit specifications. Ensuring predictable success in each new type of paper's performance is of the utmost importance to making the bank's environmental paper practices a success.

Since banking is, by its very nature, a risk-management business, testing new options requires sponsorship at the highest level of the company. Without a company-wide dedication to the end-goal of improving their paper's environmental performance, Bank of America would not be focused enough to weave that ethic into procurement practices at all levels of the company. It is likely that Bank of America, or any company committed to reducing the quantity of virgin paper it uses, will always have to meet the challenge of balancing cost and performance factors. As a result, incremental change has proven the key to Bank of America's success.

B. Nike: Basic Changes Make Good Economic Sense⁷⁰**Services Provided:**

Athletic footwear, apparel, and equipment.

Size:

5,000 employees in their corporate headquarters; 22,000 globally. \$9 Billion global sales.

Overview:

In 1998 Nike rolled out an Environmental Mission and Policy and adopted the following forest products policy: "Nike will give purchasing preference, where price and availability allow, to wood and paper products that originate in forests that have been independently certified as being

Incremental change is the key to Bank of America's success.

well managed. Nike will eliminate from its purchasing practice those materials derived from wood or pulp originating in native old growth or frontier forests. Nike will benchmark its paper consumption to determine paper usage, types and origins. Targets will be set for reducing per-capita paper usage and increasing, where feasible, the use of tree-free papers.”

Process and Accomplishments:

Develop a network of people educated in environmental principles throughout the organization.

In 1993 Nike established an environmental action team to spearhead environmental efforts throughout the company. Eventually they determined that the team could be more effective if it was better integrated into the company. Team members were reorganized into different departments, depending on their skills and the company’s needs. To broaden their network of environmental leaders, in 1999 Nike trained 65 people at its Beaverton, OR headquarters on the principles of sustainability that the company had adopted, and incorporated parts of the Natural Step—a sustainability training for business people. By creating environmental leadership in all departments, people have taken the following initiatives: improving the environmental performance in shoe design, redesigning shoeboxes to reduce pressure on forests, and increasing organic cotton content in Nike clothes.

Establish a system to assess environmental performance of the paper being used.

Since one of Nike’s initiatives is reducing the environmental impacts of paper products, they are developing a sustainability score-card to help determine what products to buy or to avoid. This score-card weighs the numerous considerations, including what type of fiber is used (for example: postconsumer, virgin, tree-free) and the bleaching process; giving a plus, minus, or neutral ranking for the various criteria. They then weigh this ranking with an assessment of how well the product will perform for a particular purpose and their budget for that product. This score-card is being developed and will be further refined as lessons are learned from its use and they plan to develop the card for label and corrugated procurement soon.

Focus on a specific action that can be taken.

Recognizing paper use reduction as one of the ways they can reduce their impacts on forests, Nike decided to improve access to duplex printers. Initially, they considered converting their current printers to duplex printers. Further research showed that their computers could be networked to upgraded photocopiers that were already duplex-ready. In doing this they could not only reduce paper purchasing costs, they also found a reduction in per-image printing costs. With laser printers, all printing costs add up \$.03 per copy, while copy machines cost only \$.01 per page. Thus, duplexing a two-page document on the copier costs less than printing one page on a printer. This does not include the additional savings from the longer life of the copier compared to a printer that uses a duplex board.

Allow the people who will be affected or who are most directly involved to be part of the planning and implementation phase.

Leta Winston, Environmental Specialist, Nike

Commit to an ongoing process of improved environmental performance.

This duplexing effort is currently being piloted and will be expanded to multiple departments as the success of this effort is proven. Environmental leaders in each department will have some responsibility for encouraging and educating people in their department about duplexing on a regular basis. People throughout the company are also initiating their own paper reduction efforts by eliminating printed reports or re-using paper in printers. As Figure 3 indicates, there are some basic guidelines that may be useful for implementing paper reduction or other environmental initiatives.

Figure 3: Tips on Environmental Leadership in Companies

Nike environmental specialist, Leta Winston, learned the following useful lessons on leading environmental initiatives:

1. In a company the size of Nike, it is important to develop environmental leadership and accountability in each department. This improves staff buy-in and participation.
2. Bring options to people of different ways of solving environmental problems instead of insisting that there is only one solution – this can be alienating and likely would not be the best informed solution anyway.
3. Allow the people who are going to be affected or who are most directly involved to be part of the planning and implementation phase.
4. Run pilot projects before overhauling a process throughout the company to reduce the risk of resistance if any challenges arise.
5. Always give credit to people for what they have done.

Challenges:

Nike has made strides in reaching the goals of their forest product policy. For example, in surveying their suppliers Nike discovered that they did not know what the recycled content was in their shoe cartons. They changed their process and simply specified 100% postconsumer fiber. As a result, nearly all of their shoeboxes are now made with 100% postconsumer waste instead of virgin fiber.

In terms of paper use, however, Nike is just beginning. Currently, there are no mandates being enforced about paper reduction. For example, Nike is improving access to duplex printing, but is not changing the systems to default to duplex. They are therefore relying on their employees to voluntarily make the shift. Nike may have found this to be the most appropriate approach based on the organizational culture, but it will be a slower road to progress. Most organizations that

encourage duplexing find that it takes consistent education and continued reminders before people automatically duplex. Unless mandates or consistent education are incorporated into the effort, they likely will not see the paper or cost-saving potential that could result from such a project.

C. AT&T: The Benefits of the Intranet and Online Billing⁷¹

Services Provided:

Voice, video, and data communications for consumers, businesses, and government.

Size:

Over 100,000 employees in hundreds of facilities.

Overview:

AT&T is a leader in industrial ecology, not only in terms of its internal efforts, but also in the research it sponsors and information it disseminates. Repeatedly, they found that reducing resource use in certain areas could significantly improve business efficiency and reduce costs. Paper reduction is one area in which they have found this to be true.

AT&T's Process and Accomplishments:

Because of the technological nature of AT&T's business, the company was at an advantage to implement significant communication improvements that could simultaneously reduce paper consumption and improve efficiency. They implemented two significant changes—providing company-wide access to the intranet and introducing online billing to customers—that are both proving to bring significant returns on their investment.

Internet

By 2001, 95 percent of AT&T's employees were connected to the internet.⁷² This change allowed AT&T to not only transition previously printed material to online versions, it also allowed them to circulate more information without an increase in costs. For example, daily or weekly updates are sent to all employees about AT&T's activities. These updates help create a more coherent corporate culture, yet would be cost-prohibitive to print and distribute in paper form. Completing projects is often faster online as well, such as shifting the development and distribution of their Environment Health & Safety paper newsletter to their internal website. This change reduced the turn-around time on the project from months to weeks.⁷³ Overall, AT&T has reached a communication rate of at minimum one million electronic messages per week, or fifty million per year, within the company.⁷⁴

One focus of having the Internet is converting numerous documents from paper to electronic versions. Almost all human resource procedures and training manuals are available on the company's intranet. They now distribute the Environmental Health and Safety newsletter online.

These environmental initiatives are really about efficiency.
Brad Allenby, Environment, Health, & Safety Director, AT&T

Table 1 includes estimates of environmental benefits, which, by AT&T's accounts, err on the conservative side. There are other environmental benefits that are not documented here, such as the increase in telecommuting that internet access allows. This reduces emissions from commuting, reduces traffic congestion, and ultimately reduces carbon emissions, which contribute to global climate change. Overall, the time savings, cost savings, improved communications, and environmental benefits have made AT&T's investment in the internet an important improvement in their business.

Table 1: Environmental Benefits of the Internet at AT&T⁷⁵

Approximate number of sheets of paper eliminated by e-systems:

Environmental Health & Safety Newsletter - 1,800,000/year
 Training - 2,000,000/year
 Employee Services - 6,000,000/year

Minimum Environmental Benefits:⁷⁶

<u>Example</u>	<u>Trees Saved</u>	<u>Gallons of Oil Saved</u>
EH&S Newsletter	100	2,400
Intra-company email	2,174	50,000
Employee services website	520	12,000
Training catalogs	130	3,000
Purchasing website	260	6,000

Online Billing

AT&T instituted an online billing service for their individual customers in 1998 and for their business customers in 2001. This created substantial cost and paper savings, especially for their business customers. Historically, some of AT&T's large corporate customers received 17,000 pages in invoices - including summary pages, call detail pages, and reprints - over the course of a year. Postage for a customer account that size was \$800. Paper and postage comprise 72 percent of the cost of billing.⁷⁷ Both of these expenses have been eliminated by implementing online billing.

As shown in Table 2, there are significant cost savings with online billing. For personal accounts, the price drops from, on average, \$6.75 per bill to \$.03. This is a cost savings of approximately 99 percent. For businesses the cost drops from an average of \$17.00 per bill to \$.03. The reduction in costs from paper, postage, printing, storage of printing paper, and processing quickly demonstrated the wisdom of this investment.

Table 2: Economic and Environmental Savings from Online Billing at AT&T⁷⁸

Personal Accounts since 1998	Business Accounts since 2001
<p>Average sheets of paper per bill: 4</p> <p>Number of new customers per year: 1998 - 98,000 1999 - 175,000 2000 - 319,000 2001 (as of 8/01) – 278,000</p> <p>Approximate sheets of paper eliminated: 1998 - 4,700,000 1999 - 8,400,000 2000 - 15,300,000 2001 (as of 8/01) - 24,360,000</p> <p>Economic Advantages: Cost of rendering a bill: Paper bill - \$6.75 per bill/per customer Electronic bill - \$.03 per bill/per customer</p> <p>Environmental Benefits from 1/98 - 8/01:⁷⁹ Trees Saved - 4,595 Energy Saved - 106,000 gallons of oil</p> <p>Barriers:</p> <ul style="list-style-type: none"> • Lack of promotion • Individuals not migrated to the internet • Individuals not wanting to give up their paper <p>Incentives:</p> <ul style="list-style-type: none"> • \$1 bill credit/per bill for a year • \$25 Amazon.com gift certificate 	<p>Average sheets of paper per bill: 71</p> <p>Number of new customers from 1/01 to 8/01: Approximately 43,000</p> <p>Approximate sheets of paper eliminated: 2001 (as of 8/01) - 22,755,000</p> <p>Economic Advantages: Cost of rendering a bill: Paper bill - \$17.00 per bill/per customer Electronic bill - \$.03 per bill/per customer</p> <p>Environmental Benefits from 1/01 - 8/01:⁸⁰ Trees Saved - 1,994 Energy Saved - 46,000 gallons of oil</p> <p>Barriers for Small Businesses:</p> <ul style="list-style-type: none"> • 40% have no access to web • May take longer to go online to pay bill <p>Incentives:</p> <ul style="list-style-type: none"> • Lower price per minute for e-billing • AT&T Business Network customers (mid-size customers) must pay for paper bills

Individual and business online billing both have their own set of opportunities and challenges. With individual accounts, AT&T found that there are still many individuals who do not have access to the internet, and thus online billing remains unachievable for these people. They also believe that better promotion is needed for it to attract customers that do have access to the internet. One of the more difficult challenges, however, is that many people simply do not want to give up their paper bills. To encourage customers to switch, AT&T gave them incentives to join, including a \$1.00 credit per bill for the first year and a \$25.00 gift certificate to amazon.com. While currently less than two percent of their individual accounts have switched to online billing, the number of customers participating is increasing at a steady pace.

With business accounts, small businesses are proving the most challenging to access. For example, AT&T has found that small businesses hesitate to switch because their bill payment systems are already well established and they feel it would take too long to go between paper bills for most of their accounts and online billing for this account. Additionally, AT&T estimates that approximately 40 percent of its small business customers do not have access to the internet. To attract business customers, AT&T offers lower price-per-minute service if businesses transition to online billing, and they have begun charging their mid-sized customers for paper bills. Business online billing is gaining momentum, with approximately 3,000 customers each week signing up for it.⁸¹

Challenges:

From a business perspective, online billing is a solid investment in cost-cutting efficiency. The challenge for AT&T and other companies is customer participation. Customers that have made the switch tend to prefer online billing. They can see information in near real time, they find it easily accessible and accurate, and it reduces the payment cycle.⁸² But there are considerable psychological obstacles – many people simply prefer the paper copy. Additionally, many individuals and small companies do not have access to computers, and those small companies that do may find that online billing slows down their bill-paying systems when all the other bills are paid manually.

Yet, AT&T is poised to make considerable reductions in paper use and costs through online billing. With a 78 percent participation increase between 1998 and 1999, and an 82 percent increase between 1999 and 2000 in individual consumer participation, growth rates are promising. Yet this still accounts for less than two percent of their customer base. Business customers are especially promising for increased participation and cost savings. This program is new enough (starting in January 2001) that it is difficult to determine how quickly it will catch on, but 3,000 new online billing customers per week indicates that there is potential. Yet at present there is still less than a one percent participation rate. It will likely require a sustained marketing effort before a critical mass of individual or business customers is reached.

**From a business perspective, online billing
is a solid investment in cost-cutting efficiency.**

D. Alameda County Offices, CA: Organizing a Large, Decentralized Agency⁸³

Services Provided:

All government operations for the county of Alameda.

Size:

11,000 employees, 27 departments.

Overview:

Alameda County residents passed Measure D in 1990, and among its many initiatives, it required the County government offices to reduce the weight of purchases of paper and products by fifteen percent. The responsibility for meeting this source reduction mandate was upon the Alameda County General Services Agency's Purchasing Department. The Purchasing Department directed efforts with all County departments through the establishment of a Source Reduction Committee. To meet the goal required of all County departments, the committee's primary emphasis was on identifying the areas with the greatest paper reduction potential. Though the departments function autonomously, they have a centralized purchasing department. One staff person in the Purchasing department was responsible for coordinating the Source Reduction Program for all County agencies.

Process and Accomplishments:

Establish a baseline.

The first priority for the County was to begin tracking paper consumption throughout the agencies. Since paper procurement is centralized through the County's Purchasing Department, the County had an advantage that organizations with decentralized purchasing do not. Their challenge, however, was obtaining accurate data from the vendors. This was a time consuming effort, but was necessary to convert the number of reams of paper purchased into pounds in order to track the County's success meeting the mandated paper reduction goal.

They started the tracking process by asking the County's approximately 30 vendors to gather information on what quantity of envelopes, forms, copy paper, and janitorial supplies the county purchased. Each vendor had its own way of recording information and the reports often came back in inconsistent, multi-paged, handwritten forms, which made the tracking process time consuming. Ultimately it was written into each vendor's contract that they would need to provide this information in a more consistent form.

By creating a usage baseline, the County was able to identify the top paper users: the Social Services Agency and the Information Technology Department both used about 17% of the total weight of paper products. The Printing Department (8%) and the County Hospital (6%) were also big users. These departments were targeted for reduction efforts.

Everybody needs to know that they can make a difference.
Beth Eckl, former Recycling Program Manager, Alameda County

Establish a network of advisors and advocates.

Concurrently a network of advisors and advocates was being built. Because the County consists of 27 diverse departments that may have little interaction between them, an advisory committee was formed primarily from members of the departments that had been identified as top paper users. This team met every one to two months to guide the program development, identify areas that could be priorities, and ultimately implement the education program.

Identify opportunities for paper reduction.

People throughout the county identified ways to reduce paper consumption. Some projects, such as increasing access to the County's internal intranet, were a substantial undertaking, as only one third of county employees had access when the initiative began. The Social Services Agency, which uses numerous forms in its processes and has frequently-changing policies, began assessing ways to reduce paper. Staff within the agency initiated several projects to support moving from paper to electronic tracking of cases within the agency, with the potential of saving vast amounts of storage space and storage costs. Many other agencies were involved in changing from paper County forms to online form access. With funds designated through Measure D, the County provided financial support of up to \$15,000 to departments involved in such efforts.

Numerous individuals also made significant contributions to the campaign. One department stopped distributing some reports and required people to walk down several flights to get the report in order to discourage its use. One woman in the tax department reformatted the secured property tax form and saved the county \$27,000 and 5,500 pounds of paper.⁸⁴

Education. Education. Education.

While the County identified larger areas to focus on paper reduction, they also determined that encouraging employee participation at an individual level was important in insuring the program's success. Realizing that it would be very difficult to reach all employees with an advisory team of ten people, they adopted a train-the-trainers approach. They identified people in each department that could take responsibility for implementing paper reduction efforts in their own departments.

To facilitate this train-the-trainers approach, a full day training session was offered for all department liaisons. This training included watching *The Paper Trail*, a 16-minute video that the County produced. The video, which is available to the public at www.stopwaste.org, focuses on educating employees about the inefficient uses of paper throughout the county and about steps that were being or could be taken in the campaign. These staff trainers then went back to their departments to present the video—which was required viewing for all county employees—using an educational leaflet and list of talking points. Additionally, every employee was given paper reduction guidelines that helped them understand specific actions that could be taken, and paper re-use trays were put near printers for scrap paper.

Challenges:

In their initial audit, Alameda County found that the Social Services Agency was one of the largest paper users. Strategically, it made sense to target this department for early paper reduction efforts, yet they discovered two inherent challenges. First, the Social Services

Agency's primary role is serving many clients, often over an extended time period. This requires consistent documentation on each case, which is extremely paper-intensive. The other challenge is the legal requirement to keep documentation for at least seven years. Currently, Alameda County rents a warehouse the size of a football field to store client files, yet it is possible that the technology exists for all this information to fit onto 500 CD-ROMs, which conceivably could fill one bookcase.⁸⁵ There are numerous considerations in how to convert these files to electronic storage, including legal requirements, accessibility, and confidence that the files will be readable over the years as technology changes. While the department staff continue to explore ways to reduce the built-in paper dependency of their procedures, they must proceed with caution before making the significant investment in an electronic data storage system. Thus, one of the county departments that could have the greatest impact on paper reduction (and cost savings from reduced storage space) is also the department that may take longer than others to assess.

E. The Gordon and Betty Moore Foundation: Getting Started⁸⁶

Services Provided:

Fund efforts in conservation, education, science, and the San Francisco Bay Area community.

Size:

Currently approximately 40 people, building up to a staff of approximately 100.

Overview:

The Moore Foundation was recently established by Gordon and Betty Moore, and will begin accepting proposals for funding in March, 2003. The next two years will be dedicated to setting up the systems that support the work they will be doing. A primary focus of this phase is developing an environmentally sustainable office. One aspect of this is developing processes and systems that support the goal of eliminating the use of paper to the greatest extent possible.

Process and Accomplishments:

Start with an organizational vision.

Since the organization is being set up to fund efforts to create a more sustainable society, the vision of creating a sustainable office environment is as much a priority as choosing the appropriate organizations to fund. Additionally, staff members largely come to the organization with a personal commitment to making environmentally sound decisions. This gives the Moore Foundation an advantage in reaching goals of minimizing paper use: while the staff may need education on how to best reduce their paper consumption, they do not need extensive education

When choosing technology, you don't want an elaborate system that people don't know how to use. You basically want something as simple as an appliance.

Ed Yoon, Chief Technology Officer, The Moore Foundation

on why it is a good idea. Thus, the goal is supported by people at all levels of the organization, which reduces top-down mandates that could be unsupported at the grass-roots level.

Assign the people in the most appropriate positions to lead paper reduction efforts.

At the Moore Foundation, the person responsible for leading the paper reduction efforts is the Chief Technology Officer. While in other organizations a different person might be responsible, the Moore Foundation's small, centralized organization allows the CTO to develop and maintain the electronic systems that support paper reduction efforts, while remaining in close contact with the people who will be using the systems once they are set up. Additionally, since Moore is just being established, they can set up electronic systems to minimize paper use without the need to overhaul systems that already exist, as is the case with most organizations.

Understand what each process requires before identifying technology to invest in.

The initial step in their paper reduction campaign is to identify the needs for each process, such as the grant funding process, internal operations, and other procedures they plan to use to support the operations of the foundation. Once these are determined, they will then research whether there is existing technology that can support their operational needs or if they need to custom-design software.

One example of this is establishing their system for storing information. The grant application process historically has been very paper-intensive, potentially requiring extensive filing cabinets and large floor space. Until they begin accepting grant applications, they will limit funding to pilot projects, which will allow them to establish the necessary tracking systems. Through this, they will identify their needs for indexing, storing, and accessing related documents. This process will help them determine what their requirements are for an electronic information storage system and then buy or develop appropriate software. If they bought the software before they knew what they needed, they would likely find challenging limitations. They may hire a staff librarian to manage the information and ensure an appropriate cataloging system. This system will not only bring them an efficient way of accessing their documents, the space savings is crucial in a city as expensive as San Francisco.

Address the basic internal operations.

Foundations are inherently interactive organizations, with a majority of their efforts serving the needs of people outside the organization. As a result, they can expect a continuous flow of information to and from external entities. With this in mind, the Moore Foundation started by addressing some of the basic tools used to communicate. For example, instead of using a fax machine, they installed a fax server. This allows them to receive faxes in an email rather than a printed copy. Additionally, they can send faxes directly from their computers without needing to print them first. This saves the need for an initial printing, gives people the option not to print, and takes less time than traditional printing and faxing.

As a foundation, they will be publishing numerous reports, some of which may be lengthy. Studies indicate that this may be one of the more challenging areas of paper reduction.⁸⁷ To address this, they began with a commitment to providing the best computer screen for the job – digital flat panel computer screens. These screens facilitate reading because they allow text to be

viewed almost as if it was a paper version. Other benefits include greater energy efficiency – these screens use about one-third the energy of normal computer monitors, and thus give off less heat. They also take up less space on the desktop, requiring a smaller workspace and thus a smaller overall office space. These monitors are also more ergonomically sound because they can swivel to portrait mode, which makes it possible to read a document onscreen as if it were a book. While the staff may still print reports at various stages of writing and editing, the ease that the screens provide can help reduce the number of times reports are printed.

Keep a clear vision of the goal, but maintain a sense of humor.

People throughout the organization are clearly open to pursuing the goal of reducing paper use. At the same time, they do not approach paper reduction dogmatically. Staff people talked about how the president purposefully gave people printers that were not performing very well and threatened to hoard all the paper in his office so he could keep track of how much paper was being used and by whom. But it was said with a good sense of humor and a recognition that even people with the best intentions are still learning to reduce their paper use.

Challenges:

Foundation work has historically been very paper-intensive. One of the more significant steps the organization could take to minimize paper use is to develop an online grant application process. However, one of the challenges of this approach is that many organizations and educational facilities may not have compatible technology or internet access for using the online process. By providing only online applications they would run the risk of excluding smaller groups and organizations from applying for funding. In order to keep opportunities more equitable, they will likely need to establish both online and manual application procedures.

Conclusion

There is considerable potential for any company or organization to reduce paper consumption. Rather than aiming for a virtually paperless office—which few companies will likely accomplish in the foreseeable future—and calling the effort a failure when the goal is not quickly attained, success can be measured in a company’s ability to become more economically and environmentally efficient over time.

There is neither one simple path to reducing paper consumption, nor one quick fix. Because so many communication methods and habits are deeply entrenched in paper processes, the greater the commitment to long-term implementation of a paper reduction policy, the greater the likelihood of success. Additionally, there are numerous other areas where use of wood-based products could be reduced as a cost-saving and environmentally preferable initiative, such as using electric dryers instead of paper towels or redesigning packaging to use less cardboard. As each company audits and assesses ways to reduce its paper consumption, its efforts can be expanded to include all wood-based products.

As the case studies in this report indicate, reducing paper can result in savings of thousands or even millions of dollars. With this understanding, reducing paper consumption really is a wise investment. Not doing so will result in an ongoing drain of important economic and environmental resources.

Reducing paper consumption really is a wise investment. Not doing so will result in an ongoing drain of important economic and environmental resources.

Appendix A: Paper Audit Worksheet

The following is a general checklist to help organize the initial paper audit. Each section may need to be adapted to each company. Note that there is a difference between what type of paper is used and how the paper is used. For example, basic copy paper is often used in photocopiers, printers, and faxes. Thus the notation of the amount of copy paper used would need to include how much is used for each purpose. Also note that not all questions need to be completely answered before a paper reduction campaign begins, but a more thorough audit will provide a more comprehensive understanding of best approaches to take. For further explanation, see page 14, the Audit Paper Consumption section of the Basic Guidelines for Reducing Paper Consumption.

1. How is paper purchased throughout the company?

Who is responsible for purchasing paper? What department are they in? Is there a centralized procurement department or do multiple people purchase throughout the company?

2. Whose approval is needed to change the paper for each commodity group?

List everyone that must approve each type of change.

- Copiers
- Printers
- Faxes
- Stationary
- Marketing Materials
- Internal Memos
- Reports
- Forms
- Billing Statements
- Shipping/Purchasing
- Facilities
- Other

3. How much of each type of paper is purchased?

Make sure quantities are in the same measurement unit as the goal stated in the company's policy.

- Copy Paper
- Computer Paper
- Stationary
- Envelopes
- Billing Statements (if custom paper is used)
- Forms (if custom paper is used)
- Marketing Materials
- Cardboard
- Tissue and Towels

Other

4. How much paper is used per commodity group?

This information may be obtained from the procurement department, as well as by monitoring the automatic counters on machines such as photocopiers, faxes, and printers. You may also ask the end users of each use. Make notes on any obvious inefficiencies or wastes.

Copiers
Printers
Faxes
Stationary
Marketing Materials
Internal Memos
Reports
Forms
Billing Statements
Cardboard
Tissues and Towels
Other

5. What is the paper weight of each type of paper purchased?

Paper weight is determined by the weight of 2,000 sheets of paper. Using lighter weight paper requires fewer trees and may cost less than heavier weight paper.

Copy Paper
Computer Paper
Stationary
Envelopes
Billing Statements
Forms
Marketing Materials
Other

6. What is the fiber content of each type of paper?

Tracking the type of fiber used will help identify places to target for increased recycled or non-wood fiber.

Copy Paper
Computer Paper
Stationary
Envelopes
Billing Statements
Forms
Marketing Materials
Tissues and Towels
Other

7. How much does each type of paper cost?

Obtain this information from the same source as the quantities of paper purchased.

Copy Paper

Computer Paper

Stationary

Envelopes

Billing Statements

Forms

Marketing Materials

Tissues and Towels

Other

Appendix B: Related Organizations and Resources

The following organizations and resources can provide further information on related issues:

Business for Social Responsibility <www.bsr.org>

BSR is a non-profit business association, that promotes corporate social responsibility (CSR) by helping companies implement and improve CSR policies and practices to enhance the quality of life for current and future generations.

California Waste Board <www.ciwmb.ca.gov/Paper>

The California Waste Board seeks to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

Celery Design <www.celerydesign.com/paper/matrix.html>

Celery Design Collaborative is a multi-disciplinary research and design firm. Their work is rooted in the fundamentals of good design: comprehensive thinking, clear communication, and bold exploration, combined with a unique emphasis on ecological sustainability.

CERES <www.ceres.org>

CERES is a U.S. coalition of environmental, investor, and advocacy groups working together for a sustainable future and a community of forward-looking companies that have committed to continuous environmental improvement by endorsing the CERES Principles, a ten-point code of environmental conduct.

Conservatree <www.conservatree.org>

Conservatree, a project of The Tides Center, is a nonprofit organization dedicated to providing technical assistance and the most up-to-date, no-nonsense, in-depth, insider information about environmentally sound papers and market development, the kind of information people need to make environmentally sound paper market decisions.

Coop America <www.coopamerica.org>

Co-op America provides the economic strategies, organizing power, and practical tools for businesses and individuals to address today's social and environmental problems.

Cutting Paper <eetd.lbl.gov/Paper/>

This site provides practical information about how to reduce the amount of office paper you use. It is a project of Lawrence Berkeley Laboratories.

ForestEthics <www.forestethics.org/purchasing/>

The ForestEthics Green Purchasing website contains an “alternatives” database of post-consumer and tree-free paper product suppliers as well as helpful information on implementing change initiatives.

International Society for Industrial Ecology <www.yale.edu/is4ie/>

ISIE promotes industrial ecology as a way of finding innovative solutions to complicated environmental problems and facilitates communication among scientists, engineers, policymakers, managers, and advocates who are interested in how environmental concerns and economic activities can be better integrated.

Journal of Industrial Ecology <mitpress.mit.edu/>

Journal of Industrial Ecology is an international, peer-reviewed, multi-disciplinary quarterly designed to foster both understanding and practice in the emerging field of industrial ecology. The journal addresses a series of related topics: material and energy flows studies ("industrial metabolism"); dematerialization and decarbonization; life cycle planning, design and assessment; design for the environment; extended producer responsibility ("product stewardship"); eco-industrial parks ("industrial symbiosis"); product-oriented environmental policy; and eco-efficiency.

Natural Step <www.naturalstep.org/>

The Natural Step (TNS) is an international organization that uses a science-based, systems framework to help organizations, individuals, and communities take steps towards sustainability. The mission of TNS is to catalyze systemic change and make fundamental principles of sustainability easier to understand and meaningful sustainability initiatives easier to implement.

New Leaf <www.newleafpaper.com/>

New Leaf Paper is a national recycled paper manufacturer and distributor dedicated to environmental responsibility.

Paper Calculator <www.ofee.gov/>

The Paper Calculator calculates the energy and wood consumption and environmental releases across the full life cycle of various types of paper. (At site, search "Paper Calculator".)

Rainforest Action Network <www.ran.org/>

Rainforest Action Network works to protect the Earth's rainforests and support the rights of their inhabitants through education, grass-roots organizing, and non-violent direct action.

Recycled Paper Coalition <www.papercoalition.org/>

The Recycled Paper Coalition strives to conserve natural resources and reduce waste by purchasing environmentally-preferred paper products and by using paper products more efficiently. The goal of the Coalition is to encourage paper recycling and stimulate demand for recycled paper products made from postconsumer materials.

Rethink Paper <www.rethinkpaper.org/>

Rethink Paper provides educational resources about environmentally preferable papers.

Rocky Mountain Institute <www.rmi.org>

Rocky Mountain Institute is an entrepreneurial, nonprofit organization that fosters the efficient and restorative use of resources to create a more secure, prosperous, and life-sustaining world.

Silicon Valley Coalition on Toxic Wastes <www.svtc.org>

Silicon Valley Toxics Coalition (SVTC) is a diverse grass-roots coalition that for almost twenty years has engaged in research, advocacy, and organizing associated with environmental and human health problems caused by the rapid growth of the high-tech electronics industry.

Social Venture Network <www.svn.org>

Social Venture Network (SVN) is a nonprofit network committed to building a just and sustainable world through business.

WasteWise <www.epa.gov/epaoswer/non-hw/reduce/wstewise/index.htm>

WasteWise is a free, voluntary, EPA program through which organizations eliminate costly municipal solid waste, benefiting their bottom line and the environment.

WasteWise is a flexible program that allows partners to design their own solid waste reduction programs tailored to their needs.

World Resources Institute <www.wri.org>

WRI is an environmental think tank that goes beyond research to find practical ways to protect the earth and improve people's lives.

Appendix C: Paper Reduction Strategies

Action	Benefits and Challenges	Links, References, and Resources
<p>Duplexing Copying or printing on both sides of a piece of paper.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Reduces paper use up to 50%.</p> <p>Reduces storage space, postage.</p> <p>Many copiers have the capacity and can be set to do this automatically.</p> <p>Networked copiers often have lower printing cost per image than printers.</p> <p style="text-align: center;"><u>Challenges</u></p> <p>Needs strong education campaign to gain momentum.</p> <p>Some machines copy more slowly when duplexing than when simplexing.</p> <p>Perception that copiers jam, though many work as well duplexing as they do simplexing.</p>	<p>In this report: Nike Bank of America</p> <p>Resources: Canon <www.canon.com> Danka <www.danka.com> Kodak <www.kodak.com> Konica <www.konica.com> Lanier <www.lanier.com> Minolta <www.minolta.com> Oce <www.oce.com> Panasonic <www.panasonic.com> Pitney Bowes <www.pitneybowes.com> Ricoh <www.ricoh.com> Sharp <www.sharp.com> Toshiba <www.toshiba.com> Xerox <www.xerox.com></p> <p>Lawrence Berkeley Labs Cutting Paper Website <eetd.LBL.gov/Paper></p>
<p>Cleaning mailing lists Eliminating duplicate or outdated names from mailing lists.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Considerable cost saving potential from reduced paper, processing, and postage.</p> <p style="text-align: center;"><u>Challenges</u></p> <p>One-time labor intensive process.</p>	<p>In this report: Legacy Health Systems</p>

Action	Benefits and Challenges	Links, References, and Resources
<p>Reducing Paper Weight Using paper with less fiber content. Paper is sold in pound weight. For example, 20-pound paper weighs 20 pounds per 2,000 sheets.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Lighter weight paper uses less wood pulp per sheet, so it saves both trees and costs. Office paper is often a heavier weight than needed to meet job specifications, and thus for general office use lighter weight paper may be a simple replacement.</p> <p>Most printers and copiers handle 20-pound paper without risk of jamming, and some can handle even lower weight.</p> <p style="text-align: center;"><u>Challenges</u></p> <p>Anything below 20-pound paper can be difficult to without special ordering.</p> <p>Lower weights may not work well with all high-speed copiers or printers.</p> <p>Some companies have very strict regulations about what kind of paper should be used for various purposes.</p>	<p>In this report: Bank of America</p> <p>Resources: Lawrence Berkeley Labs Cutting Paper Website <eetd.LBL.gov/Paper/></p>
<p>Eliminating or reducing internal report distribution Removing unneeded names from distribution lists or making reports available only online.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Many companies find significant inefficiencies in report distribution, making it a strong possibility for cost savings.</p> <p style="text-align: center;"><u>Challenges</u></p> <p>Cleaning distribution lists requires people to participate in surveys to determine who should be on each list.</p>	<p>In this report: Bank of America Alameda</p>

Action	Benefits and Challenges	Links, References, and Resources
<p>Reformatting Documents Reducing margins, font size or design to require less paper. Also, eliminating redundancies in forms.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Considerable cost benefits, especially for high volume forms.</p> <p>Virtually no loss in performance of documents.</p> <hr/> <p style="text-align: center;"><u>Challenges</u></p> <p>Redesigning forms can be a labor intensive process.</p>	<p>In this report: Alameda Bank of America Legacy Health Systems</p>
<p>Internet/ Intranet Increase employee access to internet and intranet. (Intranet refers to an internal website/ communication system).</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Speeds communication.</p> <p>Documents and forms can be distributed online instead of on paper, reducing storage, postage, and waste costs.</p> <p>Return on investment can be reached more quickly as documents are made available online.</p> <hr/> <p style="text-align: center;"><u>Challenges</u></p> <p>Large initial financial and labor investment.</p> <p>May require training.</p> <p>Increased access to information may lead to increased printing if not coupled with good education and other disincentives to printing.</p>	<p>In this report: AT&T Bank of America Alameda Public Service Electric and Gas Company Lockheed Martin</p> <p>Resources: Hewlett Packard <www.hp.com> ATT <www.att.com/globalnetwork> Cisco <www.cisco.com> Microsoft <www.microsoft.com></p>

Action	Benefits and Challenges	Links, References, and Resources
<p>Putting Forms Online Transferring forms to digital documents that can either be downloaded and printed or processed online.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Significant cost savings from reduced waste, storage, and shipping.</p> <p>Documents can be updated quickly and uniformly.</p> <p>Automated processing of paper can result in a 90% decrease in associated costs.⁸⁸</p>	<p>In this report: Bank of America Alameda ATT Bell Atlantic</p> <p>Resources: Cardiff <www.cardiff.com/liquidoffice> Adobe <www.adobe.com> Scansoft <www.scansoft.com></p>
	<p style="text-align: center;"><u>Challenges</u></p> <p>Requires established internet system.</p> <p>Can be a labor intensive process initially.</p> <p>May not eliminate all form printing.</p>	
<p>Portable Document Format (PDF) A universal file format that preserves the exact look and feel of any source document, including all the fonts, formatting, colors, and graphics regardless of the application and platform used to create it.⁸⁹</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Makes sharing documents seamless between historically incompatible systems.</p> <p>Allows for easy posting on websites.</p> <p>Supports electronic forms, digital signatures, password security, and electronic edits.</p>	<p>Resources: PDF Zone <www.pdfzone.com> Adobe <www.adobe.com> Enfocus <www.enfocus.com> ActivePDF <www.activepdf.com></p>
	<p style="text-align: center;"><u>Challenges</u></p> <p>N/A</p>	

Action	Benefits and Challenges	Links, References, and Resources
<p>Online billing or e-billing Giving customers the option to be billed through internet/email communication instead of receiving a paper bill.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Significant cost and paper savings potential.</p> <p>Some electronic invoices can be searched, and may be designed to offer customized options such as sorting calls on a phones bill by department or length.</p> <p>May need fewer customer service representatives since customers can see their bills in real time online.</p> <p>Greater customer satisfaction.⁹⁰</p> <p>Studies predict that by the end of 2002, 64 million people will be viewing accounts online.⁹¹</p>	<p>In this report: ATT Bank of America</p> <p>Resources: CheckFree <www.checkfree.com/ebp> Hewlett Packard <www.hp.com> BlueGill Technologies <www.bluegill.com> EDocs <www.edocs.com> Novazen <www.novazen.com> Bell & Howell <www.bellhowell.com></p>
	<p style="text-align: center;"><u>Challenges</u></p> <p>Many people prefer paper bills.</p> <p>Not everybody has access to computers.</p> <p>Security breaches can be an actual or perceived drawback.</p> <p>Some industries are legally limited in their use of online billing.</p> <p>Initially labor intensive to make the transition.</p>	

Action	Benefits and Challenges	Links, References, and Resources
<p>Electronic Data Storage Storing information and documents electronically, which usually involves scanning already existing documents into a data storage system and implementing new electronic-only processes, such as filing forms electronically.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Significant potential for reducing file cabinet expenses and floor space.</p> <p>Most files can be searched.</p> <p>Increases efficiency in organizing information and developing effective workflows.</p> <hr/> <p style="text-align: center;"><u>Challenges</u></p> <p>Requires a carefully organized filing system to avoid data loss.</p> <p>May require employee training.</p> <p>Initial investment can be significant.</p> <p>Planning needed to ensure that hardware and software are compatible and will be able to grow with your company.</p> <p>Careful consideration must be taken to ensure that data can be retrieved even if software evolves or becomes obsolete.</p>	<p>Resources: AIIM <www.aiim.org></p> <p><u>Data Storage:</u> Accenture <www.accenture.com> Kodak <www.kodak.com/go/docimaging> Artesia Technologies <www.artesia.com> Gauss <www.gaussinterprise.com> OnBase <www.onbase.com> Microsystems <www.microsystemsonline.com> Liberty <www.libertyims.com> Cytura <www.cytura.com> Hewlett Packard <www.hp.com/go/optical></p> <p><u>Scanners:</u> Fujitsu <www.fcpa.com> Umax <www.umax.com> Kodak <www.kodak.com/go/docimaging> Scantron <www.scantron.com> Versitec <www.versitec.com> Kofax <www.kofax.com></p>

Action	Benefits and Challenges	Links, References, and Resources
<p>Fax Servers Allows documents to be emailed to fax machines or faxes to be sent to emails.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Eliminates duplicate printing associated with faxing.</p> <p>Some fax servers translate faxes to editable documents (others will send as an image).</p> <p>Can be faster than manually printing and faxing documents.</p> <p style="text-align: center;"><u>Challenges</u></p> <p>Some fax servers send documents as images, which then cannot be edited.</p>	<p>In this report: Moore Foundation</p> <p>Resources: For an overview of different products: <serverwatch.internet.com/faxservers.html> Faxgate <www.faxgate.com> GFi Faxmaker <www.gfi.com/faxmaker> RelayFax <www.deerfield.com/products/relayfax> RightFax <www.rightfax.com> FaxPort <www.faxport.com/frame.html> Faxination <www.fenestrae.com/products/fax4exch.asp></p>
<p>Multi-functional Devices Machines that have multiple capabilities that may include printing, copying, scanning, and/or faxing.</p>	<p style="text-align: center;"><u>Benefits</u></p> <p>Reduces space requirements.</p> <p>Uses less energy than running several independent machines.</p> <p>Considerable cost-saving potential.</p> <p>Centralized printing devices may discourage printing (compared to desktop printers).</p> <p style="text-align: center;"><u>Challenges</u></p> <p>Some labor associated with reconfiguring networks.</p>	<p>In this report: Bank of America</p> <p>Resources: Canon <www.canon.com> Hewlett-Packard Company <www.hp.com> Minolta <www.minolta.com> Oce <www.oce.com> Panasonic <www.panasonic.com> Ricoh <www.ricoh.com> Sharp <www.sharp.com> Toshiba <www.toshiba.com> Xerox <www.xerox.com></p>

Appendix D: Bank of America Educational Resources

The following are samples of educational materials that Bank of America has used in its paper reduction campaign.

I. Best Practices Related to Paper⁹²

1. Achieve the highest level of support within the organization as illustrated by the Bank's Board of Directors approving the Environmental Principles.
2. Set goals at the corporate level to reduce virgin paper fiber, reduce the overall consumption of paper and track all paper consumption within the Bank to those goals.
3. Support the market for recycled paper through a closed loop approach to recycled paper, buy recycled and collect for recycling. (Bank of America co-founded the Recycled Paper Coalition and remains on the board of directors to continually provide support for the market for recycled paper.)
4. Maximize the percentage of recycled paper within the Bank given technological and economic considerations.
5. Maximize the amount of post consumer product within the recycled paper the bank purchases given technological and economic considerations.
6. Minimize the weight of paper utilized within Bank of America given processing considerations.
7. Reduce consumption of paper through converting traditional paper workflows to digital processes and changing behaviors to interact in a digital environment, i.e. policy and procedure manuals, newsletters, training materials and the On Line Forms and Manuals Library.
8. Support paper providers who are progressive in their forest management practices, avoid utilizing any supplier who buys old growth product and have suppliers disclose on these issues.
9. Recycle as much of our paper waste stream as possible.
10. Manage the desktop output device environment to reduce print output ratio by associate, reduce desktop printer ratio per associate and default remaining devices to duplex.
11. Minimize the number of warehoused items by moving them to Print-On-Demand or electronic workflows to eliminate obsolescence waste.

12. Support the reduction of paper use in customer reporting through house-holding techniques, combined statements and movement to electronic presentment, i.e. the Enterprise Statement MBF and On Line Banking.

II. Make it Second Nature

Bank of America Leaders:

In December, Bank of America launched "Make It Second Nature." The goal of this campaign is for every associate to think about how to modify his or her daily actions both at work and at home to protect our environment by using fewer resources until the new behaviors become second nature. By **reducing** our overall consumption, **reusing** products for their original or an alternative use, **rethinking** existing processes and consumption patterns and **recycling** items that have reached the end of their useful life, we save money, energy and natural resources. As a group, Bank of America associates can make significant changes when we act in concert toward a single goal. By working together to make resource conservation second nature and to integrate environmental protection in our day to day business operations, we can make a real difference. As the executive champions of the "Make It Second Nature" campaign, we ask for your help in carrying the important messages of the campaign to associates throughout our organization. Please review the Leader's Campaign Guide, a tool to help you reinforce the concepts, attitudes and behaviors the campaign encourages and to identify specific actions associates can take to support the campaign. Determine the best approach for supporting the "Make It Second Nature" campaign in your unit, share the information provided with associates and lead by example. We all have much to gain from a successful campaign. We can save money for our work units and the bank. We can also save money for our families by taking home our new ways of thinking about personal consumption and acting on that thinking every day. More important, however, we can demonstrate for others how a major corporation can make a difference in protecting our fragile environment and support the Bank of America Environmental Commitment to integrate economic development with environmental protection.

Thank you for your participation and leadership in our "Make It Second Nature" campaign.

Lynn Drury, Principal Corporate Affairs Officer

Marc Oken, Principal Finance Executive

"Make It Second Nature" Campaign Leader's Campaign Guide -- Feb. 2001⁹³

What is the "Make It Second Nature" campaign all about?

The "Make It Second Nature" campaign is a consumption-reduction campaign to give our associates the tools and knowledge to make a real difference in saving natural resources and money. During the month of February, posters highlighting the campaign will be posted on your floor by property management. Also during February, stickers that promote duplex copying and printing will be placed on photocopy machines. Periodically, the campaign team will publish or email tips for reducing consumption, focused on a specific commodity or process. Leaders will be asked to share this information with their staff.

What can you do to support the campaign?

Please determine the best approach for supporting the "Make It Second Nature" campaign in your unit. While the campaign's success relies on the participation of all associates, your

leadership and follow-through are essential to getting the campaign under way and keeping associates focused on its goals.

How to get started:

- Share the information provided with associates.
- Provide leadership by personally implementing the reduction ideas below.
- If you hold staff meetings, share the information regarding the campaign. Ask associates to identify ways they can reduce use of paper, one of the bank's most widely used commodities. Utilize a white board or ask an associate to take notes. Suggest the reduction methods listed below if associates do not think of them. Assess the best way to implement these ideas as appropriate within your unit. Bank paper-consumption results will be reported periodically to determine our progress.
- Periodically, the campaign team will publish or email tips for reducing consumption, focused on a specific commodity or process. Continue to share this information with associates.

Paper

Bank of America uses 9.5 million sheets of copy paper or 581 sheets per associate every day. This quantity of paper, if stacked, would equal the height of four Charlotte Corporate Center buildings. To reduce paper use,

- Duplex-copy (copy on both sides) all multipage documents. Report photocopier malfunctions immediately and post "out of service" signs on copiers.
- Set copiers/printers to default to duplex automatically, and disable printing of the header page, where feasible.
- Use lighter weight paper (for example, text instead of cover weight or 50# instead of 70#) whenever possible. In addition to using less fiber and saving on postage costs, it often costs less.
- Notify originating units that send you too many copies or ask that the information be sent electronically.
- Circulate one copy of a memo or reading material with a routing slip instead of making multiple copies.
- Remind recipients to recycle old material when you send out updates.
- Within bank guidelines, use smaller fonts, narrower margins and single-spacing when creating documents.

- Recycle paper at each desk or use for scratch paper, taking care not to disseminate inappropriate or confidential material.

Forms

- Ask one of your associates or a team to review the forms reduction ideas below, consider the forms ordering/use process in your unit and share the best process for your group to use when ordering forms.
- If you must use the General Purpose Requisition, order your monthly forms and supply needs all at one time to use only one paper requisition and one FAX transmission per month.
- If many associates in your area use the same forms daily, store no more than a two-month supply in a central location and ask your teammates to take an estimated daily or weekly supply only.
- Conduct monthly inventories of the supplies on hand to ensure you neither run out nor overstock.
- As a manager, review the monthly supplies your teammates are buying to better control your supplies budget.
- If your unit uses forms infrequently, check out Print Management's Intranet e-forms catalog. Many available e-forms can be completed online and then printed directly to your local network printer, and you can avoid ordering forms in volume from the warehouse.

Subscriptions

Bank of America currently spends approximately \$15 million on subscriptions every year.

- Order as many newspapers and magazines as possible for Internet delivery.
- Share hard copies of periodicals with as many associates as possible.
- Designate a book swap or library area to facilitate sharing of hard copies.
- Request that names be deleted from mailing lists if the material is not really needed.

III. Paper Recycling and Reduction Tips⁹⁴

Despite our success in increasing use of email and online reports, the bank continues to use tremendous quantities of paper. We must continually rethink our paper use and apply new ideas for reducing its use.

Use lighter weight paper (e.g., text instead of cover weight or 50# instead of 70#) whenever possible. Lighter weight paper uses fewer fibers, saves on postage costs and often costs less. Please refer to the Office Depot Corporate Desktop Supplies Catalog when purchasing paper.

Do not use ultrabrite (neon) paper, which is laden with heavy metals that are toxic and make the paper difficult to recycle. If you must use colored paper, use pastel colors only.

Use nontoxic vegetable-based inks (e.g., soy inks) that avoid the use of heavy metals.

If you receive unneeded copies of materials from other units, ask the originating unit to reduce the distribution. Take the initiative! This action alone would reduce paper use in the bank dramatically.

Use electronic media to distribute communications whenever possible. This practice also saves time spent copying documents, copier wear and tear, envelopes for mailing, mail transportation and handling costs. Also use it for information storage and retrieval instead of paper to save on storage space, too.

Print only when necessary and remember to print duplex. Use the Track Changes option to edit documents. Set your PC defaults to "duplex" and "banner off."

Reuse printer banner pages or separator sheets. If blank sheets precede print jobs, deselect the form feed option to eliminate this wasteful practice. Contact your local LAN administrator or the Help Desk for further assistance. If deselecting is not an option, use the backsides of the sheets as scratch paper or notepaper, taking care not to disseminate sensitive material.

Store reports on microfilm.

Use both sides of all paper for printing, writing and photocopying. Create scratch paper from unused sides of paper. Use obsolete letterhead and forms as scratch paper or use for printing proof copies when necessary.

Circulate one copy of a memo or reading material with a routing slip instead of making multiple copies. If you must print multiple copies, please print duplex.

Provide recycling instructions when sending out updates or other information.

To save fax paper, use Post-It fax transmittals or include a permanent place for fax information at the bottom of frequently faxed standard forms. If a fax transmittal confirmation sheet is not

needed, program your fax machine to stop producing a transmittal confirmation sheet. Use scratch sheets for printing proof copies.

Use smaller fonts, narrower margins, and single spacing when creating documents if readability can be maintained. And when possible use smaller size paper.

Proofread and edit documents online instead of printing hard copies.

Eliminate paper by canceling your hardcopy subscriptions and requesting online subscriptions or share one subscription among associates.

Eliminate junk mail.

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Endnotes

¹ While the emphasis throughout the report is on reducing office paper use, other wood-based products such as cardboard, tissue, and towels also have extensive environmental impacts. Though detailed explanation about how to reduce, eliminate, or substitute these products is beyond the scope of this paper, incorporating such efforts into an overall wood-use reduction campaign can also be a sound business decision.

² The paper reduction suggestions in this guide can be applied not only to companies, but also to organizations and government agencies as well.

³ Lovins, 174.

⁴ Abramovitz, 14.

⁵ Greengard, 69.

⁶ Sellen, (Myths) 14. Citing research carried out by Xerox PARC's Information Center.

⁷ Abramovitz, p. 13 & 14.

⁸ Abramovitz, p.13.

⁹ FAO, p. 78.

¹⁰ Increased dependency on computer technology is not without negative environmental impacts. By the year 2005 predictions point to one computer becoming obsolete for every new one put on the market. With computer equipment containing more than 1,000 materials, many of which have well documented toxic health effects (The Silicon Valley Coalition on Toxic Wastes), the development, production, and disposal of computer related technology creates its own environmental challenges. There is little documentation of the environmental impacts of paper use compared to computer technology. Initial studies at AT&T indicate that in assessing energy use, computers may have as little as one quarter of the impact of paper in a life cycle assessment, but more research is required to make definitive assessments. (From a personal communication with Brad Allenby, October 25, 2001.)

Promoting technology dependence over paper dependence then could be seen as simply shifting the environmental impacts. One of the assumptions made in the writing of this report is that most companies are already migrating toward increased access to computers and the internet, with or without a paper reduction campaign. The emphasis must then be on using these new tools to their highest potential for paper reduction.

¹¹ Fujitsu Presentation. AIIM International ECM Road Show. Sacramento, CA, September 10, 2001.

¹² Fox, V-15.

¹³ Sellen, (Myths) 28.

¹⁴ Cuadra Associates.

¹⁵ Sellen, (Myths) 29. Cited from *San Francisco Business Times*, October 20, 1997.

¹⁶ Sellen, (Myths) 29. Cited from a survey by Deloitte and Touche.

¹⁷ Sellen, (Myths) 28. Cited from *Seybold Seminars Online*, San Francisco, September 5, 1996.

¹⁸ AT&T E-Billing.

- ¹⁹ Paper weight is determined by the weight of 2,000 sheets of paper.
- ²⁰ Sellen, (Myths) 27. Cited from a study carried out by the International Data Corporation.
- ²¹ Sellen, (Myths) 29. Cited from Skapinker, M. “Warm for Forms.” *Byte*, April, 1991.
- ²² Winter, 6. Cited from Nordman, Bruce. “Useful Facts for Your Paper Efficient Office,” fact sheet. Lawrence Berkeley Laboratory, Energy Analysis Program. November 16, 1994.
- ²³ Cardiff Presentation. AIIM International ECM Road Show. Sacramento, CA. September 10, 2001.
- ²⁴ Fujitsu presentation. AIIM International ECM Road Show. Sacramento, CA. September 10, 2001.
- ²⁵ Kinsella, Susan. Personal Interview. April 1, 2002.
- ²⁶ Paper can be made from agricultural residues, bamboo, hemp, kenaf, and many other materials.
- ²⁷ Dogwood Alliance.
- ²⁸ Kinsella, Susan. Personal Interview. April 1, 2002.
- ²⁹ EPA Factsheet: “The Pulp and Paper Industry, the Pulping Process, and Pollutant Releases to the Environment.” EPA-821-F-97-011. November 1997.
- ³⁰ Abramovitz, 26. Cited from World Energy Council 1995.
- ³¹ Abramovitz, 27. Cited from Environmental Defense Fund. *Paper Task Force Recommendations for Purchasing and Using Environmentally Preferable Paper*. New York, 1995.
- ³² Lovins, 50. Cited from Liedtke, C. “Material Intensity of Paper and Board Production in Western Europe,” *Fresenius Environmental Bulletin*, August, 1993.
- ³³ Paper and paperboard includes materials such as paper and cardboard, used in products such as office paper, newspaper, corrugated boxes, milk cartons, tissue paper, and paper plates and cups.
- ³⁴ Municipal Solid Waste In The United States: 1999 Facts And Figures. EPA Report. 1999. This figure refers to the entire municipal waste stream before recycling.
- ³⁵ American Forest & Paper Association Progress Report; May, 2001. In measuring the annual rate of U.S. paper recovered, AF&PA defines “recovery” as paper that is recycled at domestic mills, exported, or used to make new non-paper products. Paper that is recovered but not utilized is not counted in the calculation. The annual recovery rate is then derived by dividing the amount of paper recovered by the amount of paper Americans use in a given year.
- ³⁶ Kinsella, Susan. Personal Interview. April 1, 2002.
- ³⁷ Lifset, 91.
- ³⁸ Kinsella, Susan. Personal Interview. April 1, 2002.
- ³⁹ General Electric Make Side Initiative.
- ⁴⁰ EPA, Fourth Year WasteWise.

- ⁴¹ Fine, 6-7. From Portland Metro (Metropolitan Service District), “The Paperless Office,” <www.metro-region.org/metro/rem/rwp/papersmt.html>.
- ⁴² Fine, 9. From U.S. Environmental Protection Agency, “Lockheed Martin Flies High with Internet Communication,” *WasteWise Update: Going Paperless with Technology*, EPA530-N-96-007, June 1996, page 6.
- ⁴³ EPA, Sixth Year WasteWise Progress Report.
- ⁴⁴ Recycled paper is made from discarded paper that has been recovered in a recycling collection system and used to make new paper. This may include preconsumer paper, which can include paper scraps that do not reach their final intended use (such as scraps from envelope converters, forms bond manufacturers, or printers). It may also include postconsumer paper, which includes paper that reached its end-use and normally would have been disposed of as a solid waste (such as paper that is recovered from an office recycling bin), but does not include manufacturing or converting wastes. When buying recycled paper, only paper that is explicitly labeled postconsumer is guaranteed to contain postconsumer recycled content.
- ⁴⁵ Sellen, (Analytic), 6.
- ⁴⁶ Contact ForestEthics <www.forestethics.org> to determine how to promote successful paper reduction efforts.
- ⁴⁷ Kee, Bob, Personal Interview, November 1, 2001. All information in case study from interview unless otherwise noted.
- ⁴⁸ Bank of America Environmental Progress Report 1991, p. 4.
- ⁴⁹ Bank of America Environmental Progress Report 1993 p. 6.
- ⁵⁰ Bank of America Environmental Progress Report 1993, p. 6.
- ⁵¹ Bank of America Environmental Progress Report 1994, p. 2.
- ⁵² Bank of America Environmental Progress Report 1994, p. 4.
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- ⁵⁴ Bank of America Environmental Progress Report 1996, p. 9.
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- ⁵⁷ Bank of America Environmental Progress Report 1995, p. 2.
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- ⁵⁹ Bank of America Environmental Progress Report 1997, p. 15.
- ⁶⁰ Bank of America Environmental Progress Report 1997, p. 15.
- ⁶¹ Bank of America Environmental Progress Report 2000. Section 7.
- ⁶² Bank of America. Environews.

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- ⁶³ Bank of America Environmental Progress Report 1992, Highlights page.
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- ⁷² AT&T, Breaking the Link.
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- ⁷⁵ From AT&T presentation notes.
- ⁷⁶ AT&T determined the environmental impact based on an Environmental Protection Agency/University of Virginia estimate that it required one pulpwood tree and 23 gallons of oil to produce 11,500 sheets of 20-pound paper.
- ⁷⁷ AT&T, E-Billing.
- ⁷⁸ AT&T presentation notes.
- ⁷⁹ See conversion factors in note 74.
- ⁸⁰ See conversion factors in note 74.
- ⁸¹ AT&T presentation notes received via email November 23, 2001.
- ⁸² AT&T, E-Billing.
- ⁸³ All information in case study from conversation with Beth Eckl, October 22, 2001, unless otherwise noted.
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- ⁸⁵ From *Paper Cuts* video
- ⁸⁶ Yoon, Ed, Personal Interview, October 17, 2002.
- ⁸⁷ For further discussion of the challenges found in electronic editing see: Sellen, (Analytic).

- ⁸⁸ Cardiff Presentation. AIIM International ECM Road Show. Sacramento, CA September 10, 2001.
- ⁸⁹ *How to Create Accessible Adobe PDF Files* Produced by Adobe Systems Incorporated February, 2001.
- ⁹⁰ MCI WorldCom found its online customers are 75% more satisfied with MCI's customer service than conventional customers. Cited from: Dalton, Gregory. "E-Bills Arrive," *Information Week Online*, April 19, 1999. Viewed April 18, 2002, <www.informationweek.com/730/bill.htm>.
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