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RESULTS OF THE
CITIGROUP-ENVIRONMENTAL DEFENSE PARTNERSHIP
TO IMPROVE OFFICE PAPER MANAGEMENT

ENVIRONMENTAL DEFENSE
finding the ways that work

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November 2004

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About the Authors

Citigroup (NYSE: C), the preeminent global financial services company with some 200 million customer accounts in more than 100 countries, provides consumers, corporations, governments and institutions with a broad range of financial products and services, including consumer banking and credit, corporate and investment banking, insurance, securities brokerage and asset management. Major brand names under Citigroup's trademark red umbrella include Citibank, CitiFinancial, Primerica, Smith Barney, Banamex and Travelers Life and Annuity.

Environmental Defense is a leading national nonprofit organization representing more than 300,000 members. Since 1967, Environmental Defense has linked science, economics, law and private-sector partnerships to create innovative, equitable and cost-effective solutions to society's most urgent environmental problems. The Alliance for Environmental Innovation is a project of Environmental Defense that works cooperatively with companies to create environmental solutions that make business sense.

Project Team

The Citigroup-Environmental Defense project team included the following persons:
Environmental Defense: Jackie Cefola, Project Manager; Tom Murray, Project Manager; Jessica Mendelowitz, Communications Director; Gwen Ruta, Director of Corporate Alliances.
Citigroup: Iris Gold, Vice President of Environmental Affairs (project leader); Tony Salerno, Program Manager – Citigroup Procurement; and Larry Martiny, VP North America Procurement Operations.

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Disclaimer

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Printed on 100% post-consumer recycled content paper

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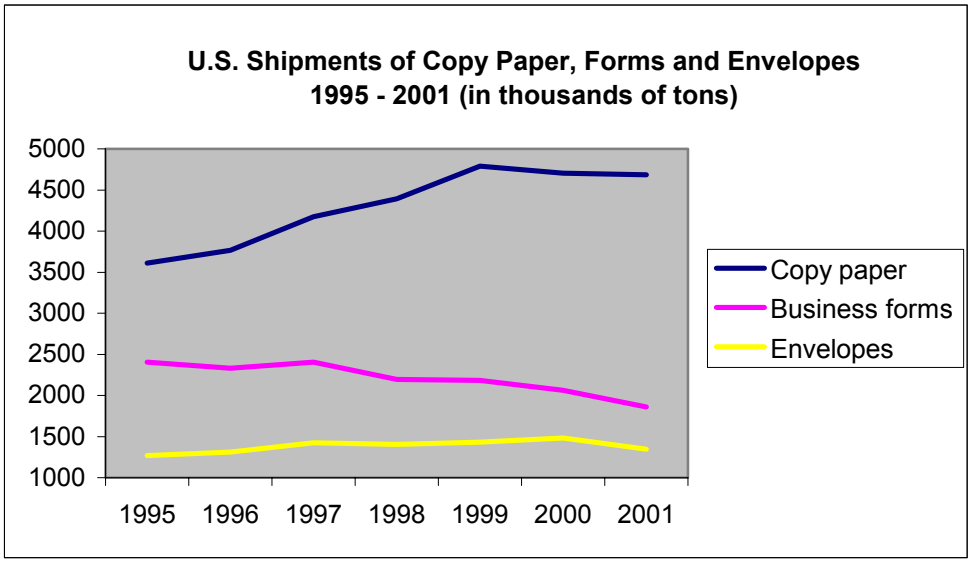
Why copy paper, why now?

Paper use is growing

While "paperless" technologies have helped reduce our need for certain paper products, copy paper remains the preferred medium for sharing ideas, storing information and communicating with others. As a result, demand for copy paper has greatly increased. In the United States (U.S.), 4.7 million tons, or 937 billion sheets, of copy paper were produced in 2001 – nearly 30% more than in 1995.[1] Worldwide, copy paper production is anticipated to increase to 396 million tons by 2010.[2]

Increased copy paper use comes with an extremely high price tag that extends far beyond the purchase price. For each sheet of paper used, an organization incurs not only purchasing costs, but also storage, copying, printing, disposal, recycling, postage and other affiliated supply costs (e.g., pens, paper clips, staples, folders, etc.). The associated costs of paper have been estimated to be as much as 31 times the purchasing cost.[3] If the purchasing cost for paper alone is $2 per ream, the total cost for using and handling that paper could be closer to $62 per ream. This estimate does not even include the human resource expenses associated with paper use such as the cost of employee time spent printing, copying, filing and retrieving paper documents.

FIGURE 1



Source: Pulp & Paper 2002 North American Factbook, © 2002 Paperloop.com, Inc.

The high financial cost of generating and handling paper seems especially unnecessary considering that only an estimated 10% of all printing and writing paper remains in long-term use in files, storage or books.[4] For many organizations, paper is one of the most expensive and perhaps least efficiently used office supplies.

The environmental cost

Even more startling are the environmental impacts of copy paper production, use and disposal. In the U.S., an estimated 90% of copy paper is "virgin," meaning that it does not contain any portion of recycled fiber.[5] Manufacturing, using and disposing of this much virgin copy paper consumes large amounts of wood, energy and water, and generates significant air pollution and solid waste:

- Virgin copy paper is made with wood pulp from trees. Forests that are managed for wood and paper products generally exhibit less biodiversity, lower habitat and water quality, and poorer soil productivity than natural forests.
- The manufacturing process for virgin paper is water-intensive. Making *one sheet* of paper can require over 13 ounces of water, more than enough to fill a beverage can.[6]
- Over 10% of all energy in the industrial sector is used for making paper products.[7]
- Approximately 30% of the municipal solid waste generated in the U.S. is paper and paper packaging. Less than half of this paper waste is recovered for reuse.[8] As landfilled paper decomposes, it creates methane, a potent greenhouse gas.

TABLE 1
Current U.S. copy paper use[a]

	Estimated Annual Environmental Impacts[b]	**Equivalent to . . .**
Wood use	15.8 million tons	Wood needed to build 1 million U.S. homes
Total energy consumption	190.4 trillion BTUs	Energy used by all households in Los Angeles each year
Wastewater flow	95 billion gallons	Annual wastewater from 1 million households
Net greenhouse gases	13.2 millions tons	Annual tailpipe emissions of 2 million cars
Solid waste generation	5.2 million tons	Annual solid waste from 2.5 million households

Notes: [a]Conservatively assumes 4.7 million tons of copy paper with an average of 3% postconsumer recycled content. 3% postconsumer recycled content is based on 4,230,000 tons of virgin and 470,000 tons of 30% postconsumer recycled content. (30% postconsumer recycled content is the U.S. government's minimum content standard for printing and writing papers.) [b]Estimates for environmental impacts and equivalents were made using the April 2003 update to the Paper Task Force Model. Paper Task Force Recommendations on Purchasing and Using Environmentally Preferable Paper, 1995, Environmental Defense. Available online at http://www.environmentaldefense.org/article.cfm?ContentID=1689.

Using postconsumer recycled paper instead of virgin paper benefits the environment in several ways. First, recycled paper uses less wood, which helps preserve forests by reducing demand for virgin wood fiber from trees. Second, incorporating postconsumer recycled content reduces the amount of total energy, chemicals and water consumed during the paper manufacturing process because the recycled fibers are easier to process than virgin wood fibers. Finally, paper recycling reduces both solid waste and greenhouse gas emissions (which contribute to global warming) from paper's decomposition in landfills. The final column of Table 1 shows the environmental benefits that would be accrued if copy paper with at least 30% postconsumer recycled content became the standard in the U.S.

Despite the environmental benefits, wide availability, competitive prices and excellent performance of copy paper products with postconsumer recycled content, the majority of companies are continuing business as usual on virgin copy paper.

> Postconsumer materials are finished products that have served their intended end use and if not recycled would be disposed of in a landfill or incinerator. Post-consumer recycled content is expressed as a percentage of the total fiber content of the paper.

A "win-win" solution

Reducing paper use and improving paper purchasing and handling is then a "win-win" scenario – it cuts costs and reduces environmental impacts. To demonstrate the viability of these strategies, Environmental Defense worked with Citigroup, the world's largest financial services firm. The project began in February 2002 to prove that improved office paper management can be done cost-effectively. We started with three goals:

- To reduce Citigroup's overall copy paper use;
- To convert copy paper used in Citigroup's primary operations from virgin to postconsumer recycled copy paper; and
- To make improvements in the supply chain by evaluating paper suppliers' environmental performance.

Working together, Citigroup and Environmental Defense accomplished all of the project's goals. This report describes our partnership strategies and results in order to provide a guide for other firms that are interested in cost-effective and environmentally improved paper purchasing and management.

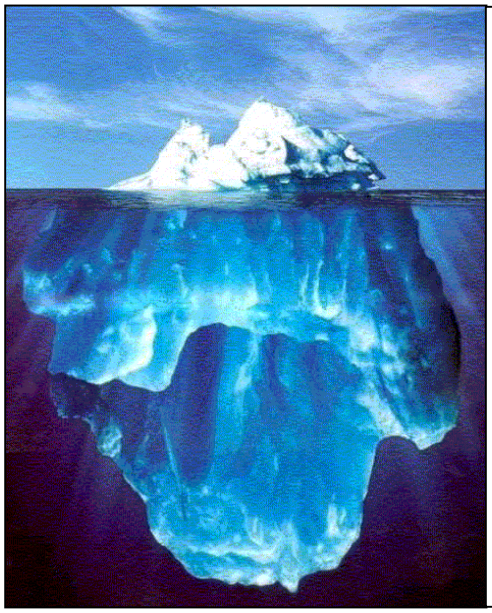
Reducing copy paper use

The most important strategy for lowering the environmental and economic costs of copy paper is quite simply to use less of it. A typical service industry worker uses 10,000 sheets of copy paper a year, or one sheet every 12 minutes.[9] Most of this paper, an estimated 90%, is used only for a short while.[10] After use, the majority of paper is not recovered for reuse – rather it gets tossed out with the trash.[11] This inefficient use of paper incurs enormous financial and environmental costs.

An office supply as ubiquitous as copy paper is more expensive than it might appear. Beyond the purchasing costs of paper, there are the associated costs of copying, printing, faxing, postage, storage and disposal or recycling. There are also miscellaneous costs for supplies used with paper such as staples, envelopes and files. Also important are the human resource costs that come with paper duplication, distribution and storage.

While these costs certainly vary from organization to organization, recent estimates show that the real costs of paper add up to 13 to 31 times the purchase costs.[12] Using typical office paper costs of $2 per ream, total organizational costs can range from $26 to $62 for each ream of paper used.

An even greater cost is the missed opportunity for organizations to achieve environmental gains through better paper purchasing and use. Each employee's paper use results in the consumption of 2 million BTUs of energy and over 1,000 gallons of water annually. Because the majority of office paper is not recovered for reuse, this same paper use generates 114 pounds of solid waste per employee per year.[13]



Purchasing costs are just the tip of the iceberg!

The true costs of copy paper can add up to 13 to 31 times the purchase cost, including:

Paper purchasing costs
+
Copying or printing costs
+
Faxing costs
+
Storage costs
+
Disposal costs
+
Human resource costs

There are many simple and cost-effective ways to cut paper use. For example, Citigroup substituted electronic versions for many of the documents that it previously printed and moved to double-sided customer statements and forms. Having enacted these and other paper-reducing strategies, the Citigroup-Environmental Defense partnership went the next step: to reduce paper used in daily operations by Citigroup's 130,000 plus employees in the U.S.

The project team had two objectives regarding reducing paper use: to encourage employees to make a more informed choice when copying or printing and to test whether or not changing the default settings of copiers and printers would be acceptable and effective for reducing paper use.

These strategies are simple, but have great potential for impact. If every Citigroup employee used double-sided copying to conserve ***just one sheet*** of paper each week, Citigroup would save an estimated $700,000 each year, plus eliminate 76 tons of solid waste as well as reduce water and wood consumption by 1.3 million gallons and 230 tons respectively.[14] Studies of printing and copying practices at other companies indicate that even greater paper savings of 10 to 30% can realistically be achieved.[15] At Citigroup, this degree of paper reduction would translate to monumental financial and environmental gains.

The Citigroup-Environmental Defense project team investigated several techniques for reducing paper use and saving money at printers and copiers and developed a set of recommendations now being implemented at Citigroup. The team's activities are described below.

Getting employees involved

Employee education and involvement is critical for successful paper management. Each employee must understand that they can truly contribute to the success of the organization through their daily efforts to conserve paper. For internal operations, it is essential to communicate to employees that double-sided documents are not only professionally acceptable, but desirable for the financial success of the company. Especially if the organizational culture encouraged single-sided documents in the past, employees must know that reducing paper use is a priority that is supported at the executive level.

Signage is one strategy for educating employees. At Citigroup, signs were first posted in the New York offices and are now being provided to offices nation-wide wherever copy machines and networked printers are located, in elevators and at internal copy centers where employees process requests for large volumes of copies.

Humorous signs encourage employees not only to think about the environment, but to use their copy paper twice whenever possible. One of the twelve signs used in the project is shown on the next page, all twelve signs are available for downloading on Environmental Defense's website.

In addition to educational signs, short articles describing office paper management were placed in Citigroup newsletters, office guides and updates. Citigroup employees were also able to read about paper reduction efforts through their daily intranet newsletter.

Source: http://www.environmentaldefense.org/alliance/citigroup_educationalsigns.htm

Creating acceptance for double-sided copying

In coordination with employee education, the project team tested the feasibility of changing the default standard on copiers from single to double-sided copying. This would allow employees to automatically create double-sided documents but still retain the option to choose single-sided copies if necessary.

A test was conducted to see how changing the default setting from single-sided to double-sided would reduce paper use and impact employees' ability to effectively make copies. We modeled the test after similar studies done by Lawrence Berkely labs[16] and the City of Portland.[17]

The project team first identified all copiers that were currently in use in several New York offices — the location of Citigroup's primary operations in the U.S. — and determined whether they were equipped with duplexing units. Because Citigroup leases its copiers, developing this inventory required close coordination with equipment suppliers, service technicians and Citigroup's facilities management team. We found that the vast majority (over 80%) of copiers had duplex units installed. Copiers without such capabilities were generally older models, and were anticipated to be retired over the next two years.

> Duplexing units are the hardware required to turn over the paper to allow for double-sided copying and printing.

A small sample of copiers, composed of several different copier models of different ages and rates of use, was chosen for testing in order to reflect Citigroup's overall copier inventory. Permission was sought and granted to test the copiers from the departments that would primarily be using them. Department employees were notified via email and signage that the defaults on

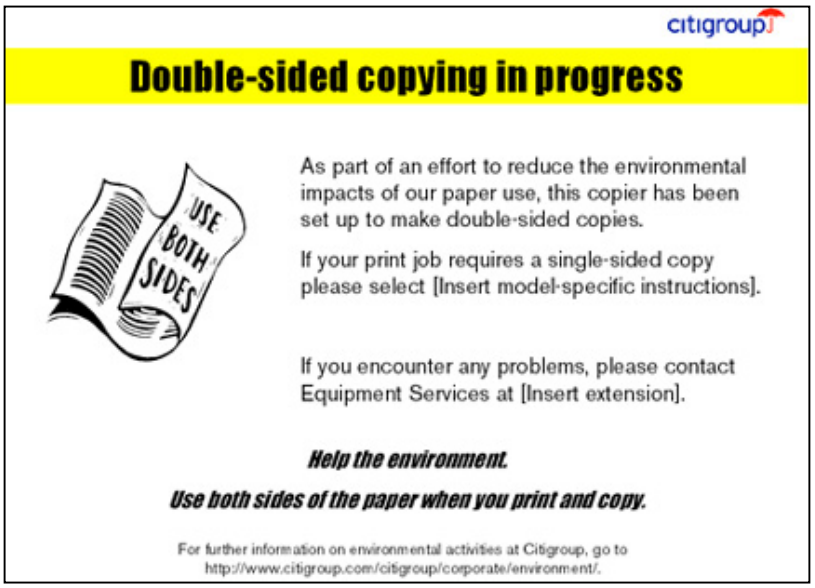
copiers were to be changed and would remain on double-sided copying for the duration of the test. The signs were posted at copier locations and provided simple directions for users on how to make single-sided copies if desired. These signs also listed multiple methods for contacting staff in Citigroup's environmental department and equipment services, in case there were any problems.

Service technicians were deployed to ensure that copiers were functioning properly and to make adjustments to copier settings, changing the default from single to double-sided copying. During the five-week testing period, these service technicians collected two pieces of data from the eight copiers in the test: the overall copy rate and the rate that paper passed through the duplexing unit. Problems were encountered with the duplexing meters on three machines, making the data incomplete for the first two weeks of testing. Technicians initially had difficulty obtaining correct meter readings because of the many calculations and adjustments involved. After resolving these initial problems, complete data were collected for all copiers during the final three weeks of testing.

The tests proved that using double-sided printing as the default setting on copiers was acceptable to employees, easily implementable and cost-effective.

Double-sided copying test results:

- Over 15 million images were copied on eight copiers during the testing, and 3.89 million of those images were copied using the duplex units
- 13.1 million sheets of paper were used during the five-week test
- The overall duplexing rate, or the fraction of images made on duplexed paper, was 25% across all machines[18]
- There was great variation in duplexing rates from machine to machine, from a low of 6% to a high of 50%
- No user complaints were logged to equipment technicians or environmental staff
- During the test, the duplexing rate on each machine either stayed constant or increased. At one copier, the rate doubled over the course of the test.



"As a Citigroup employee who makes a lot of copies, I appreciate the opportunity to help the company and the environment. Using the double-sided feature is easy to do, and I'm happy to save resources for the company and the planet." - Maritza Cruz, Administrator to the Community Development Department, Citibank

The test results indicate that employees were not adversely affected by changing the default settings to double-sided. While the rate of double-sided copying varied, probably because of the different needs of diverse departments, no complaints were received indicating that employees were comfortable switching to single-sided copying on an as-needed basis. The increase in duplexing rates at several machines over the course of the test also indicates an increasing comfort level with the use and appearance of double-sided copies. Additionally, no paper jams or technical problems were experienced during operation of the equipment.

During this five-week test alone, Citigroup avoided the use of 1.9 million sheets (9.7 tons) of virgin copy paper – resulting in significant immediate financial and environmental savings, as shown in Table 2.

TABLE 2
Savings realized during the five-week copier test

Financial Savings	Environmental Savings[a]
Direct savings in paper costs: $7,600[b]	Energy: 398 million BTUs
Total organizational savings: $98,800[c]	Greenhouse Gases: 28 tons
	Wastewater: 200,000 gallons
	Wood: 34 tons
	Solid Waste: 11 tons

Notes: [a]Calculated using the Paper Task Force Model, updated April 2003. [b]Assuming an average purchasing cost of $2/ream for 3,800 reams. [c]Including purchasing and all related costs for handling and disposal.

Improving printing practices

As with copying, double-sided printing also carries the potential for significant cost and environmental savings. The Citigroup-Environmental Defense team examined a sample of Citigroup desktop and network printers, and found a great variety in model, age and capability for double-sided printing. The diversity of equipment and the lack of a company-wide inventory of printers prevented comprehensive testing for switching the standard to double-sided printing. However, the project team calculated the estimated payback period for investment in new printers with double-sided printing capacity. These estimates utilize information from a similar analysis performed at the Lawrence Berkeley National Laboratory.[19]

The key factors that determine the payback period are the incremental cost and expected life of the duplex unit, the number of pages printed, the duplexing rate and the cost of paper. Although the price and lifespan of a printer and duplexing unit can vary, our analysis uses a conservative value of $400 as the incremental cost of the duplex unit and five years as its lifespan.

Similarly, the price of paper and its total costs to a company can vary, but our analysis uses typical current office paper pricing of $2/ream and a conservative

estimate of total organizational costs including purchase, handling and disposal of $26/ream. With these values assumed, the payback period for the duplexing unit is then dependent on the characteristics and behavior of the people and organization that use it. For example, the number of people that the company chooses to link to a single network printer, or the duplexing rate of those people, or even the total paper usage per person can vastly influence the payback period.

> *"Cost-benefit analysis shows that it makes economic sense for Citigroup to invest in duplexing units for our printers. We are confident that effective use of duplexing units will help the organization cut paper use and reduce financial costs."* – James Davis, Vice President, Citigroup Technology Infrastructure Engineering

Departmental analysis of four business units in Citigroup's New York locations found that an average of seven employees share a typical network printer. Based on this analysis, Table 3 shows the payback period (i.e., how long it takes for the duplex unit to pay for itself) and lifetime savings realized per network printer assuming typical usage rates of 5,000 printed sheets per employee per year and a 25% duplexing rate.

Table 3 shows that when total organizational costs are considered, duplexing units are a good investment with a positive return. Using conservative estimates for total paper cost (e.g., printing, copying, storage and disposal), duplexing rate and paper usage, the payback period for network printers shared by seven employees is only 21 months. Citigroup will realize a positive payback in less than two years, and can expect to save hundreds of dollars over the life of each printer. For the four business units that were analyzed, this translates into significant savings. By moving to double-sided printing, these four business units combined will save approximately $180,000 over the lifespan of their printers.

TABLE 3
Payback period for duplexing printers

	Year[a]					
	1	**2**	**3**	**4**	**5**	**Total**
Incremental cost of duplexer[b]	($400)	0	0	0	0	($400.00)
Total costs avoided per duplex printer[c]	$227.50	$227.50	$227.50	$227.50	$227.50	$1,137.50
Lifetime Savings Realized						$737.50
Payback Period						21 months

Notes: [a]The lifespan for the printer and duplexer is five years. [b]The incremental cost of duplex units vary; $400 is a conservative estimate. [c]Based on typical office worker printing 5,000 sheets of paper each year with a 25% duplexing rate and total organizational costs (including purchase, handling and disposal of paper) of $26/ream.

Using the results of the copier testing and reasonable yet conservative estimates on potential changes in printer usage, the project team estimated the annual financial and environmental savings if all Citigroup copiers and printers in U.S. operations were changed to a default setting of double-sided copying or printing. Based on Citigroup's current annual paper use of approximately 8,600 tons and an average duplexing rate of 25%, the organization would eliminate the use of 1,075 tons of paper annually. The financial and environmental impacts would include the savings indicated in Table 4.

As a result of testing and cost calculations, Citigroup has now adopted a purchasing standard that requires all new printers to be equipped with duplex units. Double-sided printing will be enabled as the default when the printer is installed. At the same time, Citigroup has established an ongoing employee education program so that employees may make the informed choice of using double-sided printing and copying.

In addition, Citigroup is exploring opportunities to establish a similar purchasing standard for copiers. The standard could require new copiers to be equipped with duplex units and that double-sided copying be enabled as the default when the copier is installed. Finally, Citigroup is developing a process to switch the default standards on existing printers and copiers with duplex units to double-sided printing or copying. Testing of this process is currently underway at Citigroup's facilities in Tampa, Florida. The goal of these tests is to develop and put into operation a successful double-sided printing and copying implementation process across the U.S.

TABLE 4
Predicted annual savings by changing copier and printer default settings

Financial Savings	Environmental Savings[a]
Direct savings in paper costs: $860,000[b]	Energy: 44 billion BTUs
Total organizational savings: $11,180,000[c]	Greenhouse Gases: 3,000 tons
	Wastewater: 22 million gallons
	Wood: 3,700 tons
	Solid Waste: 1,200 tons

Notes: [a]Calculated using the Paper Task Force Model, updated April 2003. [b]Assuming an average purchasing cost of $2/ream. [c]Including purchasing and all related costs for handling and disposal.

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Strategies for reducing paper use

The Citigroup-Environmental Defense partnership saved almost ten tons of paper and $100,000 in only five weeks, and instituted a program that will save millions of dollars and hundreds of tons of solid waste each year by reducing paper use. Interested in reducing internal paper use at your organization? Try these strategies:

- Work with your equipment suppliers and contract technicians to inventory copier and printer equipment. Identify models that are capable of making double-sided prints and copies.

- Create an educational campaign to encourage employees to reduce paper use. Download educational signs at:
  http://www.environmentaldefense.org/alliance/citigroup_educationalsigns.htm

- Work with technicians and support personnel to switch defaults to double-sided copying and printing.

- Use electronic communications for directories, forms, bulletins, manuals, reports and storage when possible (and don't print them unless absolutely necessary).

- Decrease the size and weight of commonly used papers.

- Eliminate unnecessary pages, title pages and fax cover sheets and reduce white space in publications.

- Work with employees to implement other paper-saving strategies customized for your organizational operations and culture.

Buying postconsumer recycled copy paper

Incorporating postconsumer recycled content into copy paper helps reduce the environmental impacts of paper production, use and disposal. Specifically, using postconsumer recycled content helps conserve natural resources, reduce energy, chemical and water use, and cut pollution and solid waste.

As part of our partnership project, Citigroup committed to purchasing copy paper with postconsumer recycled content, but needed to do so without increasing costs. In 1998, President Clinton's Executive Order 13101 "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition" increased the U.S. government's minimum content standard for printing and writing paper to 30% postconsumer recycled content.[20] After reviewing available recycled paper alternatives, we found that copy paper containing 30% postconsumer recycled content was widely available and being used successfully by a number of organizations. The team decided to establish 30% postconsumer recycled content copy paper as a realistic and cost-competitive purchasing standard that would also result in significant environmental benefits.

The project team developed information about recycled paper supply, quality and pricing and armed with this information, Citigroup's purchasers were able to negotiate a cost-neutral price for 30% postconsumer recycled copy paper. Here is how we did it.

Identifying potential suppliers

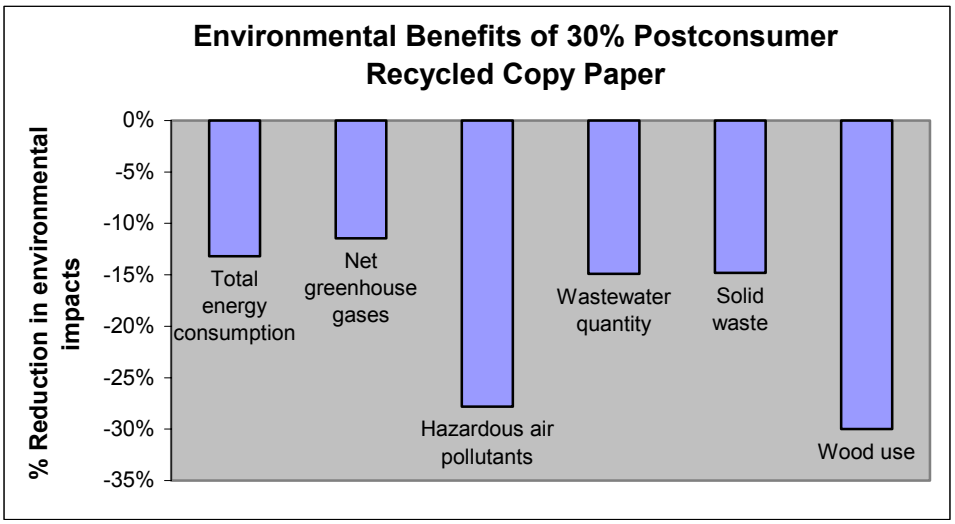
There is an ever-growing variety of postconsumer recycled copy paper products available on the market today. Our first step was to identify exactly what quality specifications were suitable for internal copy paper use at Citigroup. The project team worked with purchasing managers to determine current quality standards and then selected products with recycled content that met those standards. Brightness and basis weight were the two most important criteria for determining which recycled papers were appropriate for Citigroup.

Citigroup then approached its current major copy paper suppliers, Boise and Weyerhaeuser, to inform them of their intention to switch to a 30% postconsumer recycled content copy paper. Both suppliers were very interested in helping Citigroup make the switch. At the same time, Citigroup reviewed the recycled paper offerings from other paper suppliers. By reviewing all potential suppliers, Citigroup had a better understanding of the market. Appendix A provides a table listing numerous brands of copy paper with a minimum of 30% postconsumer recycled content.

Testing quality

Having decided to initially work with its current suppliers, Citigroup began to test the quality of their 30% postconsumer recycled content copy paper products. The tests simply involved substituting recycled copy paper for virgin copy paper

FIGURE 2



Source: Paper Task Force Recommendations on Purchasing and Using Environmentally Preferable Paper, © 1995.

in several different departments of select New York locations over a period of six weeks. Employees were not specifically notified of the change, though the paper was clearly labeled as having recycled content. Several rounds of testing were completed and no complaints were received regarding the quality or performance of the new paper products (e.g., no complaints of copy machine jams, even at high output print centers).

These tests supplemented testing done in 1999 by the U.S. Conference of Mayors.[21] During those tests, three brands of 30% postconsumer recycled copy paper were tested by Cannon U.S.A., Hewlett-Packard and Lexmark. The tests showed that there were no significant performance differences across a number of quality indicators including paper feeding, reliability, image quality, toner fixability, smoothness and curl.

Negotiating for price parity

Pricing for copy paper is influenced by a number of different factors related to supply-and-demand forces affecting the paper market. For example, from the supplier's point of view, the costs of fiber, energy and other inputs all influence copy paper pricing. Pricing is also influenced by customer demand and by capacity utilization of manufacturing equipment. As a result, pricing is customized, varying greatly among buyers and suppliers.

To obtain the most competitive prices, paper buyers need to take steps to improve their negotiating position and understand current market conditions. Citigroup and Environmental Defense worked together to implement the following strategies to maximize the organization's purchasing power:

- **Start with the standards.** Citigroup made the decision to purchase copy paper that matched the current standard for federal governmental purchasing: 30% postconsumer recycled content, 84 brightness, and 20# basis weight. Because

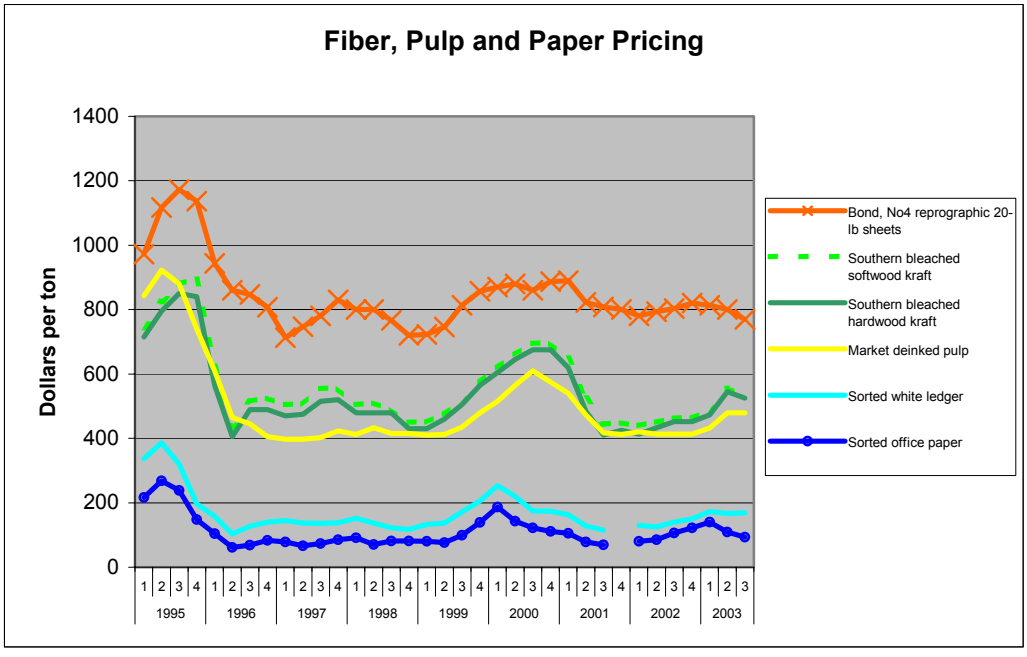
Citigroup started with this standard, more suppliers were able to offer appropriate products at competitive prices.

- **Pump up the volume.** Citigroup centralized copy paper purchases among its many offices and business units to offer suppliers a large and steady demand.
- **Simplify your needs.** Citigroup maintained its need for minimal delivery services and thus was able to cut down on delivery costs for its suppliers – a savings that was passed on in the price of paper.

To understand the industry dynamics and market conditions, Citigroup and Environmental Defense also tracked market indicators for recycled paper. These included pricing for:

- Sorted office paper and white ledger: the recovered paper grades that are used as inputs for making deinked pulp
- Deinked pulp: pulp made from recovered paper that displaces hardwood pulp in postconsumer recycled paper
- Hardwood pulp: the virgin wood pulp that deinked pulp partially displaces in postconsumer recycled paper
- Softwood pulp: another type of virgin wood pulp used in copy paper
- Finished pricing for bond, 20 pound reprographic paper

FIGURE 3



Sources: Pulp & Paper 2002 North American Factbook, © 2002 Paperloop.com, Inc. and Pulp & Paper Week, Paperloop.com, Inc.

These data show that the market price for deinked pulp – the pulp used to make recycled copy paper – has consistently been less expensive or equal to the market price for hardwood pulp, its tree-based substitute. This indicates that there are opportunities for paper manufacturers willing to produce postconsumer recycled papers to take advantage of this price differential. It also indicates opportunities for recycled paper buyers to ask suppliers to pass on those savings and reduce the price of postconsumer recycled copy paper.

Armed with this information Citigroup entered into negotiations with its suppliers for recycled paper at good prices. Citigroup made it clear that it was willing to invite a broad range of competitors into the discussions to ensure the best pricing. However, over multiple meetings, Citigroup was able to negotiate with its current suppliers to purchase 30% postconsumer recycled content copy paper at parity with the prices formerly paid for virgin copy paper. This new paper is now in use in Citigroup's corporate offices and its Citibank, CitiFinancial, Global Corporate and Investment Banking Group, and Global Investment Management (formerly Smith Barney) locations across the U.S.

Citigroup used approximately 8,600 tons of paper in 2003. By switching this much paper to 30% postconsumer recycled content, Citigroup and its suppliers will annually conserve an estimated: [22]

- 43.8 billion BTUs of energy
- 2,800 tons of greenhouse gases
- 26.3 million gallons of wastewater
- 8,900 tons of wood
- 1,450 tons of solid waste

Citigroup, now in the process of expanding this purchasing effort, is investigating options for increasing recycled paper usage in its other U.S. subsidiaries, as well as in Europe and Asia. Citigroup is also exploring ways to increase the recycled content levels in other grades of paper commonly used, including text and writing papers, publication papers and customer statements.

Using these strategies and information, we believe that other organizations can achieve similar environmental benefits at no additional cost by working with suppliers to obtain competitive pricing for recycled paper products.

COPY THIS!

Strategies for buying recycled paper

The Citigroup-Environmental Defense partnership saved thousands of tons of wood and waste per year at no extra cost by buying recycled content paper. Interested in purchasing postconsumer recycled content paper for your organization? Try these strategies:

- Work with suppliers and stakeholders to understand the market dynamics for copy paper pricing.
- Consolidate the volume of paper purchased to increase operational efficiency and reduce financial risk.
- Streamline delivery and service requirements where possible.
- Identify copy paper quality needs and set aggressive goals for recycled content.
- Invite broad competition from suppliers to ensure the best prices.

Evaluating supplier performance

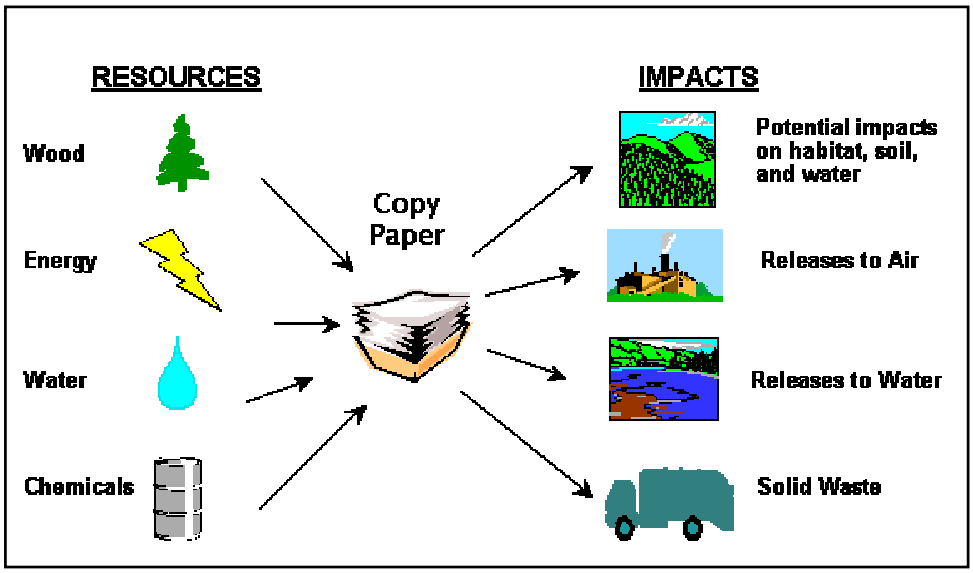
Why look at supplier performance?

Paper production, use and disposal create a wide range of environmental impacts throughout the lifecycle, from the forest, where wood fiber is obtained from trees, to the landfill or incinerator, where paper and paper products are typically disposed of.

As discussed in the previous sections, reducing paper use and incorporating postconsumer recycled content significantly reduces the environmental impacts associated with paper manufacturing, use and disposal. However, because organizations will continue to use paper to communicate and some level of virgin fiber remains necessary to make that paper, it is important to take additional steps to reduce the environmental impacts associated with forest management and paper production.

Major paper purchasers can play an important role in further reducing the environmental impacts of forest management and pulp and paper manufacturing by learning about their suppliers' environmental performance, and considering that performance in their purchasing decisions along with product availability, price, performance and other factors.

As a major consumer of office paper, Citigroup is committed to working with its suppliers and others to promote responsible forest management and environmentally preferable pulp and paper manufacturing practices. To this end, Citigroup worked with Environmental Defense to develop and implement an annual environmental performance evaluation of its paper suppliers. Through this process, Citigroup will collect baseline information for all of its copy paper suppliers and track their performance over time.



Identifying priorities

Citigroup and Environmental Defense worked together to identify priority areas where suppliers can make additional efforts to reduce the environmental impacts associated with forest management and pulp and paper production. The following two priority areas will be used by Citigroup to evaluate paper suppliers' environmental performance:

Responsible fiber sourcing

Growing and harvesting trees for paper production can cause a variety of environmental impacts ranging from the destruction of plant and animal habitat to the degradation of soil and water quality, which also affects human populations. The paper industry's forest management practices have come under increased public scrutiny in recent years because demand for wood and paper products has contributed substantially to the loss of diverse natural forests. Forests that are intensively managed for wood and paper production generally exhibit less biodiversity, lower habitat and water quality and poorer soil productivity than natural forests.

Working together, Citigroup and Environmental Defense explored the complex environmental and economic issues surrounding forest management, and identified the following priorities for responsible fiber sourcing:

- **Protecting endangered forests.** Paper production can contribute to the loss of rare, threatened or ecologically vulnerable forests by making it profitable to liquidate those forests or convert them to simplified, less biologically diverse forest ecosystems.
- **Conserving biodiversity.** Both the amount and variety of plant and animal life can be protected by conserving rare forest types and habitat for endangered species, establishing wildlife corridors (areas managed to link larger forest preserves with intervening suitable wildlife habitat) and maintaining a diverse mix of tree species and ages in a given forest.
- **Protecting water quality.** Because forested watersheds are often the source of drinking water for cities and towns, maintaining water quality from forestry operations is critical. Buffer strips of trees bordering streams and other bodies of water help filter and absorb sediments, maintain shade, and protect fish and other wildlife habitats. In coastal areas, careful management of fresh water drainage from forests protects sensitive estuaries that serve as nurseries for fish and other aquatic organisms.
- **Protecting soil quality.** Less intensive harvesting methods can help minimize soil erosion, avoid overcompaction, and maintain soil temperature, moisture levels and nutrient content.

Citigroup is committed to working with its suppliers to gain a better understanding of their current practices and encourage the adoption of forest management practices that protect both the timber and non-timber values of a forest including biodiversity, wildlife habitat, soil and water quality and aesthetics. In the longer term, Citigroup plans to include forest management practices along with other business and environmental criteria in its purchasing

decisions, and to take steps to use only paper and paper products that meet its criteria for responsible fiber sourcing.

Clean production

Pulp and paper manufacturing exact a heavy toll on the environment in the form of energy and natural resources consumed, greenhouse gas emissions and other pollutants released to the air and water.

- **Energy use.** Paper production is the third most energy intensive of all manufacturing industries, using over 10% of all energy in the U.S. industrial sector.[23]
- **Water consumption.** The pulp and paper industry is one of the largest users (per ton of product) of industrial process water in the U.S. Depending on the manufacturing technology used, the production of one single sheet of copy paper can require over 13 ounces of water, more than enough to fill a typical beverage can.
- **Chemical releases.** In 2002, the pulp and paper industry ranked third among industrial sectors in emissions of Toxics Release Inventory chemicals to air, and sixth in discharges of such chemicals to surface water.[24]

To encourage cleaner manufacturing, Citigroup's goal is to work with paper suppliers that are committed to keeping pace with technological advances and producing paper in the cleanest possible manner. Specifically, this includes using the most advanced manufacturing technologies, the most efficient mill operations and the most effective environmental management systems to minimize the consumption of natural resources (e.g., wood, water, energy) and the quantity of releases to air, water and land.

Developing the evaluation process

The project team's next step was to develop a process by which Citigroup could establish a baseline for its paper suppliers' environmental performance and measure their progress in the future. To accomplish this goal, the project team developed an annual supplier evaluation form (Appendix B) to collect information about paper suppliers' forestry and fiber sourcing practices, manufacturing processes, environmental management systems, environmental releases and regulatory compliance.

Citigroup and Environmental Defense worked with the company's current paper suppliers to explain Citigroup's environmental priorities and commitment to improving office paper management. In addition, the project team sought input from suppliers on aspects of the evaluation process including confidentiality, format of the evaluation form and convenient timing for distribution and completion.

On an annual basis, Citigroup will request that current and prospective paper suppliers complete the supplier evaluation form and provide the same environmental performance data when submitting product and pricing proposals.

These evaluations will be conducted and considered prior to making commitments to paper suppliers for the next procurement cycle.

Asking the right questions

To design the annual supplier evaluation form, Citigroup and Environmental Defense developed a series of questions that could be used to evaluate paper suppliers' environmental performance in the established priority areas of responsible fiber sourcing and clean production.

Responsible fiber sourcing

Together, Citigroup and Environmental Defense identified the following critical factors for evaluating paper suppliers' forest management practices:

Chain of custody control

In the U.S. less than one-third of the pulpwood consumed by the typical pulp mill comes from land owned by that company: most of it comes from lands owned by other private landowners or from public lands.[25] Because the origin of the wood used to make paper can have important impacts on the environment, Citigroup is asking its paper suppliers to report on the sources of their pulpwood supply, on the forest management practices employed to produce that pulpwood and the steps they are taking to ensure that the landowners, loggers and others in their supply chain use the best environmental practices.

Independent third-party certification

Independent third-party certification of forest management practices can help paper suppliers provide credible and complete information to their customers. In the U.S., standards for forest management include the American Forest and Paper Association's Sustainable Forestry Initiative (SFI) and the Forest Stewardship Council (FSC). At present, the FSC standard is more broadly accepted among independent environmental advocacy groups.

Citigroup believes that independent third-party certification helps paper suppliers ensure that environmentally preferred forest management practices are employed at each link in the supply chain. Citigroup will ask suppliers to provide information about their participation in an independent third-party certification process, and use this information to track progress and involvement in the future.

Protecting endangered forests

"Endangered," "old growth" and "high conservation value" are all terms used to describe forests that may contain rare, threatened or endangered species, habitats or ecosystems; provide critical watershed protection or erosion control; or be of special cultural or ecological significance. Citigroup is committed to working with its paper suppliers to ensure that pulpwood procurement for its products does not contribute to the loss of such forests. In addition, Citigroup will collect information about steps that suppliers are taking to contribute to the conservation and restoration of these forests (e.g., land donations, easements, increasing

endangered species populations and restoration of rare forest types), and use this information in its future purchasing decisions.

Annual reporting

Citigroup publishes an annual Corporate Citizenship Report to provide accountability and transparency on its environmental and social responsibility record. As a paper purchaser, Citigroup needs concise, reliable information about its suppliers' forest management practices and annual reporting can be a good source of this kind of information. Citigroup will request individual company reports from its paper suppliers and review the quality and comprehensiveness of this information as part of the annual evaluation process.

Clean production

When evaluating its suppliers' pulp and paper manufacturing practices, Citigroup will consider the following factors:

Pulping and bleaching technology

The first place to look for ways to reduce the environmental impacts of papermaking is in the pulping and bleaching processes used by mills to produce pulp from trees. The bleached kraft pulp used to produce printing and writing papers is made from wood that has been cooked with various chemicals to separate the fibers from the lignin (the "glue" that holds the fibers together). This pulp is then bleached through a multi-step process using chlorine compounds (e.g., chlorine dioxide) and/or oxygen-based chemicals (e.g., hydrogen peroxide or ozone).[26] The specific technology used during this process can make a big difference in energy and water use, air and water pollution and solid waste.

Table 5, on the following page, shows the environmental hierarchy of pulping and bleaching processes for chemical pulp – with the shaded areas representing environmentally preferable options.

In the U.S., the volume of bleached kraft pulp produced is smallest at the top of the hierarchy and increases as one moves down, with the exception of elemental chlorine, which has been phased out. There is currently only one TCF pulp producer in the U.S.[27] and ozone processes are installed at only two U.S. bleached kraft pulp mills.[28] (TCF pulping processes are much more common in Europe, accounting for 25% of Scandinavian bleached kraft pulp production.) Extended and/or oxygen delignification technologies are more commonly found in the U.S., and are currently used at 26 bleached kraft pulp mills. However, traditional ECF continues to be the most widely used bleaching process, and is the minimum standard allowed under the U.S. Environmental Protection Agency's (EPA) Cluster Rule.

Citigroup will gather information about the pulping and bleaching processes used at the mills that produce the company's paper and track progress in adopting advanced pulping and bleaching processes that allow mills to produce paper in the cleanest possible manner.

TABLE 5
Environmental hierarchy of pulping and bleaching technologies[29]

Process	How It Works	Environmental Advantages
Processed Chlorine Free (PCF) & Totally Chlorine Free (TCF)*	Completely substitutes oxygen-based compounds for chlorine compounds.	Further improves quality of wastewater. Enables virtually complete recovery and reuse of wastewater.
Enhanced ECF with ozone or hydrogen peroxide	Uses ozone or hydrogen peroxide as brightening agent in initial stages of bleaching processes. (Final or near final stage uses chlorine dioxide.)	Further improves quality of wastewater. Reduces quantity of mill wastewater by 70% to 90% compared with traditional ECF. Enables recovery of most wastewater.
ECF with extended or oxygen delignification ("enhanced ECF")	Removes more of the lignin before bleaching, thus reducing energy and chemical use during bleaching process. (Final stage uses chlorine dioxide.)	Compared with traditional ECF, reduces energy consumption by 30%, improves quality of mill wastewater and reduces quantity of mill wastewater by nearly 50%.
Elemental Chlorine Free ("traditional ECF")	Replaces elemental chlorine with chlorine dioxide.	Required as of April 2001 per EPA's Cluster Rule.
Elemental Chlorine	Uses elemental chlorine to bleach pulp. In the U.S. elemental chlorine was phased out as of April 2001 per EPA's Cluster Rule.	Phased out as of April 2001 per EPA's Cluster Rule.

Notes: * The terms PCF and TCF refer to paper produced without chlorine or chlorine compounds. As used in the market today, PCF paper is preferable because it contains recycled fiber, while TCF refers only to 100% virgin paper.

Environmental management systems

Even the most environmentally advanced technologies cannot reach their full potential in reducing pollution if a mill is not operated efficiently. A comprehensive environmental management system (EMS) can help mills improve efficiency, take advantage of advanced technologies and further improve environmental performance by reducing resource use, improving energy efficiency and controlling pollution.

Citigroup will look for paper suppliers' with comprehensive EMSs designed to achieve:

- Energy and water conservation
- Pollution prevention and control systems
- Preventative maintenance
- Emergency preparedness and response
- Ongoing training for mill staff in process control to improve environmental performance

Environmental releases and compliance

For Citigroup, compliance with current environmental regulations is the minimal requirement for all its suppliers. As part of its annual environmental evaluation of paper suppliers, Citigroup will ask its suppliers to provide data on environmental releases from the mills that produce its paper, as well as details of any non-

compliance incidents at these mills over the past three years. Such data are publicly available from state permitting boards where each mill is located, so Citigroup could obtain the same information independently if it wished.

For Citigroup, the primary purposes of reviewing this data is to determine whether a mill (or paper supplier) is in compliance with existing regulations and shows a trend of continuous improvement over time. Equally as important as a mill's environmental performance in a given year is the supplier's commitment and ability to maintain strong performance into the future by keeping pace with technological advances and maintaining its environmental releases well below regulatory limits.

Working together, Citigroup and Environmental Defense established criteria for evaluating paper suppliers and developed and implemented an annual paper supplier evaluation process. In Spring 2003, Citigroup sent its first supplier evaluation forms to its current paper suppliers and received responses from all suppliers. Citigroup will use the completed evaluation forms to establish baseline performance information for each paper supplier. Citigroup will request that current and prospective paper suppliers complete the supplier evaluation form annually. Citigroup plans to use the information collected through this process to track suppliers' performance over time and to consider that performance along with other business factors in making improvements to its paper supply chain.

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Strategies for supplier evaluation

Citigroup and Environmental Defense worked together to make improvements in the supply chain by evaluating suppliers' environmental performance. Interested in evaluating your paper suppliers? Try these strategies:

- Work with suppliers and stakeholders to understand the environmental impacts associated with paper production and forest management.
- Identify priority areas and evaluation criteria relative to your organization's environmental values and supplier expectations.
- Develop a standardized evaluation form with the questions needed to collect accurate information.
- Use an annual evaluation process that allows to you to establish baseline information for each supplier and measure environmental progress over time.
- Incorporate the information collected through this process in your organization's purchasing decisions.

Spreading the word

Through the Citigroup-Environmental Defense partnership, Citigroup has reduced its overall paper use, switched to postconsumer recycled copy paper in U.S. operations and begun evaluating paper suppliers' environmental performance. Citigroup is committed to continuing these efforts and to exploring new opportunities to improve office paper management.

In addition, Citigroup will encourage its colleagues in the financial services sector to adopt similar strategies within their organizations. This is important because the environmental benefits from reducing paper use and increasing recycled content grow as more companies make the switch, and because building and sustaining demand are the keys to creating a strong and stable market for recycled-content paper in the long term.

Moving forward, Citigroup will continue to work in partnership with its suppliers and stakeholders to pursue new opportunities to reduce paper use, increase recycled content in paper products and promote environmentally responsible forest management and cleaner pulp and paper manufacturing.

> *"Citigroup has learned a great deal through this partnership. We have taken concrete steps to reduce the financial and environmental impacts of our operations, and we are committed to sharing our findings with others."* – Iris Gold, Vice President of Environmental Affairs, Citigroup

COPY THIS!

Improving office paper management

Citigroup and Environmental Defense worked together to save money and the environment by reducing paper use and improving paper purchasing practices. You can too. Try these strategies:

- Review the findings from this project and contact Citigroup or Environmental Defense with any questions. Citigroup: valerie.b.cook@citigroup.com or Environmental Defense: tmurray@environmentaldefense.org
- Work with internal and external stakeholders to identify and implement opportunities to reduce paper use within your organization.
- Adopt new purchasing and usage policies for copiers and printers that make double-sided printing the standard.
- Purchase copy paper with a minimum of 30% postconsumer recycled content.
- Institute an evaluation process to measure progress toward cleaner pulp and paper manufacturing processes and better forest management practices within your paper supply chain.

APPENDIX A

Major suppliers of recycled content copy paper

Brand Name	Supplier	% Recycled	% PCR	Chlorine-free?	Brightness	Basis weight
30% or 35% postconsumer recycled:						
Copyrite All Purpose Copy/Bond	Badger	50	30		85	20, 24
Envirographic Bond Copy/Bond	Badger	50	30		85	20, 24
Aspen Xerographic Copy/Bond	Boise Paper	30	30		84	20
Domtar Plainfield Multi Purpose Copy/Bond	Domtar	30	30		84	20
Domtar Recycled Copy	Domtar	30	30		84	20
Worx Multipurpose	Fraser Papers	30	30		88	20
Eureka! 30 Copy/Bond	Georgia Pacific	30	30		84	20
Eureka! 30 High Bright Copy/Bond	Georgia Pacific	30	30		87	20 - 24
GeoCycle Copy/Bond	Georgia Pacific	30	30		84	20
Grays Harbor Laser/Copy Recycled	Grays Harbor	30	30		88	20, 24
Grays Harbor Xerographic Recycled	Grays Harbor	30	30		84	20
HP Office Recycled Paper Copy/Bond	Hewlett-Packard	30	30		87	20
IBM Multipurpose Recycled Paper	IBM	30	30		84	20
Champion Multipurpose Recycled Copy/Laser	International Paper	30	30		84	20
Great White Multi-Use Copy/Laser	International Paper	30	30		84	20 - 24
Hammermill Savings Copy/Bond	International Paper	30	30		84	20
Encore 30 Copy/Laser	New Leaf	50	30		85	20
Office Depot Recycled Copy Paper	Office Depot	35	35		84	20
MaxBrite Premium Recycled Copy Paper	OfficeMax	30	30		88	20
Staples Recycled Copy Paper	Staples	30	30		84	20
Recycled Husky Xerocopy	Weyerhaeuser	30	30		84	20
Recycled Laser Copy	Weyerhaeuser	30	30		88	20, 24
Xerox Multipurpose Recycled Paper	Xerox	30	30		84	20
100% postconsumer recycled:						
Envirographic 100 Copy/Bond	Badger	100	100	PCF	85	20, 24
Aspen 100 Copy/Bond	Boise Paper	100	100	PCF	84	20
Eureka! 100 Copy/Bond	Georgia Pacific	100	100	PCF	84	20
GeoCycle 100 Copy/Bond	Georgia Pacific	100	100	PCF	84	20
Grays Harbor 100% Recycled Xerographic	Grays Harbor	100	100	PCF	84/88	20
Encore 100 Copy/Laser	New Leaf	100	100	PCF	85	20
MaxBrite 100% Recycled Multipurpose	OfficeMax	100	100	PCF	92	20
Xerox 100% Recycled Paper (only at Staples)	Xerox	100	100		84	20

Brand Name	Supplier	% Recycled	% PCR	Chlorine-free?	Brightness	Basis weight
Other recycled copy papers with specialty brightness, weight or recycled content:						
New Life DP 100 Copy/Bond	Cascades Fine Paper	80	60	PCF	84	20, 24
New Life Opaque Repro Copy/Bond	Cascades Fine Paper	30	30		91	20
Eureka! 50 High Bright Copy/Bond	Georgia Pacific	50	50		87	20
Hammermill Bond	International Paper	30	30		92	20 - 24
MaxBrite Recycled Multipurpose	OfficeMax	30	30		92	20, 24
Ecology Copy/Bond (water-marked)	Riverside	100	35		79	18, 20, 24
Ecology Writing Copy/Bond	Riverside	100	35		79	18
Recycled Lynx Opaque Laser	Weyerhaeuser	30	30		92	20, 24, 28
Xerox Extra Bright Multipurpose Recycled (only at Office Depot)	Xerox	30	30		92	20

Source:www.conservatree.com/paper/PaperGuide/Copy.shtml

APPENDIX B

Paper supplier evaluation form

Please complete and return to Citigroup. Attach separate pages as necessary. This information is solely for Citigroup's internal use to evaluate and compare suppliers' environmental performance over time.

Part I: Paper Supplier Information

Completed by: _____ Title: _____ Date:_____

Company Name: _____

Paper purchased by Citigroup: _____

Amount purchased by Citigroup: _____

Location of mill(s) where paper is produced: _____

1. What is the composition of the paper you supply to Citigroup?

Chemical pulp:	_____%	(Hardwood: _____% Softwood: _____%)
Semichemical & Mechanical pulp:	_____%	(Hardwood: _____% Softwood: _____%)
Recycled pulp:	_____%	(Postconsumer fiber: _____%)
Coatings/fillers/moisture:	_____%	
TOTAL:	100%	

2. For the paper you supply to Citigroup, how much of the pulp you use is…

	Produced at your mill	Acquired from another source (please specify sources)	Total
Chemical			100%
Semichemical, Mechanical			100%
Recycled			100%

Part II: Pulp Supplier Information

Please answer the remaining questions for each source of pulp used in Citigroup's paper. Where there are multiple pulp sources, have each source submit a separate response.

Name of pulp mill: _____

Location of pulp mill: _____

Contact name and title: _____

Amount of pulp supplied annually: _____

Type of pulp produced (check):

_____ Chemical
_____ Semichemical or Mechanical
Please specify type, e.g., TMP, CTMP, BCTMP: _____
_____ Recycled

For Chemical Pulp Mills:

1. How many bleach lines are in place at the mill?

2. For each bleach line, what is the pulping and bleaching sequence?

3. At what stage in the bleaching process are the filtrates from the first bleaching and extraction stages recirculated to the chemical recovery system?

For Mechanical, Semichemical or Recycled Pulp Mills:

4. What bleaching or brightening agents are used, if any?

For All Pulp Mills:

5. What technology upgrades to the pulping and/or bleaching lines have been made since 1997, or are planned in the next five years?

6. What other investments have been made in pollution prevention since 1997, or are planned in the next five years?

7. What investments have been made in pollution control technologies since 1997, or are planned in the next five years?

8. Please describe the major features of your environmental management system (EMS). Provide examples of how your EMS has improved environmental performance.

9. (a) Indicators of general environmental performance: please complete for all pulp mills.

Values for these indicators reflect manufacturing technology used by mill and effectiveness of pollution-control equipment	2001 Supplier Annual Monthly Average	2001 Supplier Process Variability (%)	2002 Supplier Annual Monthly Average	2002 Supplier Process Variability (%)	2003 Supplier Annual Monthly Average	2003 Supplier Process Variability (%)
Biochemical Oxygen Demand (BOD) (kg/metric ton of final product)						
Color (kg/metric ton of final product)						
Fresh Water Use (gallons/ton of final product)						
Sulfur Dioxide (SO_2) (pounds/ton of final product)						
Nitrogen Oxides (NO_X) (pounds/ton of final product)						
Total Reduced Sulfur Compounds (pounds/ton of final product)						
Total Energy Consumption (millions of BTUs/ton of final product)						
Purchased Energy Consumption (millions of BTUs/ton of final product)						
Particulates (pounds/ton of final product)						
Carbon Dioxide (CO_2) or equivalent (tons/ton of final product)						
Hazardous Air Pollutants (HAPs) (pounds/ton of final product)						
Volatile Organic Compounds (VOCs) (pounds/ton of final product)						
Total Suspended Solids (TSS) (kg/metric ton of final product)						

(b) Environmental performance indicators for bleached kraft pulp mills: please complete if applicable.

Values for these indicators reflect: • Performance of pollution prevention technologies • Progress toward minimum impact mill	2001 Supplier Annual Monthly Average	2001 Supplier Process Variability (%)	2002 Supplier Annual Monthly Average	2002 Supplier Process Variability (%)	2003 Supplier Annual Monthly Average	2003 Supplier Process Variability (%)
Bleach Plant Effluent Flow (gallons/ton of air-dried pulp)						
Adsorbable Organic Halogens (AOX) (kg/metric ton of air-dried pulp)						
Chemical Oxygen Demand (COD) (kg/metric ton of air-dried pulp)						
Dioxins (in bleach plant filtrates) (picograms/liter of water)						

Notes: (1) All data should be provided on a per ton of product basis. (2) The monthly average provides information about the mill's level of performance. As mills implement pollution-prevention technologies, the magnitude of the performance indicators should decrease. (3) The variability provides information about the mill's ability to control the manufacturing process. Improved process control, maintenance and housekeeping should reduce the variability of these indicators over time.

10. Please provide details of any non-compliance incidents in the last three years. Summarize the degree of non-compliance, enforcement actions taken (if any), fines paid (if any) and steps taken to correct the problem.

2001: _____

_____

2002: _____

_____

2003: _____

_____

Part III: Forest Management Practices

1. Citigroup is encouraging its paper suppliers to know the sources of and forest management practices employed to provide their pulpwood supply, and to ensure that the landowners, loggers and others in their supply chains use the best environmental practices. Do you currently have chain of custody control over some or all of your pulpwood supply? If so, please describe. Additionally, what steps are you taking to ensure that the loggers that harvest wood for your mills are using the best environmental practices?

2. Citigroup believes that independent third-party certification helps paper suppliers ensure that environmentally preferred forest management practices are employed at each link in the supply chain. Are the forest management practices that you and/or your suppliers employ currently certified by an independent third-party? If so, please describe.

3. Citigroup publishes an annual Global Citizenship Report to provide accountability and transparency on our environmental and social responsibility records. Do you publish a report describing your forest management practices and efforts to minimize your environmental impacts? If so, please provide your most recent report.

4. "Endangered," "old growth" and "high conservation value" are terms that describe forests that may contain rare, threatened or endangered species, habitats or ecosystems; provide critical watershed protection or erosion control; or be of special cultural or ecological significance. What steps are you taking to ensure that pulpwood procurement does not contribute to the loss of such forests? In addition, what steps are you taking to contribute to the conservation and restoration of these forests (e.g., land donations, easements, increasing endangered species populations)?

Endnotes

[1] Pulp & Paper 2002 North American Factbook, page 214, © 2002 Paploop.com, Inc.

[2] Green Seal, "Choose Green Report: Copy Paper," January-February 2000, available at http://www.greenseal.org/recommendations/CGR=CopyPaper.pdf

[3] "Office Paper Reduction Demonstration Project, Final Report," Solid Waste Management Coordinating Board, February 2002, available at http://www.swmcb.org/studies/OfficePaperReport.pdf

[4] Paul Hawken, Amory Lovins, L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution*, (New York: Little, Brown and Company, 1999) p. 174.

[5] Green Seal, "Choose Green Report: Copy Paper," January-February 2000, available at http://www.greenseal.org/recommendations/CGR=CopyPaper.pdf

[6] Assumes office paper has water use of 20,500 gallons per ton of paper produced. Paper Task Force Recommendations on Purchasing and Using Environmentally Preferable Paper, 1995, Environmental Defense Fund, p. 109. Available at http://www.environmentaldefense.org/article.cfm?contentid=1689

[7] U.S. Department of Energy, Energy Information Associations Manufacturing Energy Consumption Survey, 1998.

[8] U.S. Environmental Protection Agency, "Municipal Solid Waste in the United States: 2000 Facts and Figures," June 2002, available at http://www.epa.gov/epaoswer/non-hw/muncpl/report-00/report-00.pdf

[9] "Paper Efficiency: What is it and How to Achieve it," Bruce Nordman, available at http://www.Rethinkpaper.org

[10] Only an estimated 10% of the paper stream is used for "cultural memory," e.g., long-term storage, files, records and books. Paul Hawken, Amory Lovins, L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution*, (New York: Little, Brown and Company, 1999) p. 174.

[11] 46.9%, less than half, of office paper was recovered in 1999. The remainder entered the waste stream. American Forest & Paper Association, "Paper Recovery Progress Report," May 2001.

[12] "Office Paper Reduction Demonstration Project, Final Report," Solid Waste Management Coordinating Board, February 2002, available at http://www.swmcb.org/studies/OfficePaperReport.pdf

[13] Estimates were made using the April 2003 update to the Paper Task Force Model. Paper Task Force Recommendations on Purchasing and Using Environmentally Preferable Paper, 1995, Environmental Defense Fund. Available at http://www.environmentaldefense.org/article.cfm?ContentID=1689&Page=1

[14] Citigroup is estimated to have 260,000 employees worldwide. Including all related costs, copy paper is conservatively estimated to cost $26/ream, or approximately 13 times average purchasing costs.

[15] "Cutting Paper" website, Ernest Orlando Lawrence Berkeley National Laboratory, http://eetd.lbl.gov/paper/index.html

[16] Ibid.
[17] "Copy Machine Duplexing Study," Metro Regional Center, Waste Reduction section, Portland, OR, August 1999.
[18] Duplexing Rate = 2 * [1 – (Sheets/Images)] = 2 * [1- (13.1M sheets/15M images)] = .25 (Calculated based on the "Cutting Paper" website, Ernest Orlando Lawrence Berkeley National Laboratory, http://eetd.lbl.gov/paper/index.html
[19] Ibid.
[20] Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition," available at http://www.ofee.gov/eo/13101.htm
[21] http://www.usmayors.org/USCM/uscm_projects_services/buy_recycled/30paper.pdf
[22] Estimates were made using the April 2003 update to the Paper Task Force Model. Paper Task Force Recommendations on Purchasing and Using Environmentally Preferable Paper, 1995, Environmental Defense Fund. Available at http://www.environmentaldefense.org/article.cfm?ContentID=1689&Page=1
[23] U.S. Department of Energy, Energy Information Association's Manufacturing Energy Consumption Survey (MECS) 1998. The pulp and paper industry consumed 2,747 trillion BTUs in 1998, making it the third most energy-intensive major industry group behind petroleum, coal products and chemicals. The total manufacturing energy use was 23,796 trillion BTUs.
[24] TRI On-site and Off-site Reported Releases (in pounds), All Chemicals By Industry, U.S., 2002. Available at http://www.epa.gov/triexplorer
[25] Smith, Brad W. et al., *Forest Resources of the United States,* USDA Forest Service, 2001.
[26] Paper Task Force Recommendations on Purchasing and Using Environmentally Preferable Paper, 1995, Environmental Defense Fund, p. 30. Available at http://www.environmentaldefense.org/article.cfm?contentid=1689
[27] Scandinavian bleached pulp production from Alliance for Environmental Technologies, *Trends in Bleached Chemical Pulp Production: 1999-2000.* The one TCF pulp mill in the U.S. is Samoa Pacific Cellulose in Samoa, CA.
[28] 2001 Lockwood-Post's Directory and Alliance interviews with bleached kraft pulp mills, summer 2001. Ozone is used in the hardwood bleached kraft pulp line at Stora Enso North America's Wisconsin Rapids, WI mill, and in one bleached kraft pulp line at International Paper's Franklin, VA mill.
[29] "A Common Vision for Transforming the Paper Industry: Striving for Environmental and Social Sustainability," November 2002. Available online at http://www.conservatree.com/paper/Choose/commonvision.pdf

ENVIRONMENTAL DEFENSE

finding the ways that work

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