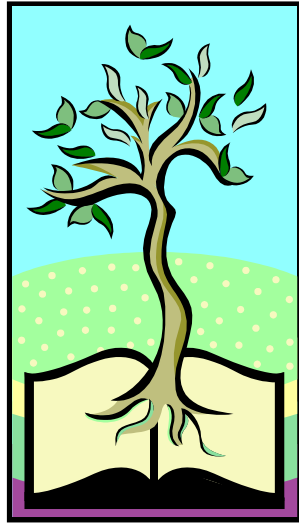Print Smart

Print Sustainably

Toward Sustainable
Campus Printing
Practices
at Colorado College

Summer of 2003

Strategic Management Plan
By Kris Jones

George Washington University
Educational Technology Leadership Program
EDUC230: Managing Computer Applications

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Executive summary

Colorado College is a top liberal arts college currently in the midst of an exciting process to reinvigorate itself over the next ten years. As it revisits its mission and core values, it purports to provide the finest liberal arts education in the country. Coincident with this ambition, Colorado College strives to provide its students the preparation necessary for lifelong learning and leadership as responsible citizens of the world.

Fitting nicely with this mission is Colorado College's distinction for its unique sense of place. It is located in the Rocky Mountain and Southwest Region of the United States – the only liberal arts institution of its kind in the Mountain Time zone. Leadership as responsible world citizens directly connects to the value of sustainability, for concern for the environment and protection of limited resources are acutely discussed in the fragile Rocky Mountain and Southwest Region.

In one small arena of sustainability, namely the efficient use and non-waste of paper products, the College has an opportunity to take a leadership pose. National trends in paper consumption show that paper use, and paper waste, are growing at rapid rates. Given the natural resources required to make paper, import paper, recycle paper, and dispose of paper waste, it is an ideal setting for making a positive impact.

Toward the goals of leadership and sustainability, I am proposing a *PrintSmart: Print Sustainably* campaign. The desired results of this campaign are straightforward: promote responsible printing and reduce paper waste. I propose to accomplish these goals with a three-pronged approach: monitor network printing on campus using a print tracking package; collect data and use an educational component to shape attitudes and behaviors toward responsible printing (social norming); and create and promote a website of printing resources so that the campus community is armed with effective ideas, tips, and strategies for printing more responsibly.

This strategic management plan (SMP) combines relevant background information and historical data with the use of research and evaluations of software packages to provide further details about this plan, as well as ideas about how to properly implement and evaluate this plan.

I expect that this SMP will be seriously reviewed and considered by my Information Technology Services staff, colleagues, and senior management during the summer of 2003, with likely implementation of aspects of this proposal by fall semester 2003. The timing will be advantageous, because Colorado College is hosting a computing conference in June 2004 for the ITS leaders of 59 top liberal arts colleges in the United States. Showcasing an effort such as this one would present a strong commitment to sustainability in higher education.

If implemented well, the *PrintSmart* campaign could significantly impact Colorado College, creating community members who think sustainably, who print responsibly, and who reduce their paper waste. ***PrintSmart: Print Sustainably!***

Introduction

Overview of this document

This strategic management plan (SMP) centers around the concept of sustainability and printing. Recognizing that a college campus environment requires printing – occasionally even lots of printing – I don't propose eradicating the practice altogether. Instead, I propose to implement a more sustainable practice of responsible printing, more in line with our campus mission and values for practicing sustainability and leadership. I am tentatively naming this campaign "*PrintSmart: Print Sustainably*," with a logo designed to inspire a sense of *balance* between the responsible needs for campus printing with a responsible commitment to the environment – on campus and in the larger community.

After providing a bit of background about trends in paper consumption and about the current printing culture of Colorado College, I'll share key elements of my *PrintSmart* strategic management plan proposal. In the final analysis, my SMP will cover topics such as needs assessment, planning, improving productivity, practicability, usefulness, use of research, design, budget, and strategies for acceptance.

National trends in paper consumption

An ideally sustainable community would function such that its resource production and waste absorption does not overburden its surrounding areas (Wright, 2002). Cutting back on the amount of paper that we use on a college campus is a great way to start making a positive impact on the environment, because it would require a lessened resource production (to make and import the paper) and it would offer a reduced waste absorption need (less wasted paper to recycle or otherwise dispose of).

According to predictions in the 1960's, electronic office machines would make paper – and paper waste – obsolete. Such predictions have not been born out. U.S. office workers discarded about 225 pounds of paper each in 1988, for a total of 7.3 million tons, compared with 1.5 million tons in 1960 (Futurist, 1992). According to the Minnesota Office of Environmental Assistance, the average office worker uses 10,000 sheets of paper each year (Hennepin County Environmental Services, 2003). Other sobering paper consumption statistics, taken from Sarantis (2002, p. 2), include:

- The average American office worker is estimated to use a sheet of paper every 12 minutes and dispose of 100-200 pounds of paper every year
- The number of pages consumed in U.S. offices is growing by about 20% each year
- The introduction of email into an organization resulted on average in a 40% increase in paper consumption
- A worldwide growth of 600% in printer accessibility between 1988-1993 helped fuel the other growth trends
- The United States is by far the world's largest producer and consumer of paper

Thus, this is a very relevant and important topic, and a reduction in paper consumption and paper waste could have a significant impact on local and global sustainability efforts. Furthermore, this is a topic that has room for institutional change and support, as well as for personal change and support. Cuthbertson (2002) defines green computing, broadly, as "environmental consciousness about using computer equipment." He goes on to share that while it's a collective ideal, with all levels of administration required to play a part, "the most useful results come from individuals assuming personal responsibility." I believe that this makes the topic of reduced paper consumption one that is ideally suited for education, planning, and implementation on a college campus that values sustainability, responsibility, and leadership.

<u>Campus background related to sustainability</u>
Colorado College is a private, independent, four-year liberal arts and sciences college located in Colorado Springs, at the foot of Pikes Peak. There are close to 2,600 individuals associated with the College – approximately 1,850 undergraduates, and close to 750 faculty, staff, and administrators. Under the leadership of our 10th president, Richard F. Celeste, we are refining our mission statement and mapping our course of distinction for the next decade. An important aspect of our institution is our unique sense of place as a liberal arts institution in the Rocky Mountain and Southwest region. A core institutional value is sustainability, a value that is accentuated by our unique sense of place in an area of precious and limited resources. Colorado College desires to position itself as a leader in the area of sustainability, and as a premiere example of the finest liberal arts institution in the United States.

In May 2002, student Emily Wright, working in conjunction with Dr. Howard Drossman, prepared *The Ecological Footprint of the Colorado College: An Examination of Sustainability*. In July 2002, then brand-new President Celeste commissioned the *Working Group on Campus Sustainability*. There has been a good deal of attention about environmental awareness and consciousness over the past academic year. The campus' ecological footprint, conducted during the 2001-02 academic year, shows that most of our impact comes from electricity (80%) and food consumption (10%), but not all aspects of campus living could be compiled in the limited time for this analysis (Wright, 2002). For example, the 2001 footprint could not analyze the impacts from our satellite campuses, from home energy and material consumption (by faculty, staff, and off-campus students), nor could it analyze issues of pollution or waste (other than carbon dioxide release). Thus, while paper use and paper waste may not carry the heavy weighted impact on the overall campus footprint, they may still be an important aspect of a complete analysis, and they may lend themselves well to creative ideas for waste reduction.

In roughly the same time period, but in a more anecdotal manner, the staff members in Information Technology Services were beginning to note a marked increase in the amount of paper used, and worse, a marked increase in the amount of paper *waste* generated in the campus computer labs. Given the rising costs of paper and the shrinking levels of budget, and especially given the increased attention to sustainability, the time seems ripe for formulating a strategic management plan around this topic.

Where do we want to be?

Colorado College mission statement

As can be seen in Appendix 1, Colorado College has been revisiting its mission statement under the leadership of President Richard F. Celeste, positioning itself for a leadership role in the liberal arts tradition for the next decade. While the mission statement is still a work in progress, one essential characteristic of it is its goal to prepare its graduates for "leadership as responsible citizens of the world."

The Working Group for Campus Sustainability is working hard to get a more formalized statement in support of sustainability into the mission statement. Indeed, sustainability was an important theme that emerged from the mapping and visioning work conducted by campus members in the spring of 2003. Noting that we live on a planet with limited resources, and that we live in a region (the Rocky Mountain & Southwest region) that has very limited resources, it is an ideal opportunity for Colorado College to show its commitment to being a sustainable member and leader in the region.

Information Technology Services (ITS) mission statement

As can be seen at the following address, http://www2.coloradocollege.edu/Computing/, the ITS Division at Colorado College has articulated its own mission statement, as follows:

"The Colorado College Information Technology Services Division strives to enable and enhance the teaching, learning, research, and the administrative processes of the College. This will be accomplished through the services of a productive, informed, and responsive staff. The staff will work collaboratively with all College constituencies to plan for, and operate, an information technology infrastructure that is appropriate for College needs."

This mission statement was developed in 1999-2000, before our current thinking in the area of sustainability and green computing. It may be a useful exercise to work within the ITS directorate, and in conjunction with our Information Technology Policy Board membership, to revisit this mission statement.

Vision for printing smarter and more environmentally

Whether or not the ITS mission statement is updated to include language supportive of sustainability, it is useful to articulate a vision for printing smarter and more environmentally. This vision might read as follows:

PrintSmart: Print Sustainably! *Colorado College is a premiere liberal arts institution with a great commitment to sustainability. Desiring to show leadership in the area of green computing, Colorado College recognizes the value of information, and indeed the value of paper, but it encourages the thoughtful use of the medium by its students, faculty,*

staff, and administrators. The Colorado College community prints smart and prints sustainably by reducing what it prints, and by reducing what it wastes.

This vision for printing smarter has two concrete values that emerge. First, I note the value for reducing paper consumption. Second, I note the value for reducing paper waste. Each of these values will be explored in greater detail later in the plan. Finally, there is one indirect value that emerges, and that is the value for gathering data to inform our planning and our decisions. As will be shown later in this plan, we sense a great deal of "anecdotal information," but we don't have systems in place for reliably collecting data on a regular basis. A vision for printing smarter embeds within it the need to collect information about what we are currently doing, so that we might be able to accurately assess and compare costs, and so that we might then be able to analyze trends over time.

Where are we now?

Current printing arrangements

Colorado College does not currently track printing on behalf of individual users, nor departments, nor public computing labs. There is no cost associated with printing; it is perceived as a "free good." Information Technology Services (ITS) budgets for the cost of buying paper and toner cartridges, and the maintenance budget within the division covers any costs associated with printer maintenance (cleaning, replacing broken parts, etc.). There are currently no recycling bins located in or near computer labs, so any printouts that are not collected by the students who printed them are simply abandoned on the table near the printer. Eventually, the abandoned papers are thrown away.

There are ten public computer labs on campus that are maintained by ITS, each with its own networked black-and-white laser printer. One specialized lab for the Humanities Division also operates a couple of smaller printers, such as a 4x6 photo printer and a color laser printer. There are many small departmental labs operated in different manners by academic departments, and most of these labs have their own networked laser printer as well. Only two public computer labs, in the library and in the science building, have high-capacity printers with duplexing (double-sided printing) capabilities. The default setting on those two printers is for single-sided printing; users must check a box if they desire double-sided printouts.

Colorado College's ITS Division buys the paper needed for the public computer labs on campus; it is not responsible for the paper required by individual departments. The College has a preferred vendor relationship with Office Depot for paper products, and the current type of paper is an Office Depot brand of 8.5" x 11" "premium white copy paper" made for use in all office copiers, printers, and fax machines. It is labeled as an acid-free 20-pound paper with 84-brightness. To my knowledge, no group has studied this type of paper to see if it is made without chlorine, and further to see if it is made with any recycled materials.

Student workers are primarily responsible for filling the lab printers with paper during their shifts, and "fence runners" check each lab daily and make deliveries to file cabinets

in each public lab. When the paper stock, housed in a storage closet in the Barnes
Science Center, is getting low, an ITS staff assistant orders more. There is no careful
tracking of the paper deliveries, paper use, or paper waste in each lab, and there are
anecdotal stories of students taking paper out of the lab printers in order to supply their
personal printer with "free paper."

Appendix 4.2 shares some information that I was able to compile on paper consumption
for computer labs over four academic years, spanning 1999-2003. It is interesting to note
that despite our collective sense that paper consumption has been spiraling out of control
over the past two years in particular, we actually procured less paper in 2002-03 than we
did in 2001-02. It is also interesting to note that we typically spend between $2600-
$3500 annually on paper for the public computer labs, which is much less than our
budgeted amount of $10,000 annually. Of course, we must also procure toner cartridges
out of this fund, and I was unable to gather those figures in time for this report; however,
I do not imagine that the cost for toner cartridges exceeds that for paper.

It is also interesting to note, based upon data in Appendix 4.2, that we can roughly
compute the number of sheets of paper consumed by each student. This figure for the
past two academic years is roughly 400 sheets per student per academic year. This
assumes that only students print in the public computer labs, which is not the case,
although they are the primary printers. This also assumes that all students print equally in
the computer labs, which is also not the case. Approximately 10% of our student body
resides off-campus, and 69% of first-year students own their own printer (see Appendix 3
for more information on personal ownership of printers by incoming freshmen). Thus, the
number of sheets likely attributable to any given student is more than 400 sheets per
student per academic year, or there is a tremendous amount of uncalculated waste.

There are two main print servers on the Colorado College campus, and they are
maintained by the senior systems administrator in the network and systems group. The
primary print server manages the network print queues for departmental office printers
around the campus. The second print server was added to the fleet in 1997 as a security
boundary segmenting the public computer lab printers from office printers. Thanks to the
second print server, students can only "see" the networked printers available to them in
the public computer labs; the office printers are off limits on the primary print server.

Networked printer growth on the Colorado College campus has exploded in recent years.
There is currently no formal mechanism or policy by which a department adds a new
computer or a new printer to the campus inventory. Members of ITS, working in close
collaboration with the Information Technology Policy Board, have proposed a
"Sustainable Computing Policy" (see Appendix 2) that would begin to tackle this
unchecked growth. In the meantime, data from 1997, 1998, and 2003 is available (see
Appendix 4.1 for more detailed information).

Information about the rate of printer growth for office printers is unavailable at this time,
but I'm working with purchasing records and staff members in ITS and in the Business
Office to try to track this growth as well. Anecdotally, without a centralized ITS

computer/printer budget, and without a policy discouraging personal printers, the rate of
personal printer growth has been even more severe than in the case of networked printers.
The primary drivers appear to be the convenience (over walking down the hall to a
departmental printer) and the privacy (for printing sensitive documents). The drawbacks
to this growth are not fully known at this time, but include factors such as: loss of
ergonomic breaks (it's useful to take occasional breaks from keyboarding and computer
work); loss of exercise (walking to pick up printouts); loss of socializing (less reason to
venture out of one's office); greater costs (ink cartridges are more expensive, for
instance, and it's harder to duplex on small office printers); and no ability to track non-
networked printing for use, abuse, and waste.

Current ITS organizational structure
The ITS Division is comprised of 32 administrative and support staff members. As of
July 1, 2003, the division will be reorganized slightly to include five main areas or
directorates: academic computing services; administrative computing services; audio
visual services; network and systems services; and user services (Help Desk).

The two staff members whose main responsibilities to computer lab initiatives report to
two of the five directorates. The Lab Services Coordinator is in the academic computing
group, and the Lab Systems Coordinator is in the network and systems group. These two
staff members have the primary responsibility of overseeing computer lab functions, from
installing standard and specialized software packages to coordinating the efforts of
approximately 30 work study students who help monitor the labs during open hours.

Other staff assist with the planning and maintenance of the labs, including members of
the academic computing services, network and systems services, and user services
directorates. The state of the public computer labs, including changes to them and future
planning for them, would need to be carefully coordinated with these ITS teams.

Current Information Technology Policy Board (ITPB) membership
The Information Technology Policy Board (ITPB) is an advisory board for both the
Director of Information Technology Services and for the Director of the Library. Its
membership is comprised of three faculty members, one from each division of the
college, including one who serves as chair; members of the ITS and library staff, mostly
in ex officio capacities; at large members from the student, staff, and administrative
bodies; and the Director of Budget and the Director of Purchasing, both administrators
from the Business Office.

In recent years, the ITPB has focused on issues such as an acceptable computer use
policy, bandwidth issues (including installation of a firewall and configuration of a traffic
shaper), wireless computing initiatives, information literacy initiatives, and the analysis
and selection of an enterprise administrative computing system (SCT Banner).

It is my hope that the ITPB could review, discuss, and hopefully adopt a policy on
sustainable computing practices, coupled with support for specific initiatives such as the
PrintSmart: Print Sustainably campaign.

Issues driving change in the current environment

An informal needs assessment was conducted in order to ascertain the reasons for considering a change to the status quo. The primary driver is a growing awareness for sustainable practices on the Colorado College campus. As Sellen and Harper (2002) note in their research, this bodes well for promoting a likely and lasting change. They contrasted two businesses, one which transformed its paper practices due to conceptual changes in their business practices, and one which transformed its paper practices merely to reduce paper use. The second company achieved less of a transformation, because they failed to tap the "big issues."

Beyond the concern for campus sustainability, to include greener computing practices, ITS has a few important drivers for change as well. First, the cost of paper and toner cartridges is significant, and they have been growing in overall volume, if not in unit pricing, over the past few years. Second, fiscal constraints have put greater pressures on the ITS budget, and ways in which we can recover those costs or reduce those costs would be welcome in the current economy. There is even some interest in at least exploring the opportunity to recover printing costs via a charge-back system (each student could be charged for their printing, rather than getting free paper). Third, most staff share a sense of waste and inefficient printing practices, and it would be more challenging and optimistic to implement changes to this waste (rather than doing nothing but gripe about the waste).

PrintSmart campaign

Goals of the PrintSmart campaign

Simply put, the goal of the *PrintSmart* program will be to promote responsible printing and to reduce paper waste.

Three-pronged approach

For the *PrintSmart* campaign to be successful at Colorado College, we'll need a comprehensive, well considered, and well-rounded plan for changing widespread campus practices. Toward this end, I'm proposing a three-pronged approach for this strategic management plan.

Print tracking software

First, I'll examine opportunities to track network printing using a software package. This will supply my campus with much-needed data to monitor the current printing impact. Later, we may want to charge for excessive printing, or for printing beyond a certain "quota" set based upon a reasonable usage (culled from our initial tracking data). This will be a backbone element of the *PrintSmart* campaign.

Software solutions to consider

I have conducted a thorough canvassing of the available print tracking software packages, and I have located fourteen. They are presented briefly below, in no particular order. Please refer to Appendix 5 for a bit more information about each software title.

Software Title	Vendor; Web Information
Print Manager Plus	Software Shelf; www.softwareshelf.com
Pcounter	A.N.D. Technologies; www.andtechnologies.com/pcounter.html
WatchDog Print Monitor	ADI Group Inc.; www.adiwatchdog.com
PrintControl	Northern; www.northern.net/printControl/
Print Quota Manager	Information Gateways; www.ig.com.au/PrintQM.htm
PaperCut	Oscura; www.papercut.biz
VendPrint	VendPrint; www.vendprint.com
UniPrint	Pharos Systems; http://www.pharos.com/Products/Uniprint.asp
Homegrown by Whitman	SNMP, Perl, and graphing tools applied to newer HP networked printers
Microsoft Solution	Use built-in monitoring tools in Windows 2000 Server Edition
PrintLog & PageCounter	Equitrac; http://www.equitrac.com/
GoPrint GS-2	GoPrint Systems, Inc.; http://www.goprint.com/
Print Manager Plus	Sunbelt Software; http://www.sunbelt-software.com/product.cfm?id=668
Print Watch	O & K Software; http://prnwatch.com/doc.html

Nominate features to consider in selection/evaluation process

A bit more will be said in the implementation section of this plan about which features might be most relevant in our evaluation process, who should be involved in selecting features, and how the features might be prioritized.

For now, I will propose several aspects of the print tracking software packages that should be considered on some level by the members of the testing/selection committee. The following are attributes that are relevant:

- Investment cost (up-front price of the software package)
- Annual cost (maintenance or renewal fees, if any, in order to stay current)
- Ancillary hardware costs (for example, are separate servers or PC "release stations" or card-swipe keyboards required?)
- Integration with Windows security (i.e., able to utilize Active Directory account information, without a need for a second user database)
- Ability to run on existing campus print servers as a "service," without a need for a separate software tracking server
- Ability to implement a phased tracking approach (e.g., first monitoring, then eventually limiting via quotas, and finally supporting a charge-back mechanism for users who exceed their posted quota)
- Stability of the software (for example, non-beta releases)
- Logging capabilities of the software (for recording printing volume by user, by printer, or by block in an effort to better collect relevant data)
- Ability to chart trends of interest for education (social norming) campaign, for policy setting, and for information (live graphs of printing volume on the Internet)

Social norming

Second, I'll explore how social norming might be used to help to shape and educate the campus community during the *PrintSmart* campaign. One element of this approach will be to draw upon any relevant results from a Sustainability Survey administered to the entire campus during the winter of 2003. Another element might be to plan on conducting a small, targeted survey on printing attitudes and current behaviors. This data, along with data from the tracking software, would be used to inform the campus community about printing practices with the hope of shaping behaviors (and perceptions of behaviors) in a more sustainable way (National Social Norms Resource Center, 2003).

Define social norming

Social norms are the perceived standards of acceptable attitudes and behaviors prevalent among members of a community (National Social Norms Resource Center, 2003). Social norming has become very popular in the student life arena over the past couple of years. It is a proactive tool being used by residential life staff on college campuses in an effort to reshape expectations and stereotypes about potentially destructive personal behaviors. It is probably most commonly applied to alcohol consumption or alcohol abuse, but it has also been extended to tobacco use, sexual assault prevention, and academic performance.

Essentially, the social norms approach uses a variety of methods to correct negative misperceptions, and to identify, model, and promote the healthy, protective behaviors that are, in fact, the demonstrable norm among students (National Social Norms Resource Center, 2003).

Propose aspects of a campaign to promote sustainability

At the Consortium for Liberal Arts Colleges (CLAC) conference at Hope College in June 2002, I attended a talk by Paea LePendu from Whitman College. The talk was titled "Paper Waste and Social Norming," and LePendu presented an interesting twist on the concept of social norming, because he applied it to printer abuse on his campus. At Whitman College, students agree that paper waste is a general problem, and most students will admit that they waste paper themselves from time to time. Much like the Napster bandwidth problem in the late 1990's, it is often the case that a mere handful of students waste significantly more paper than their peers. The social norming approach, then, to combat paper waste was to track actual paper use and calculate the individual use per student, and then use this information to allow students to make informed choices about their behavior.

Whitman College's goal was to reduce the number of pages printed per student per week over time. Their social norming campaign included the tallying of real-time printing statistics, websites, and posters encouraging students to "think before they click print."

Colorado College has already experimented with social norming on the topic of alcohol consumption and partying rates in the Student Life (and Residential Life) arena. I believe that this would be an interesting area for exploration as applied to the institutional value of sustainability. Social norming could be a helpful factor in encouraging long-term understanding and support for paper waste reduction. Social norming, if coupled with a

printing quota system and other tips for reducing paper waste, could enhance strategies for campus acceptance of this project.

Other strategies for reducing paper waste

Third, I'll craft a plan to create campus resources to support other *PrintSmart* strategies. These strategies will be designed to encourage thoughtful, responsible printing behaviors, and they will also be designed to reduce paper waste. Examples of such strategies include seemingly simple ideas such as: use print preview before printing; don't double-space documents unnecessarily; print double-sided whenever possible; etc. The idea would be to gather all such ideas together, and also to encourage the campus community to submit their own "best practices." Methods of communicating these sustainable printing tips include: a *PrintSmart: Print Sustainably* website; use in our computer workshops and other educational seminars; posting signs in the public labs; and disseminating ideas through weekly Help Desk e-newsletters.

Share benefits of reducing paper waste

Articulating the many benefits of reducing paper waste goes hand-in-hand with the social norming/educational campaign, and it ties in nicely with the emphasis on sustainability. Ideas such as saving on mailing costs, disposal costs, and hard copy storage costs should inspire members of the campus community to recognize that reducing paper waste has far-reaching impacts. Please see Appendix 6.1 for a more complete list of ideas for this category.

Offer specific tips for reducing paper waste

Many users don't fully utilize the features of their word processing program to control paper-wasting aspects of their documents such as large margins, double-spacing, font sizes, and print preview. Many users are not as vigilant as they could be when working with Internet printing (for example, printing empty frames instead of content, printing too many pages compared to the information that was needed, or looking for the print-friendly version of the file). Few people know how to print on two sides of a sheet (when the printer supports that option), and fewer people know how to manually feed sheets with one side already printed (especially useful for draft versions of documents). Building up a detailed set of strategies, coupled with the social norming campaign and the print tracking option, would benefit the entire community by sharing "best practices" and teaching people more effective working and printing strategies. Please see Appendix 6.2 for a more complete list of ideas for this category.

Suggest campus infrastructure changes to encourage paper waste reduction

There are many ideas that extend beyond the individual level if the *PrintSmart* campaign is to maximize its chance for success. Showing the members of the campus community that the College supports this program at the highest levels of the administration, through its changes, through its funding, and through its examples, would send a powerful message. For example, relying on a culture of email instead of printed memos for important newsletters and messages would suggest that the institution is printing smarter. As another example, a commitment to upgrading to duplex printers, and a policy to change the default setting to double-sided printing, would send a strong message in

support of printing smarter. Please see Appendix 6.3 for a more complete list of ideas for this category.

<u>Strategies for acceptance of the PrintSmart campaign</u>
The three-pronged approach of the *PrintSmart* campaign reflects sensitivity to the campus culture. Simply implementing a new software package (and a relatively "invasive" one at that, if it tracks people's computing behaviors) would not fare very well, no matter how well intentioned. But phasing such an implementation in over time, perhaps graduating from merely tracking to implementing quotas, and then eventually considering charging for people who exceed their quota, has a greater chance for success. And phasing in stages of a print tracking solution, coupled with social norming efforts and a broader campaign to educate and disseminate "best printing practices," has a fair chance for long-term success.

Overall, as with any new implementation or major change to the system, communication will be essential. Good communication and planning – with users, with Information Technology Services Division colleagues, with Information Technology Policy Board members, with Senior Staff members, with the Working Group for Campus Sustainability, and so on – will go a long way toward ensuring the success of the *PrintSmart* campaign.

We'll have to address a few specific issues or possible concerns. For example, there may be political concerns about charge-backs, since students pay a great deal of money to attend Colorado College and we do not want to be perceived as "nickel-and-diming" them with ancillary expenses. However, the political climate has shifted, as has the economic reality, and ITS is receiving suggestions from the highest levels of the College that it might be time to institute necessary charge-back systems. As another example, we'll have to address social concerns about the technical implementation of any print tracking software, which might be perceived as inconvenient, invasive, unnecessary (people resist change), or "Big Brother-ish." To allay these concerns, it will be important to review any decisions to implement such software with the Information Technology Policy Board, and to be open and honest with our user community about what we can see (and why) and what we cannot see, to respect their privacy while tallying the data that we so crave.

We will also have to be prepared to address shorter-term (perceived) practical disadvantages of the *PrintSmart* campaign. For example, it takes time to educate and retrain users' habits, and the short-term changes to conducting one's printing business will likely meet with initial resistance or frustration. As another example, printers might jam more often until people get the hang of new printers and duplexing units. And as a final example, it again takes time to do things like recycle paper, or to manually feed reusable paper back through a printer for the second side. Until users are educated and invest a bit of time in changing their habits, some of the changes suggested by the *PrintSmart* campaign could be seen as less desirable.

Hopefully most of the practical considerations can be addressed by an emphasis on our shared community value for sustainability, coupled with educational efforts in the area of social norming, coupled again with building a campus resource for other tips and strategies for avoiding paper waste. A community of learners will most likely enjoy benefiting from and contributing to "best practices" for environmentally friendly printing. Cost analyses (preliminarily presented in a section below) will also contribute "good will" toward the *PrintSmart* campaign, assuming that the long-term financial benefits of a move toward smarter printing practices will pay off for Colorado College.

Projected outcomes

The likely benefits of the *PrintSmart* campaign are many. Over the next year or two of implementation and assessment, I predict the following sorts of projected outcomes.
- Pride in a meaningful and measurable contribution to campus sustainability
- Matching values to behaviors in terms of campus sustainability practices
- Reduced paper use in lab environment
- Reduced paper waste in lab environment
- Money saved on paper, toner, and life cycle printer maintenance
- Enhanced work productivity, to include practices such as
    - Increased education and implementation for effective document creation
    - More effective printing practices (see Appendix 6)
    - Less paper to physically file and retrieve and store
    - Enhanced electronic file management skills (organizing folders, etc.)

Looking a bit further out, over the next two-five years, I predict the following sorts of possible outcomes:
- Pride in a continued contribution to campus sustainability
- Steps taken in this campaign to provide forward momentum on other efforts toward campus sustainability in technology and non-technology areas
- *PrintSmart* effort could go beyond campus lab printing
    - Could alter personal printing habits by students, faculty, and staff
    - Could alter departmental printing on campus in non-lab settings
- *PrintSmart* campaign could suggest policy changes to better support green computing initiatives
- *PrintSmart* campaign could encourage an examination of printer growth (both networked and non-networked printers)

Implementation plan

This strategic management plan for a *PrintSmart* campaign at Colorado College will have to address many logistical elements related to the three-pronged approach. For example, how to form a working committee to advise on and shape this overall campaign; which features are most important for selecting a print tracking software solution; how to form a technical testing team to install, test, and compare the software finalists; how to construct

a timeline for implementing various aspects of the *PrintSmart* campaign; how to collect
relevant historical data, as well as how to collect and maintain relevant future data; etc.

The overarching theme of the implementation plan will be to form the right
implementation committee to shape these important questions and issues. For any
strategic management plan to maximize its chance of success, the right kind of invested
(and vested) committee will have to come together on the budget, on the timeline, on the
governance issue, and on the community buy-in process. I'll tackle each of these
implementation issues in turn.

<u>PrintSmart committee membership</u>
The *PrintSmart* planning committee would need to be comprised of colleagues within the
different directorates of the Information Technology Services Division. For example,
there should be at least one representative from academic computing services, user
services, and network and systems services, with special emphasis on the staff members
who provide lab services. Upper-level managers and leaders will have to know about this
endeavor, and they would hopefully support it with their time (or their staff members'
time). The *PrintSmart* planning committee should also draw some of its membership
from the campus community, to emphasize non-technical aspects of the campaign. For
example, committee members could be drawn from the Business Office and the Student
Life Division, especially in the case of researching possible charge-back mechanisms.
Broader community representation could be drawn from the student body, from members
of the Working Group for Campus Sustainability, and from other interested parties
volunteering their time. The overall planning committee could be quite large, since it
would not need to meet regularly, and since people's busy schedules would surely
preclude some members from attending every session.

The charge of the *PrintSmart* planning committee would be to help refine the elements of
the campaign, help conduct further research, and help target the campaign to achieve the
stated goals of printing responsibly and reducing paper waste on campus. It would serve
at least for the planning and implementation phases, but ideally, a reconstituted group
would continue to provide energy and momentum for the ongoing support of the
PrintSmart campaign.

To be most effective, the *PrintSmart* planning committee would likely have several
smaller working groups or sub-committees. For example, I can envision a technical
planning team that would draw primarily from the ITS Division. It would be responsible
for researching the features of the different print tracking software packages, and it would
provide leadership for the prioritization of those features (with input from the overall
committee). It would then test the finalist packages before recommending its decision.
As another example, I can envision a public relations planning team whose primary
responsibility would be to focus on the educational and communication aspects of the
PrintSmart campaign. Which campus digests and newsletters and newspapers should
have articles posted about the campaign's progress? What should the *PrintSmart* website
look like? What kind of signs would be most effective in the labs? How can we best
"spin" the campaign to emphasize the sustainable practices and minimize the perceived

hassles from changes to campus printing practices? These would be excellent questions for that sub-committee to focus on.

The *PrintSmart* planning committee would report its findings and recommendations to the Directors within the ITS Division. The committee would also communicate with the Information Technology Policy Board, both by presenting its data and recommendations and progress, and by asking the Board to authorize any necessary changes to information technology policies.

Budget

By necessity of fiscal constraints, the budget for the *PrintSmart* campaign will have to be modest at best. The good news is that my preliminary research suggests that this can easily be the case. Print tracking software packages seem to run about $800 per server license (see Appendix 5 for a bit more information on known pricing), and Colorado College has just two print servers at this time. Furthermore, we would likely start with print tracking on the student (or lab) print server, simply because it would be even more sensitive to track faculty and staff printing trends.

Beyond the costs of procuring and implementing print tracking software, the other cost would be any incurred in the creation and maintenance of a *PrintSmart* website. However, this can easily be assumed as a special project for a staff member (or a small team of staff members), especially given the importance of sustainability and the pending preparations for the CLAC 2004 computing conference being hosted at Colorado College.

The *PrintSmart* planning committee would be responsible for refining budgets, collecting any necessary historical data, and analyzing a cost comparison between "doing nothing" and implementing the *PrintSmart* campaign as proposed in this strategic management plan. Below are some ideas for the kinds of issues that would need to be assessed so that a detailed comparison can be performed. I suspect that the *PrintSmart* campaign would save money, in the long run, by reducing paper costs, waste disposal costs, toner costs, printer maintenance costs, etc.

A budget analysis should start with an assessment of the costs associated with implementing print tracking software. For example:
- Up-front software cost
- Yearly maintenance or upgrades of software
- Hardware requirements (e.g., a server to run on?)
- Network compatibility and requirements
- Time and labor for staff members to collect the data
- Time and labor for staff members to assess fees

A detailed budget analysis should then assess the savings associated with implementing print tracking software from areas such as:
- Paper type savings (reducing bond, buying recycled, etc.)
- Paper volume savings

  o   Buying less paper overall (if users print less)
  o   Buying less paper overall (if users print double-sided)
- Toner cartridge savings
- Printer maintenance savings (if printers are used less)
- Funds collected from charge backs (beyond a certain quota)

The budget analysis should also factor in the costs for conducting a social norming or educational campaign. Costs might be incurred from the following sorts of activities:
- Surveys
- Signs and posters
- Education (workshops, staff labor, etc.)

The budget analysis should also assess the costs for preparing a website for the *PrintSmart* campaign. These costs would be nominal, because they are in the form of staff time devoted to this special project. Presumably, this staff time would be in lieu of performing other duties for a period of time, or the time could be donated by work study students as well. Staff time would be incurred for the following:
- Staff time to gather resources (references, tips, best practices, etc.)
- Staff time to create a website
- Staff time to maintain and update the website

In the end, these costs and projected cost savings should be compared with the realities of doing nothing (the status quo) and continuing to budget for wanton paper use (and abuse). As we can show in Appendix 4.2, this is not as bad as we anecdotally feared, but the paper use could indeed be growing unchecked unless we try to do something about it.

In the long term, depending upon the institution's commitment to the *PrintSmart* campaign, there could be other infrastructure costs. For example, replacing the current lab printers with duplex-capable printers would add a certain up-front cost to the budget. Detailed calculations should show, however, that the environmental benefits and the reduced paper consumption outweigh the additional costs of the duplex units.

Timeline
The *PrintSmart* planning committee would offer an important contribution in establishing (and monitoring progress on) a proposed timeline for implementation. It would be important to allow adequate time for research and testing, and it would be most important to allow adequate time for campus communication strategies to be implemented.

Below is a possible timeline, with emphasis placed upon a phased approach (tracking before quota-ing before charging, for example) that combines elements of the three-pronged approach. It would be important to present a first draft of the *PrintSmart* website *coincident* with aspects of the social norming campaign drawing upon tracking data. The overall timeline may be a bit ambitious (approximately six months for the first phase), but I feel that it is important to begin collecting more detailed data, and to assess the initial impacts of the educational aspects of the campaign, before planning out a second or third phase of the campaign.

- Review of SMP by Director of Information Technology Services (July 2003)
- Form an oversight committee for this project (July 2003)
- Evaluate the 13 software solutions for print tracking (July 2003)
- Install and test the top 1-3 software packages in a test lab environment (July and August 2003)
- Collect data about current printing situation (July and August 2003)
- Develop survey about attitudes about sustainability, printing practices, etc. (July and August 2003)
- Develop mock version of the *PrintSmart* website (July and August 2003)
- Procure and install the selected finalist software package (August 2003)
- Communicate with campus about the *PrintSmart* campaign (September 2003)
- Finalize *PrintSmart* website (September 2003)
- Execute social norming aspect of the *PrintSmart* campaign (October 2003)
- Report to the Information Technology Policy Board (November 2003)
- Communicate with key groups on campus, such as the Working Group for Campus Sustainability (December 2003)

<u>Community buy-in</u>

This ties in tightly with two aspects of the campaign: anticipating effective strategies for acceptance, and providing ample communication. Both of these aspects have been mentioned earlier (strategies for acceptance were covered in the section introducing the *PrintSmart* campaign, and the importance of communication was addressed in the *PrintSmart* committee membership section just above). Assuming that the committee membership is formed wisely (with political sensitivities in mind), and that they are committed to the importance of community buy-in, this strategic management plan offers many good ideas for convincing Colorado College that the *PrintSmart* campaign is a smart and sustainable step.

Evaluation/Assessment

We must at least attempt to identify criteria for assessment, for how else will we know that the *PrintSmart* campaign is working? Again, the *PrintSmart* planning committee will have an important voice in this process, but some ideas for evaluation are presented below:

- Adequate tracking and logging of data, whatever the source or process, to allow a measure of paper consumption and paper waste
- Find ways of measuring paper consumption over time, in order to see if the implementation of the *PrintSmart* campaign reduces overall printing volume by some percentage
- Find ways of measuring paper waste over time, in order to see if the implementation of the *PrintSmart* campaign reduces abandoned printouts by some percentage
- Design user surveys and/or interview protocols to assess the impact of the social norming campaign on students' attitudes and behaviors toward smarter printing
- Track "hits" on the *PrintSmart* website to see how often it is visited, and which are the most valuable sub-pages

I would like to point out that an important component of the evaluation process should be an openness to midstream corrections to the *PrintSmart* campaign. For example, we might refine our methodology for tracking printing, or we might need to change quota limits for unforeseen reasons, etc. We should be able to use the feedback that we are collecting to improve the *PrintSmart* program. We should also be ready to seize opportunities to evolve the *PrintSmart* campaign, or extend it even further in time. For example, imagine a day when we can integrate interactivity on the *PrintSmart* website for updating *personalized* paper consumption statistics!

Summary

The goal of the *PrintSmart* program is to promote responsible printing and to reduce paper waste. I propose to accomplish this with a three-pronged approach to changing printing practices at Colorado College: implement a print tracking software package that can monitor and/or limit and/or charge for excessive printing; conduct an educational program using social norming strategies to encourage responsibility to campus sustainability; and provide a resource for other tips and strategies for reducing printing and reducing paper waste.

My strategic management plan addresses planning, research, and needs assessment in the formulation of the plan itself for the Colorado College environment. My plan encompasses usefulness and practicability and productivity in its design, so as to maximize the relevance to campus printers. My plan details specific implementation aspects such as preliminary budget estimates and projected timelines. My plan integrates strategies for campus acceptance and it proposes modest ideas to get started on project assessment. And finally, my *PrintSmart* campaign offers references and appendices for more detailed data and bibliography information, for the reader who wants to explore the topic in greater detail.

Annotated bibliography

I have done a good deal of research on this topic, and my complete bibliography is included below. Each entry is briefly annotated to provide a highlight of its applicability and interest to me on this topic. The references can be roughly grouped into four categories: guidelines for writing technical plans; information about social norming; information about sustainability; and information about paper usage and ideas for reducing paper waste. It is my strong desire to use these readings as a starting point for a campus website for the *PrintSmart* campaign.

--- (1992). Reducing paper waste. Futurist, 26 (5), p. 6.
>   *This issue had a short section titled "Tomorrow in Brief." It included a short column on paper consumption trends and a few ideas for how to reduce paper use.*

Anderson, L., & Perry, J. (1994). Technology planning: recipe for success. National Center for Technology Planning. Retrieved on June 8, 2003 from http://www.nctp.com /html/tp_recipe.html.
>   *This is a nice article for covering most aspects of technology planning, beyond the creation of a "technology plan" document. For instance, the authors cover committee representation, progress reporting, setting time frames and target dates, building consensus, and importantly, evaluating the plan. They also include a nice set of references.*

AT&T (2001). Breaking the link: Paper reduction through information technology. Environmental Health and Safety Report. Retrieved on June 4, 2003 from http://www.att.com/ehs/annual_reports/ehs_report/break_link.html.
>   *This is a brief corporate report that talks about how AT&T was able to communicate without paper, as well as store information without paper, and save money in the process.*

Cuthbertson, I. (2002). PC power drains national energy. The Australian, Tuesday, July 23, 2002, p. C11.
>   *This brief business article defines green computing, and it emphasizes the need to blend support for green computing initiatives at both the organizational level and at the individual level.*

Dell (2002). Green computing: Practical tips from Dell to make your computer environmentally friendly. Business Wire, Thursday, November 14, 2002.
>   *Dell Computer Corp. produced a list of ways to be environmentally responsible when using your computer. Most relevant for my topic (printing) was their tip on being a smart printer.*

Environment Protection Authority (2001). Reducing paper waste at work. Retrieved on June 4, 2003 from http://www2.livingthing.net.au/action02/info/paperWaste.pdf.

This brochure is produced by an Australian government agency, and it provides a series of short checklists for auditing printer use, ordering printer supplies more effectively, and printing with less waste.

Environmental Protection Agency (2002). Seventh year wastewise progress report.
   Retrieved on June 4, 2003 from http://www.epa.gov/wastewise/about/results.htm.
      The United States EPA, for the past seven years, has been partnering with businesses and organizations to help them reduce the amount of solid waste they generate. WasteWise is dedicated to fostering a sustainable environment. This lengthy report has useful data and sample programs.

Global Footprints (2003). Reducing paper waste in school. Retrieved on June 4, 2003
   from http://www.globalfootprints.org/teachers/activities/waste/reducing_waste.htm.
      This is a teacher's lesson to use with mid-primary students. It encourages sustainable thinking while assessing children's measuring abilities. It briefly describes a semester-long activity for calculating the school's paper waste and thinking of ways to reduce it.

Greengard, S. (1999). Getting rid of the paper chase. <u>Workforce</u>, <u>78</u>, pp. 69-70.
      While seemingly skeptical about the hope for a paperless office, the author ultimately concludes that some technologies can assist the process of reducing reliance on paper. He also emphasizes that reducing paper waste can do more than save money – it can enhance business practices. He ends with a discussion of employee acceptance.

Hennepin County Environmental Services (2003). Reduce your use of office paper.
   Retrieved on June 4, 2003 from http://www.co.hennepin.mn.us/environmental/
   business/OfficePaper.html.
      Hennepin County, Minnesota offers some ideas for the benefits of using less paper, such as storage, mailing costs, and environmental benefits. They also offer a list of paper waste reduction tips (e.g., printing on both sides, email, reusing old paper for notepads).

Lawrence Berkeley National Laboratory (2003). Cutting Paper: Practical information
   about how to reduce the amount of office paper you use. Retrieved on June 9, 2003
   from http://eetd.lbl.gov/Paper/.
      This is a helpful and fairly comprehensive site for learning about paper types, exploring ideas to put into action, and there is even a section on the admitted problems that may arise when trying to reduce paper use (paper jams, difficulty duplexing faxes, etc.)

LePendu, P. (2002). Paper waste and social norming. Retrieved on June 4, 2003 from
   http://people.whitman.edu/~lependpj/printer_tracker/presentation.ppt.
      Whitman College implemented a tracking system that allowed them to query each printer, generate graphs of printer usage, and publish the files on a website for an educational awareness campaign. They modeled their campaign after the social

norming literature in an attempt to supply the correct perception in order for that perception to influence students' behavior.

McCarthy, S. (2000). How to write a technology implementation plan. Hyperion Ltd. Retrieved on June 8, 2003 from http://www.hyperion.ie/How%20to%20Write%20a% 20 Technology%20Implementation%20Plan.PDF.
> *The author emphasizes that writing technology implementation plans (or TIPs) is not always a fun project, but it is an important one that can be used by the powers-that-be as a tool for assessing research and development, and to identify exploitable results. He has a few practical guidelines for writing a TIP in this short article.*

Mississippi State University (1996). Guidebook for developing an effective instructional technology plan (version 2.0). Prepared by graduate students in Dr. Larry Anderson's "Seminar in Planning for Instructional Technology." Retrieved on June 8, 2003 from http://www2.msstate.edu/~lsa1/nctp/Guidebook.pdf.
> *This 45-page guidebook is a very comprehensive resource for anyone preparing a strategic management plan. This resource was located by EDUC230 classmate Peggy Bird, and I plan on reviewing its recommendations as I prepare my SMP.*

Muhtar, F. (2003). Reducing printing cost with remanufactured cartridges. New Straits Times Press (Malaysia), Monday, April 21, 2003, p. 34.
> *Many businesses are looking to reduce printing costs, and one way that this can be accomplished is to use remanufactured toner cartridges, which are usually 30-50% cheaper than original toner cartridges.*

National Social Norms Resource Center (2003). Social norms: An introduction. Retrieved on June 8, 2003 from http://www.socialnorm.org/.
> *This website is one of many on the topic of social norms, but it provides a helpful introduction to the topic, and it shares examples of social norming in use for alcohol awareness, etc.*

Sarantis, H. (2002). Business guide to paper reduction: A step-by-step plan to save money by saving paper. Forest Ethics. Retrieved on June 4, 2003 from http://www.forestethics.org/pdf/reduce.pdf.
> *This is a very detailed (67-page) report organized around case studies of the Bank of America, AT&T, Nike, Alameda County, and the Moore Foundation. Section Two supplies a step-by-step guide for reducing paper consumption with some very helpful elements to review for the SMP assignment.*

See, J. (2001). Developing effective technology plans. National Center for Technology Planning. Retrieved on June 8, 2003 from http://www.nctp.com/html/john_see.html.
> *This is a short but clearly written article on developing technology plans. It emphasizes the short-term focus (don't try to predict out too far in time), and I also appreciated the comment that an effective technology plan be outcome-based, not input-based (focus on applications, not the technology itself).*

Sellen, A. & Harper, R. (2002). <u>The myth of the paperless office</u>. Cambridge, MA: The MIT Press.

> *This book discusses research conducted over the past few years on why and how paper is used. They share many helpful insights into our continuing reliance on paper. However, their thesis is that while paper will continue to occupy an important place in office life, it will increasingly be used in conjunction with electronic options.*

University of Delaware (2003). PrintLess: Save a tree. Retrieved on June 9, 2003 from http://www.udel.edu/topics/printless/.

> *This is a fabulous site from an academic institution that models something similar to what I would find suitable for Colorado College. It's helping me to frame the specific nature of my SMP, or at least envision the scope of what I could help accomplish at my campus.*

University of Limerick (2001). CSIS Department pilot paper saving scheme. Retrieved on June 4, 2003 from http://www.ul.ie/envirocom/CSIS%20DEPARTMENT%20PILOT %20PAPER%20SAVING%20SCHEME.doc.

> *The Information Services Department at this Irish university describe their pilot project for reducing paper consumption and increasing awareness of the benefits of saving paper. Their idea of implementing a pilot project before tackling implementation at their entire university is a particularly helpful idea.*

Waste Prevention World (2003). California business waste reduction: Office paper reduction quick tips. Retrieved on June 9, 2003 from http://www.ciwmb.ca.gov/ BizWaste/OfficePaper/QuickTip.htm.

> *This site has a wealth of information, but the quick tips are especially well organized into categories such as policy considerations, education, printing improvements, document creation, reuse, etc.*

Working Group on Campus Sustainability (2003). Colorado College. Retrieved on June 6, 2003 from http://www2.coloradocollege.edu/Sustainability/welcome.htm.

> *This website presents the purview of the Colorado College working group on campus sustainability, appointed in the summer of 2002. There are a few helpful links to projects, publications, and such.*

Wright, E. P. (2002). The ecological footprint of The Colorado College: An examination of sustainability. Retrieved on June 7, 2003 from http://www2.coloradocollege.edu/ Sustainability/EcoFootprint.pdf.

> *This 23-page report includes an analysis of the ecological footprint for the main Colorado College campus during the 2001-02 academic year. The main categories of impact included in the analysis were electricity, water, heating, transportation, and food. Detailed calculations are included in the appendices, and ideas for future analyses are also presented.*

Appendices

Appendix 1: CC Mission Statement from May 2003

Mission: At Colorado College our goal is to provide the finest liberal arts education in the country. Drawing upon the adventurous spirit of the Rocky Mountain West, we challenge students, one course at a time, to develop those habits of intellect and imagination that will prepare them for life-long learning and leadership as responsible citizens of the world.

Core Values: As members of the Colorado College community, we commit ourselves to

- honor the life of the mind as the central focus of our common endeavor;
- value all persons and their diverse origins, experiences and perspectives;
- practice intellectual honesty and live with integrity;
- serve as stewards of the traditions and resources of Colorado College;
- encourage engagement and social responsibility at local, regional and global levels;
- seek excellence, constantly assessing our policies and programs

Our Promise of Distinctive Experience: Colorado College succeeds in its mission of educating for our time when it graduates women and men with mental agility and the skills of critical judgment, persons who have learned how to learn. Taking advantage of small classes and the unique learning opportunities of the Block Plan, Colorado College provides a variety of stimulating environments for intellectual development, creative expression, and personal growth. In the studio and on the stage, in classroom and library and laboratory, in residence halls and on playing fields, in the local community and in foreign countries, the College confronts students with unfamiliar perspectives and new possibilities of thought and action. We explore with them the complexities of the natural world, the achievements of the human past, and the urgent social and moral issues of the present. We teach them how to recognize relevant evidence in various fields of inquiry and how to weigh that evidence. We press them to read carefully, think critically, reflect thoughtfully, and express their ideas effectively, with precision and grace. We encourage their personal quest for a worthy vision that can inspire both action and hope and will enable them to help create a more humane world.

Colorado College is distinctive in its conviction that active learning happens best when students pursue a single subject of study for several weeks in small classes in which no ticking clock can interrupt the animated exchange of ideas. We are confident that the learning opportunities made possible by our distinctive curricular system foster a kind of intellectual engagement that will continue to enrich the lives of Colorado College graduates as they become leaders in their professions and communities.

<u>Appendix 2: Colorado College Sustainable Computing Policy from May 2003</u>

PROPOSED

Sustainable Computing Policy
Colorado College
May 2003

Computers and related technology profoundly impact Colorado College, from learning and business processes to the budget and the environment. The concept of "sustainable computing" considers the total cost of ownership, the total impact, and the total benefit of technology systems. Consider:

- All computer and server inventory growth has associated costs, including staff time and support, software licensing, and infrastructure support (bandwidth, servers, hubs, wiring, etc.).
- All old inventory buildup comes with associated risks, including increased repair time, increased maintenance costs, security holes, and inefficient operation.
- All growth, whether the equipment is new or old, requires planning for future lifecycle replacements of both the computer and the infrastructure supporting it, as well as environmentally responsible methods for disposing of old equipment.

It is imperative that the College practice sustainable computing, using a policy which:

- Directs new equipment purchases;
- Maintains a reasonable lifecycle for computers, peripherals, and network equipment;
- Limits inventory growth;
- Governs energy-saving computer use;
- Plans for future donation, recycling, and disposal of equipment.

The College's computer and peripheral (printers, scanners, etc.) inventory has grown at a rate of 10-20% annually for at least the last six years. Currently, departments are individually responsible for tracking and updating all technology equipment, often leading to imbalances or oversights and, therefore, lost productivity and extra costs. Many other schools – and most corporations – centrally manage information technology resources to ensure that those resources receive adequate support, that everyone has relatively up-to-date and appropriate equipment, and that technology resources are purchased, employed and disposed of responsibly.

To that end, Information Technology Services (ITS) and the Information Technology Policy Board provide the purchasing, lifecycle, energy-use, and recycling policies below, to help the College consider long-term effects of technology decisions, plan efficient growth, and maintain a commitment to reducing waste.

Purchasing and Support

1. Information Technology Services fully supports all standard, Colorado College-owned computers purchased through ITS within the last five years. Nonstandard, on-campus, College-owned computers will still be fully supported, if they received prior approval from the Help Desk Manager, but nonstandard computers are exempt from the Help Desk's 48-hour repair policy and may incur extra repair expenses. Full support includes assisting with and repairing the standard software and hardware installed on the computer when it was first delivered to the user, but it does not include assistance with subsequent software or hardware installations not performed by ITS

2. All computers with the standard ITS software and hardware configuration that are purchased for home use through ITS with grant, faculty development or special project funds, will be fully supported, but users must bring the computers to the Help Desk for repair. The Help Desk provides limited support for all home users affiliated with the College, whether or not they have standard computers. Limited support includes phone and email assistance with connecting to the College network and giving advice and suggestions for troubleshooting.

3. All off-campus computers varying from the standard image but purchased through ITS must have at least a 3-year manufacturer's warranty, and all software and hardware support and repair will be entirely the manufacturer's and user's responsibility. The Colorado College bookstore provides discounted versions of College-licensed software, such as Microsoft Office, and users buying nonstandard computers should purchase additional software there or from another vendor. As with all home users, the Help Desk will provide limited phone and email support.

4. Anyone wanting to purchase a nonstandard computer with College funds should consult with the vendor's phone sales line or website, generate an electronic or paper quote, and then give that quote to the ITS purchasing coordinator. ITS will then arrange the purchase and delivery.

5. All peripherals (scanners, printers, etc.) and extra parts (monitors, external drives, etc.) purchased through ITS for on-campus use will receive Help Desk support for the duration of that peripheral's or part's warranty. ITS will attempt to standardize peripheral and part purchases so the College buys high-quality, consistent hardware with long-term warranties. Hardware and software support and repair of peripherals and extra parts purchased for off-campus or home use will be entirely the manufacturer's and user's responsibility. As with all home users, the Help Desk will provide limited phone and email support.

Lifecycle Replacement and Inventory Growth

1. The College will maintain a four-year lifecycle for all College-owned computers and peripherals, ensuring that each computer, printer and scanner is replaced with

a new system every three to five years, on average.[1] The College Equipment Committee will manage a centralized budget pool to fund lifecycle replacements. Departments should request technology equipment from this pool, rather than the annual budget process.

2. All new computers or peripherals from the lifecycle pool must replace an existing system, but departments may "cascade" computers or peripherals (i.e., give a new computer to one user, give his/her used but still supported computer to another user, and remove the oldest system). Whenever one new computer or peripheral is delivered to a department, that department must give one old computer or peripheral, originally purchased by the College, back to ITS. Any equipment not returned constitutes a net addition and requires Equipment Committee approval.

3. The Equipment Committee must approve all net additions to the inventory, excepting computers used to run lab equipment. Departments purchasing lab equipment computers should do so in consultation with ITS and the Equipment Committee. This committee also oversees any requests for new server capabilities.

4. All net additions to the inventory approved by the committee must come out of department funds using the annual budget request process. The lifecycle pool must increase in proportion to all inventory growth. Any net additions purchased with grant or special project funds also necessitate an increase in the lifecycle pool, unless the grant includes regular lifecycle replacement or the computer runs lab equipment.

5. Departments using computers to run lab equipment or otherwise employing older computers are exempt from the four-year average lifecycle policy, as well as review by the Equipment Committee. New computers running lab equipment should carry warranty support from the manufacturer. If old lab equipment computers fail, ITS will replace them with a computer otherwise intended for donation, provided one is available. ITS will replace, not repair, old computers.

Energy-Saving Computer Use

1. All campus computers should employ built-in power-saving features such as Standby or Hibernate, sending them into a reduced power use mode after 30 minutes of inactivity.

2. Computers should normally be left powered on, day and night during the week, as long as they are employing Standby or Hibernate modes. They should be turned off during weekends or whenever they will not be used for a day or more.

3. Computer and technology equipment purchasing should prioritize energy-saving equipment, such as LCD (i.e., flat panel) monitors, which use half the power of a standard CRT display, and network printers with built-in power save modes. ITS will prioritize purchasing recyclable, environmentally friendly equipment.

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[1] With an inventory of approximately 1300 desktop and laptop computers (3-4 years) and 140 networked printers (4-5 years), the College will need to budget approximately $432,000 - $573,000 annually.

Recycling and Disposal

1. **Donations**: ITS will donate or recycle all old computers and peripherals. ITS prioritizes donations as follows: (1) donation to non-profit educational institutions; (2) donation to other non-profit organizations; (3); gifts to for-profit organizations or companies committed to environmentally sound recycling or disposal.

2. **Recycling**: If ITS cannot find institutions that will accept donations, or if computers or components are not functioning, ITS will give them to organizations or companies committed to repairing, selling or responsibly recycling or disposing of technology equipment.

3. **Other Computer Recycling**: ITS will assist those affiliated with the College in donating or recycling their personal computers or peripherals. Individuals should bring old computer equipment to the Help Desk for donation or recycling.

This is a working document and may be revised with the approval of the Information Technology Policy Board.

Appendix 3: ITS Statistics for Incoming First Year Students
Academic Year Fall 1999 to Fall 2002

|		Fall 1999	Fall 2000	Fall 2001	Fall 2002
Survey Statistics					
Total First-Year Students		483	536	479	482
Total Students Completing Survey		238	374	377	339
Response Rate		49.2	69.8	78.7	70.3%
		Fall 1999	**Fall 2000**	**Fall 2001**	**Fall 2002**
Questions	**Responses**				
Students bringing Personal Computer to CC	Yes	80.7	85.8	90.6	91.5
	No	19.3	14.2	9.4	8.5
Kind of Computer Brought to CC	PC	75.7	79.6	82.9	81.3
	Mac	2.0	11.3	9.6	11.3
	Other	2.7	7.2	4.5	5.3
	I don't know	1.6	1.9	3.0	2.0
	Desktop	53.8	43.0	33.2	22.3
	Laptop	45.1	56.6	65.6	77.0
	Both	1.1	0.3	1.2	0.7
Age of computer	New for college		77.7	71.4	78.4
	1-2 years old		14.2	11.1	13.8
	3+ years old		7.2	5.6	6.2
	I don't know		0.9	1.3	1.6
Software applications that students know how	Word Processor	97.5	91.0	97.7	99.7
to use upon entering college	Spreadsheet	85.3	53.8	65.3	84.4
	Presentation	70.6	42.1	48.9	83.4
	E-Mail/Organizer	69.1	71.5	81.3	92.3
	Web Browser	82.8	80.4	88.6	95.8
	Web Authoring	12.3	14.1	17.6	40.1
	Other	5.4	7.9	6.0	25.6
Impression of CC's website	Very Favorable	11.8	7.1	6.2	10.7
	Favorable	39.8	41.8	45.7	48.2
	Neutral	19.0	29.6	31.4	28.3
	Unfavorable	2.7	3.0	3.5	3.3
	Very Unfavorable	0.9	0.5	0.5	1.3
	I don't know	25.8	17.9	12.7	8.1
Impression of CC's public labs?	Very Favorable	15.7	12.5	10.4	13.3
	Favorable	46.5	50.8	50.8	49.7
	Neutral	20.3	24.2	27.0	25.3
	Unfavorable	0.0	3.3	2.2	4.2
	Very Unfavorable	1.8	0.3	0.0	0.6
	I don't know	15.7	9.0	9.6	6.8
Impression of "CC Bound?"	Very Favorable		16.5	17.9	16.9
	Favorable		40.7	42.9	42.7
	Neutral		26.4	25.0	30.3
	Unfavorable		3.6	2.7	2.6
	Very Unfavorable		1.6	0.8	0.7
	I don't know		11.3	10.6	7.2
Students who brought the following to CC:					
E-Mail Account			79.3	84.4	89.2
Personal Printer			58.9	63.6	68.8
Cell Phone			18.0	34.5	65.8
Palm Pilot			4.6	10.5	14.7

Source: Collected from the Office of Institutional Research and based on data collected from the First Year Survey, which is currently being administered every year.

Office of Institutional Research, 01-29-03

Appendix 4: Data on printer growth, paper consumption, etc.

I have begun to gather Colorado College campus data on historical trends. The data doesn't go back as far as I would like, and there are admittedly some gaps, but I am continuing to work with various campus offices in an attempt to gather more complete information.

Appendix 4.1: Networked printer growth (1997-2003)

Figure that shows networked printer growth for two print servers on campus. Print server 1 hosts the departmental (non-lab) networked printers. Print server 2 hosts the public computer lab printers.
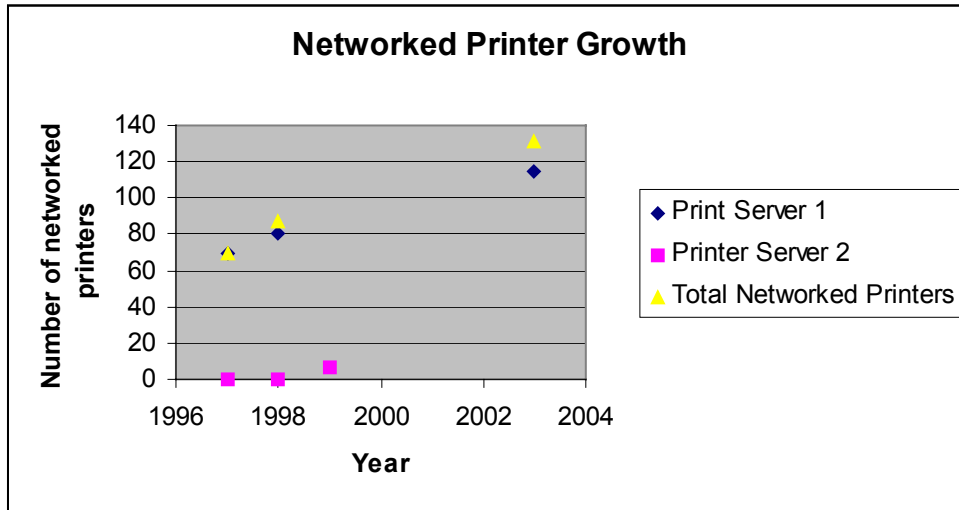
The growth in networked printers on campus is up 46% in 2003 compared with 1997. At the moment, we are missing data from the years 1999-2002, but we are working to recover that information so that we can see the complete growth trend.

Appendix 4.2: Paper consumption for computer labs (1999-2003)

Table that shows paper consumption for ITS computer labs over 4 academic years:

Budget Year	Date	Cases	Unit Price	Total Price	No. Reams	No. Sheets
1999-2000	8/25/1999	20	$23.99	$479.80	200	100000
1999-2000	10/25/1999	20	$23.99	$479.80	200	100000
1999-2000	11/30/1999	20	$26.02	$520.40	200	100000
1999-2000	2/11/2000	20	$21.37	$427.40	200	100000
1999-2000	3/15/2000	20	$21.18	$423.60	200	100000
1999-2000	4/24/2000	20	$21.73	$434.60	200	100000
2000-2001	7/7/2000	20	$20.63	$412.60	200	100000
2000-2001	10/6/2000	20	$21.56	$431.20	200	100000
2000-2001	12/14/2000	20	$22.12	$442.40	200	100000
2000-2001	3/13/2001	20	$21.56	$431.20	200	100000
2000-2001	4/17/2001	20	$21.56	$431.20	200	100000
2000-2001	5/15/2001	20	$21.56	$431.20	200	100000
2001-2002	8/29/2001	20	$21.00	$420.00	200	100000
2001-2002	9/28/2001	20	$21.00	$420.00	200	100000
2001-2002	11/9/2001	20	$20.72	$414.40	200	100000
2001-2002	12/11/2001	20	$20.72	$414.40	200	100000
2001-2002	1/22/2002	20	$20.72	$414.40	200	100000
2001-2002	2/22/2002	20	$20.72	$414.40	200	100000
2001-2002	4/23/2002	20	$19.88	$397.60	200	100000
2001-2002	5/14/2002	20	$20.72	$414.40	200	100000
2002-2003	8/28/2002	20	$20.72	$414.40	200	100000
2002-2003	10/4/2002	20	$20.72	$414.40	200	100000
2002-2003	11/5/2002	20	$21.84	$436.80	200	100000
2002-2003	11/25/2002	20	$21.84	$436.80	200	100000
2002-2003	12/20/2002	20	$21.84	$436.80	200	100000
2002-2003	2/12/2003	20	$21.84	$436.80	200	100000
2002-2003	3/5/2003	20	$21.84	$436.80	200	100000

Summary information from this table:

The average price for a case of paper over the time span of four years was $21.61. The cost of paper generally decreased over time.

In each budget year, the total cost of computer lab paper was between $2600-$3300. At this time, I have no data on the cost of toner cartridges or printer maintenance. It is interesting to note, however, that the cost of paper is just a fraction of the overall "computer lab paper budget" that has been established (at $10,000) over the past four years.

The figure below shows a modest trend toward increased paper consumption, especially during the 2001-02 academic year. Paper consumption actually decreased during the current academic year compared to last year.

Colorado College Paper Consumption
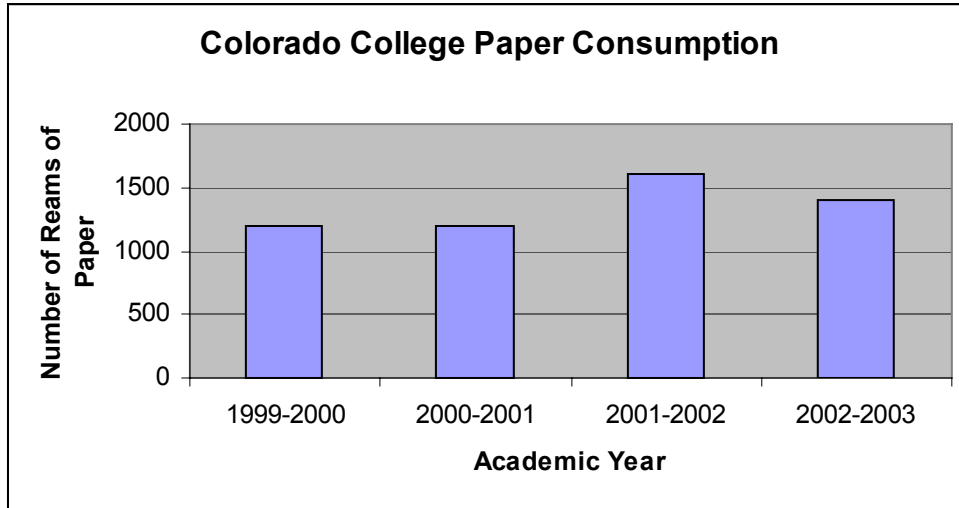
As you can see, our anecdotal sense of the drastic trend in paper consumption at Colorado College is not as severe once we collect the data.

Appendix 5: Highlights of each print tracking software package

1. PRINT MANAGER PLUS BY SOFTWARE SHELF
  www.printmanagerplus.com
  Cost: $596.25 per server (Academic pricing including one year maintenance)
  All platforms supported
  30-day evaluation available
  Budget and quota users by $ Amount, Pages, Copies, and File Type
  Billing abilities, complete reporting abilities
  Users can be warned when getting close to quota limit
  Customizable error messages

2. PCOUNTER BY A.N.D. TECHNOLOGIES
  www.andtechnologies.com/pcounter.html
  Cost: $695 per server
  See brochure (available on website) for more detailed information
  60-day evaluation available

3. WATCHDOG PRINT
  www.adiwatchdog.com
  Cost: $500 per server
  Unclear as to whether only does monitoring or can be used to assign quotas
  30-day evaluation available.

4. PRINT CONTROL
  www.northern.net/printControl/
  Cost: $695 (1 server and 5 printers) – would only be effective in labs
  Uses quota system to allow printing
  Customizable error messages for different cases
  Cost can be set per printer
  Quota reset monthly
  Creates reports including cost analysis
  30-day evaluation available
  Brochure available
  Most cost options available but need to call.

5. PRINT QUOTA MANAGER
  http://www.ig.com.au/PrintQM.htm
  Cost: Must call for information
  Full integration with Microsoft Windows NT
  Limits printer use by print server, print device, user, or group

6. PAPERCUT
  www.papercut.biz
  Cost: $299 for 10 clients – Unclear as to whether client is a workstation or server

Uses invoice reports for billing – NOT SUITABLE FOR Colorado College
30-day evaluation available

7. VENDPRINT
www.vendprint.com
Cost: Unclear
Uses release stations (big plus)
Various perks such as free number of pages, free printing from certain websites
Gives number of pages and number of copies on release stations
Offers administrative abilities from certain machines
Data reports stored as comma delimited – easy to create reports in EXCEL
Works on all platforms (including Novell)
Uses smart card, magnetic stripe, coins for release
Demo may be available – form to be filled out online

8. UNIPRINT
http://www.pharos.com/Products/Uniprint.asp
Cost: No pricing information available
Uses release stations
Displays print job vital statistics (number of pages, copies, finishing details etc.)
Can use magnetic stripe for charging or other authentication
Works on all windows platforms
Brochure available at http://www.pharos.com/docs/HE_Uniprint.pdf
List of resellers at http://www.pharos.com/Resellers/ResellersAmericas.asp

9. HOMEGROWN SOLUTION BY WHITMAN COLLEGE
http://wcts.whitman.edu/news/paperwaste/paperwaste.html
Cost: Free, assuming some code shared by liberal arts colleagues
Time needed by CC ITS staff in order to learn some new scripting
SNMP, Perl, and graphing tools applied to newer HP networked printers

10. MICROSOFT SOLUTION
No URL at this time
Cost: Free, assuming that we only desire minimal tracking options
Time needed by CC ITS staff in order to learn the Microsoft interface

11. PRINTLOG & PAGECOUNTER
http://www.equitrac.com/
Not very promising from first look
Lack of clear information from the website

12. GOPRINT
www.goprint.com
No software installed on workstations or fileservers
Self-service vending machine for print jobs
Unsuitable for Colorado College - uses expensive print charging stations

13. PRINT MANAGER PLUS BY SUNBELT SOFTWARE

http://www.sunbelt-software.com/product.cfm?id=668
Cost: $795 per server with one year of maintenance included
Works on all platforms (Windows, DOS, Mac, Unix, etc.)
Free evaluation download available

14. PRINTWATCH

www.prnwatch.com
Cost: $69.95
Brochure available
30-day evaluation available
Only a monitoring software – has very limited charging abilities – see brochure

Appendix 6: Other strategies for reducing paper waste

I have researched many other ideas for reducing paper waste on college campuses, and I have given a lot of thought to ideas that might work particularly well for Colorado College. I have organized these strategies into three parts: benefits of reducing paper waste; specific tips for reducing printing waste; and infrastructure changes needed to encourage waste reduction.

Appendix 6.1: Benefits of reducing paper waste

- Easier storage and handling if less paper is being bought – more space is available to store items other than printer paper
- Reduced mailing costs of using fewer sheets (e.g., double-sided printing is less weight)
- Reduced "lost" documents from mismanaged filing systems
- Environmentally sound (conservation of resources, reduction of water and energy use, prevention of pollution)
- Weight reduction of paper being carried around by students and staff (assuming that less is printed, and that more is printed double-sided)
- Waste reduction is more cost-effective than recycling because it reduces the amount of paper that needs to be collected, transported and processed.
- Waste disposal costs would be reduced
- Money saved on paper costs, toner costs, printer maintenance, and life cycle replacement of printers
- Think in terms of categories of benefits: improve internal operations; improve efficiency and reduce costs; earn a reputation for being environmentally conscious

Appendix 6.2: Specific tips for reducing printing waste

- Check the default settings of your word processor
    - Use single-spacing rather than double-spacing whenever possible
    - Check the margins – do they need to be as large?
    - Check the font – could you use a 10-point font instead of larger?
    - Use Print Preview for editing, rather than printing drafts
    - Use Print Preview to make sure that you won't waste a final piece of paper for a trailing line or two of your text
- Think twice before printing something off the web – do you really need it?
    - Consider bookmarking the page
    - Consider saving the page, site, or file to your hard drive
    - Beware of a website that relies on frames, or you may not print what you need
    - Check the length before printing – it may be much longer than you realize
    - Copy the subsection of the website into a word processor
    - Check for a "Print-Friendly" version of the site if you must print it, as this is often more efficient and avoids graphics-intensive banners and commercial ads
- For Adobe .pdf files and other articles from online library databases, watch printing

- o Use Print Preview in your web browser whenever possible
- o Note the article length
- o Read the article on-screen if at all possible (only print if it's longer than a certain threshold, like 5 or 10 pages)
- o Use Adobe Acrobat Reader's print feature, and NOT the print option from within the File menu of your web browser
- o Check for a "Print-Friendly" version of the article to reduce paper waste
- Print double-sided whenever possible
- Solidify file management strategies, both electronically and physically
  - o Set up an electronic folder system to organize your documents
  - o Keep track of file versions as you move from work to home and back
  - o Don't print copies of your files in order to compare drafts – check file details for attributes like file size, data last modified, etc.
  - o Don't print extra copies of your files in order to replace your lost physically-filed copy – spend a few extra minutes looking for it and improving your system
  - o Maintain the organization of your file management system on a regular basis – at least weekly or monthly
- Don't print as many drafts of your documents
  - o Use Print Preview instead
  - o Use Microsoft Word's "Track Changes" feature when collaborating on a document
- Archive your email messages instead of printing hard copies
- Use email to share documents and ideas (instead of printing)
- For short memos that you must print, consider using half- or quarter-sized sheets
- Reuse paper that's already printed on one side
  - o Manually feed it into printers and copiers and fax machines
  - o Use it for draft documents, and save virgin paper for final manuscripts
  - o Use it for short-lived items (meeting agendas, temporary signs, etc.)
- Minimize misprints
  - o Check your default printer location before printing
  - o Check for a diagram on how to load special paper (like letterhead)

Appendix 6.3: Campus infrastructure changes to encourage paper waste reduction

- Support a culture of sustainability, encouraging both personal accountability and institutional commitment
- Buy duplex printers, perhaps with a discount for printing double-sided documents
- Buy remanufactured toner cartridges, and recycle used toner cartridges
- Post signs/diagrams on printers to demonstrate proper loading techniques for special paper (like letterhead)
- Collect one-sided printing paper to be reused, and post bins where users can pick it up (presumably at no cost)
- Recycle double-sided printouts that are no longer needed
- Create notepads and scratch pads from recycled paper

- Rely on a culture of email for sharing community messages
- Circulate memos rather than making individualized copies for each staff member
- Encourage the use of shared network printers rather than personal printers for each individual faculty or staff member (it's a healthy option in terms of exercise and ergonomics)
- Think of creative solutions to the privacy issue (e.g., when a faculty member has to print a sensitive document on a public departmental printer)
- Purchase recycled paper stock whenever possible, and order in bulk to minimize packaging waste (not to mention securing a better volume discount)
- Consider several paper suppliers and find out how they encourage paper waste reduction in their own organization
- Set targets for reducing paper use and track data to see how various departments are doing in achieving the goals
- Provide incentives for successful paper reduction (e.g., donate savings to charity; give percentage of savings to the department who achieves the greatest reduction; etc.)
- Consider implementing print monitoring/quota software to track campus printing trends, notify "abusers," and possibly charge for printing
- Recognize that some apparent waste reduction strategies simply shift the burden from one office or budget source to another (e.g., departments post readings online, thus eliminating the need to photocopy course packets; however, students generally print the readings out, often several times, so printing costs might actually be increased, not reduced)

<u>Appendix 7: Listing of paper conservation websites at other colleges</u>

This is by no means an exhaustive list of academic institutions who are attempting to conduct some sort of green computing or efficient printing campaign. However, based upon detailed attempts at searching for such examples during the early summer of 2003, it does not yet appear that smart printing is the "norm" in higher education. The list below is a nice array of different approaches to the topic, from simple statements to aggressive campaigns, from informational postings to environmental analyses.

Whitman College Technology Services
Before you click PRINT, Think! Do you really need it?
http://wcts.whitman.edu/news/paperwaste/paperwaste.html

University of Delaware IT-User Services
PrintLess: Save a Tree
http://www.udel.edu/topics/printless

Colby College Information Technology Services
"Green Computing" @ Colby
http://www.colby.edu/info.tech/green/reduce_printing.html

University of Limerick CSIS Department
Pilot Paper Saving Scheme
http://www.ul.ie/envirocom/CSIS%20DEPARTMENT%20PILOT%20PAPER%20SAVING%20SCHEME.doc

Swarthmore College Information Technology Services
Paper Conservation Campaign
http://www.swarthmore.edu/its/news/eeitems/120

Macalester College Environmental Studies Program
Campus Paper Waste Reduction Project in 2000
http://www.macalester.edu/environmentalstudies/Audits/audit2000_paperwaste.htm
And a Follow-Up in 2001
http://www.macalester.edu/environmentalstudies/Audits/audit2001_paperwaste.htm

Guilford College Environmental Studies Program
Green Campus Initiative: Personal Printing Survey
http://www.guilford.edu/original/academic/envst/Footprint2002/PaperF02/data_and_research.htm