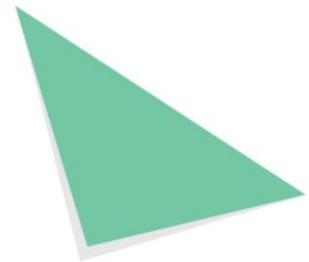# Two Sides Facts

The Myth: Electronic communication is more environmentally-friendly than print and paper.

The Fact: Not necessarily. E-media also has environmental impacts.

Go paperless, go green and save trees are common themes these days as many corporations and governments encourage their customers and employees to switch to electronic transactions or communications.   But are appeals to help the environment by eliminating paper based on sound science or on marketing strategies aimed at cost cutting?

Organizations that truly want to make responsible environmental choices should do so based on rigorous, factual and verifiable life cycle assessments of each alternative. Rather than asking which is better, paper or electronic communication, we should be working to figure out which combination of the two has the least impact on the environment while best meeting social and economic needs.


All cited facts are quoted directly from the source unless otherwise noted. Where indicated, Two Sides U.S. has summarized lengthy information, but links to original sources are provided in the footnotes. Information in brackets was added by Two Sides U.S. for clarification purposes.

What constitutes a credible environmental claim?

* Environmental marketing claims about any product should be factual, verifiable and ideally backed up by reliable scientific data[1].

* In order to adequately substantiate environmental marketing claims, the [Federal Trade Commission Green] *Guides* advise marketers that they will need competent and reliable scientific evidence. The *Guides* currently define competent and reliable scientific evidence as "tests, analyses, research, studies or other evidence based on the expertise of professionals in the relevant area, conducted and evaluated in an objective manner by persons qualified to do so, using procedures generally accepted in the profession to yield accurate and reliable results. Since the last *Green Guides* review, the Commission has clarified this standard, stating that such evidence "should be sufficient in quality and quantity based on standards

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[1] Terrachoice, 2010.

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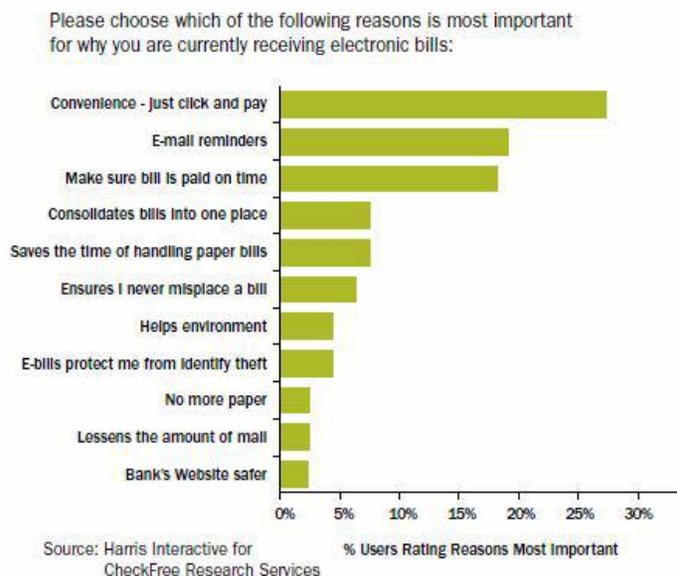story to tell

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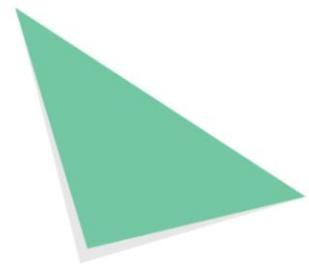
generally accepted in the relevant scientific fields, when considered in light of the entire body of relevant and reliable scientific evidence, to substantiate that a representation is true."[2] [3]

- An environmental claim that is vague or non-specific or which broadly implies that a product is environmentally beneficial or environmentally benign shall not be used. [4]

What is driving marketing strategies that urge consumers to "go paperless and save trees" and how can unsubstantiated claims be corrected?

- Key Business Drivers of Paperless Billing. Providing and promoting e-bills positively impacts a biller's cost-to-serve, retention, customer satisfaction and cross-selling opportunities, regardless of the distribution channel. When billers consider the investment necessary to achieve their e-bill penetration potential and returns, they have primarily focused on cost savings. Across industries, billers can expect to save money by digitizing paper billing processes and formats, which include the cost of paper, postage, labor and equipment. The exact cost savings depends on the biller and the bill. For example, according to ESP Consulting, telecommunications companies can expect to save 45 percent per bill, while credit card companies save 37 percent when a paper bill is converted to an e-bill.

Please choose which of the following reasons is most important for why you are currently receiving electronic bills:

Convenience - just click and pay
E-mail reminders
Make sure bill is paid on time
Consolidates bills into one place
Saves the time of handling paper bills
Ensures I never misplace a bill
Helps environment
E-bills protect me from identity theft
No more paper
Lessens the amount of mail
Bank's Website safer

0% 5% 10% 15% 20% 25% 30%

Source: Harris Interactive for CheckFree Research Services

% Users Rating Reasons Most Important

Convenience, time savings, access, clutter reduction, environmentalism and ID theft prevention provide measurable value to online customers.   E-bills offer different value propositions to different consumer segments (see adjacent figure). [5]
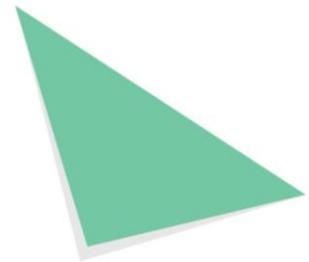
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[2] U.S. FTC, 2010.
[3] US FTC, Guide for the use of environmental marketing claims.
[4] ISO, Standard 14021:2001.
[5] CheckFree Research Services, 2007.

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- The digital revolution, particularly the rise of mobile computing, has made 'e' almost synonymous with 'free'. The cost of virtual information is no longer paid on an item by item basis (though there are some exceptions, notably music), but largely through hardware capital and running costs. This shift in the financial model of information provision has huge implications for the paper industry. For many paper users, such as advertisers, the digital world enables them to make massive savings by shifting from production of multiple copies of their work to release of a single globally accessible copy. In the case of online billing and finance, cost savings are combined with functional improvements. The finance industry has also tapped into people's desire to be environmentally-friendly by associating the shift from paper to online billing with 'saving trees'. [6]

- *(Two Sides Summary)* A recent study by Two Sides UK found that 43% of telecommunications companies, 70% of banks and 30% of utilities in the United Kingdom were making unsubstantiated claims about the environmental benefits of electronic billing. In response, Two Sides initiated a campaign to educate leading UK CEOs and their corporate general counsels on the sustainability of paper and to encourage them to abandon misleading environmental claims. Of 33 companies contacted, 27 either changed their online environmental claims or are working with Two Sides to develop language that does not contain misleading or factually incorrect environmental claims about the use of online transactions and communications.[7]
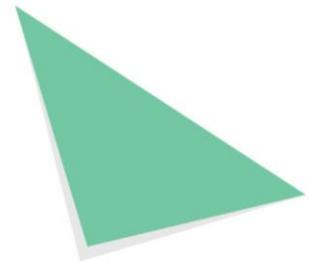
Does going paperless save trees?

- *(Two Sides Summary)* No. In fact the opposite is true. By providing a market for responsibly grown wood fiber, the U.S. paper industry encourages forestland owners to continue managing their lands rather than selling them for development or other non-forest uses. The message that "going paperless saves trees" is misleading because it links paper to deforestation, i.e. the permanent removal of forest. In the United States, however, the paper industry encourages and depends on sustainable forest management practices that regenerate billions of trees annually.

- Deforestation implies a change in land cover from forest to non-forest land, whereas sustainable wood production involves cyclical harvesting and growing.[8]

- Deforestation is the permanent clearing of trees for purposes such as creating farmland and pasture land, for commercial and residential development, or for any other use for which trees are cut and not allowed to grow back. Paper companies and others in the forest products industry are actively reforesting. They not only allow trees to grow back, they actually encourage new growth by replanting and caring for new trees,

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[6] Haggith, M., 2010.
[7] Two Sides UK press release.
[8] IEA, Bioenergy Task 38, 2001.

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and by creating forest land in areas where it previously did not exist. Unfortunately, deforestation is occurring in many parts of the world, especially in the tropics. This deforestation is mainly due to population pressure. In most of these cases, forests are cut down and burned for domestic fuel (heating homes and cooking) or to clear land for farming.[9]

- Reduced demand for virgin fiber does not translate directly into reduced pressures on forests. In the case of private forest land, the harvesting of trees to meet demand for forest products provides income to landowners that helps reduce the incentives to convert forestland to other uses. Pressures to convert forests to non-forest uses may increase if the market for wood fiber declines Therefore, if one is concerned about keeping land in forest rather than wood use *per se*, activities that reduce the demand for virgin fiber can actually cause detrimental effects.[10]

- The income landowners receive for products grown on their land encourages them to maintain, renew and manage this valuable resource sustainably. This is an especially important consideration in places facing economic pressures to convert forestland to non-forest uses.[11]

- Changing forest ownership patterns, and the divestiture of large tracts of forest land by traditional forest management companies in particular, are important trends to consider when analyzing the loss of forest lands. A number of studies have shown that managing forests for timber production can enhance biodiversity and other ecosystem services in certain settings (Gustafson et al. 2007; Miller et al. 2009). Moreover, where profitable, timber management and the revenues it generates can serve as a hedge against the conversion of forest land to other uses such as real estate development, although the extent to which it can actually do so in the face of rapid increases in land values close to urban areas will vary.

  The same issue faces nonindustrial private forest landowners who must balance concerns such as their need for current income and desire to maximize their long-term investments for themselves and their children with their desire to be good stewards of the forests under their care (Stein et al. 2009)[12]

- Responsibly managed forests are necessary for the maintenance of biodiversity and ecosystems services, both on individual sites and within the wider landscape. Forest management, including intensive commercial management, can be a critical and cost-effective conservation tool within larger-scale conservation strategies.[13]
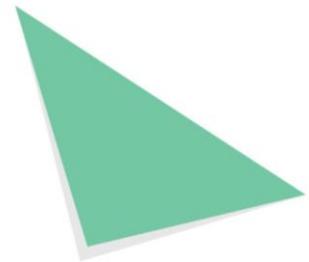
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[9] TAPPI, Paper University.
[10] NCASI, 2009.
[11] WBCSD and NCASI, 2005.
[12] USDA Forest Service, 2010.
[13] WWF, 2010.

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- In the United States, we grow more trees than we harvest. The country continues to benefit from a large and diverse forest inventory distributed across about one-third of total land area. The amount of U.S. forestland has remained essentially the same for the last 100 years at about 750 million acres, even though the U.S. population tripled during the same period. [14]

- Over the last 50 years, the volume of trees growing on U.S. forestland increased 49%.[15]

- Over 2.5 billion trees are planted in the United States each year. The forest community plants over 1.5 billion of these trees; that's an average of 4 million new trees planted every day by the forest community. Millions more trees regrow from seeds and sprout naturally.[16]

Is the electronic life cycle really "paperless"?

- (*Publisher's Abstract*) Over the past thirty years, many people have proclaimed the imminent arrival of the paperless office. Yet even the World Wide Web, which allows almost any computer to read and display another computer's documents, has only increased the amount of printing done by computer users. The use of e-mail in an organization increases paper consumption by an average of 40 percent (Greengard). In The Myth of the Paperless Office, Abigail Sellen and Richard Harper study paper usage as a way to understand the work that people do and the reasons they do it the way they do. Using the tools of enthnography and cognitive psychology, they look at paper use from the level of the individual up to that of organizational culture.

  Central to Sellen and Harper's investigation is the concept of "affordances" -- the activities that an object allows, or affords. The physical properties of paper (its being thin, light, porous, opaque, and flexible) afford the human actions of grasping, carrying, folding, writing, and so on. The concept of affordance allows us to compare the affordances of paper with those of existing digital devices. We can then ask what kinds of devices or systems would make new kinds of activities possible or better support current activities. The authors argue that paper will continue to play an important role in office life. Rather than pursue the ideal of the paperless office, we should work toward a future in which paper and electronic document tools work in concert and organizational processes make optimal use of both. [17]
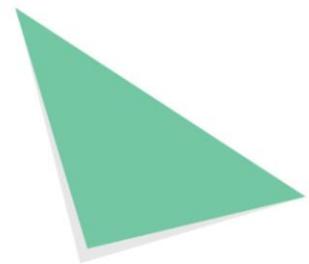
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[14] ibid, USDA Forest Service.
[15] Society of American Foresters, 2007.
[16] ibid, TAPPI.
[17] Sellen, A. and R. Harper. 2003.

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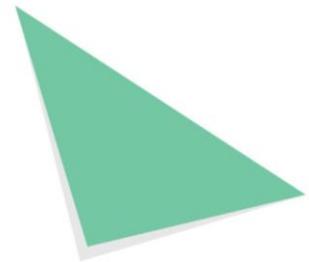**What are the environmental impacts of electronic media?**

- The pulp and paper industry has for long been under attack from different environmental groups, sometimes being projected as a clear-cutting, polluting sector using large amounts of energy, water and other resources. The option of using information and communication technology (ICT) instead of paper – reducing the consumption and thereby reducing the environmental implications of pulp and paper production – therefore attracts interest among the fast growing group of environmentally aware citizens. However, the direct impact of ICT products and services replacing paper is far from negligible, and the trade-off between the two "technologies" depends on conditions such as use frequency, source of energy, end-of-life management of the products, etc.[18]

- Manufacturing computers is materials intensive; the total fossil fuels used to make one desktop computer weigh over 529 pounds (240 kilograms), some 10 times the weight of the computer itself. This is very high compared to many other goods: For an automobile or refrigerator, for example, the weight of fossil fuels used for production is roughly equal to their weights. Also, substantial quantities of chemicals (45.5 pounds or 22 kg), and water (3,307 pounds or 1,500 kg) are also used. The environmental impacts associated with using fossil fuels (e.g. climate change), chemicals (e.g. possible health effects on microchip production workers) and water (e.g. scarcity in some areas) are significant and deserve attention.[19]

- Consumer electronics – including TVs and other video equipment, computers, assorted peripherals, audio equipment, and phones – comprise approximately one to two percent of the municipal solid waste stream (as tracked in the <u>Municipal Solid Waste Characterization Report</u>) but they garner a great deal of interest for several reasons:
  - ✓ Rapid growth and change in this product sector leading to a growing number of products needing appropriate end-of-life management;
  - ✓ The intensive energy and diverse material inputs that go into manufacturing electronics represent a high degree of embodied energy and scarce resources;
  - ✓ The presence of substances of concern in some electronics that merits greater consideration for safe end-of-life management; and
  - ✓ The opportunities for resource recovery through improved collection and recycling. [20]

- In the United States in 2009, 47.4 million computers were ready for end-of-life management. Some 29.4 million were disposed of and 18 million (38%) were collected for recycling. Reliable data on exported e-waste is not available. Electronics are complex devices which are made of a wide variety of material

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[18] <u>Arnfalk, P., 2010.</u>
[19] <u>Kruhr, R. and Williams, E. , 2004.</u>
[20] <u>EPA, 2011</u>

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constituents. Some of the constituents, such as lead, nickel, cadmium, and mercury, could pose risks to human health or the environment if mismanaged at their end-of-life.

EPA is very concerned about ensuring the proper management of used electronics and has undertaken important work to increase the collection and responsible recycling of used electronics. We strongly support keeping used electronics out of landfills, to recover materials and reduce the environmental impacts and energy demands from mining and manufacturing. Electronics are made from valuable resources, such as precious metals, copper, and engineered plastics, all of which require considerable energy to process and manufacture. Recycling electronics recovers valuable materials and as a result, we reduce greenhouse gas emissions, reduce pollution, save energy, and save resources by extracting fewer raw materials from the earth.[21]

- It is estimated that the production and running of the ICT sector equates to 2% of global GHG emissions, similar to the airline industry, and this is expected to double by 2020.[22]

- With a reading time of 30 minutes per day the environmental impact of the web based newspaper was in general in the same range as the printed newspaper environmental impact.[23]

- There are an estimated 3.95 million laptop computers in California. In this study [by Hoang, et al], the amount of greenhouse gases (GHG) generated from the time of a laptop's manufacture through its disposal is assessed using life cycle analysis. This study calculated the total annual energy consumption and GHG emissions associated with all laptop computer activities. As expected, data analysis showed that the laptop production and use phases consumed the most energy and emitted the most greenhouse gas. Energy consumption and GHG emissions for the end-of-life phase were relatively low compared to other phases. Laptop production and usage accounted for more than 99% of energy consumptions and greenhouse gas emissions. Based on data analysis for the year 2008, laptop computer activities in the U.S. accounted for a total of 6.5599 x 107 gigajoules (GJ) of energy and 4.210 x 106 tons of CO2 eq. emissions per year. Currently, California uses 9.54 x 108 GJ of electricity per year. The amount of energy consumed by laptop activities corresponded to 7% of total annual electricity used by California. This is a significant number considering that California is the most populated state in the U.S. The amount of annual GHG emissions mentioned above is equivalent to the annual GHG emissions of 700,000 midsize vehicles or to a single coal fired power plant ("Greenhouse Gas Equivalencies Calculator," 2008).[24]
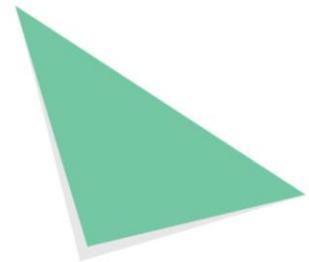
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[21] ibid, U.S. EPA.
[22] Gartner Consulting
[23] Moberg, A., et al, 2007.
[24] Hoang, A., et al, 2010.

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- Information Communications Technology (ITC) manufacture is material- and energy-intensive. The production of each PC requires 22 kg of toxic chemicals, 240 kg of fossil fuels and 1,500 kg of water. Also, 80% of life-cycle energy use is accounted for before we even switch a PC on for the first time.[25]

- The production of electrical and electronic devices is the fastest-growing sector of the manufacturing industry in industrialized countries. At the same time, technological innovation and intense marketing engender a rapid replacement process. Every year, 20 to 50 million tons of electrical and electronic equipment waste ("e-waste") are generated world-wide, which could bring serious risks to human health and the environment.[26]

- *(Two Sides Summary)* A recent study estimates that developing countries will produce at least twice as much electronic waste (e-waste) as developed countries within the next six to eight years. The authors, who are based in China and the United States, forecast that in 2030 developing countries will discard some 400 million to 700 million obsolete personal computers per year compared to 200 million to 300 million in developed countries. This is significant because uncontrolled toxic emissions result from the informal recycling practices that are often used to deal with e-waste in the developing world. Informal recycling practices documented in China and other developing nations over the past decade include burning plastic computer materials and using crude methods to recover precious metals such as copper and gold by using acids and cyanide. The resulting emissions, which can include dioxins, furans, and cyanide, can harm the recycling workers and pollute local environments.[27]

- *(Two Sides Summary)* A study commissioned by the Internet security software company MacAfee estimated spam wastes 33 billion kilowatt-hours annually, with the same greenhouse gas emissions as 3.1 million passenger cars using 2 billion gallons of gasoline, or enough to drive a car around the globe 1.6 million times.[28]

How does electronic communication compare to print and paper in terms of its social benefits?

- Paper has been an integral part of our cultural development and is essential for modern life. Paper helps to increase levels of literacy and democracy worldwide and plays an important role in protecting goods and
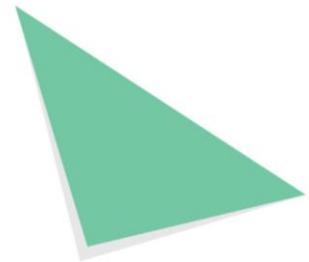
[25] Computer Aid International, 2010.
[26] UNEP, 2005
[27] Jinglei, Y. et al., 2010
[28] McAfee and ICF, 2009.

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foodstuffs during transit. Paper is made from renewable resources, and responsibly produced and used paper has many advantages over other, non-renewable alternative materials.[29]

- *(Two Sides Summary)* A number of studies have tracked the movement of readers' eyes and revealed that Web readers typically do not read line-by-line, the way they would if they were reading a printed text. A study by Danish researcher, author and web usability expert Dr. Jakob Neilson found that readers' eyes trace out a pattern resembling the letter *F*. The eyes typically begin by following a few lines all the way across, then skim part-way across a few more lines before drifting downward along the left-hand side of the text. Put succinctly, Nielsen concludes: "How do users read on the web? They don't. The online medium lends itself to a more superficial processing of information," he says. "You're just surfing the information. It's not a deep learning."[30]

- *(Two Sides Summary)* It has been argued that we learn differently from the printed word than from a screen, and that we may actually learn better from a book, newspaper, or printed report than we do using a computer.   Researchers Kenton O'Hara and Abigail Sellen demonstrated this point in a laboratory study that compared reading from paper to reading on-line. Critical differences revealed have to do with the major advantages paper offers in supporting annotation while reading, quick navigation, and flexibility of spatial layout. These, in turn, allow readers to deepen their understanding of the text, extract a sense of its structure, create a plan for writing, cross-refer to other documents, and interleave reading and writing.[31]

- In the fall of 2009, the Office of Information Technology at Princeton conducted a pilot program using electronic readers (e-readers) in a classroom setting. The pilot was conducted with three broad goals. One was to reduce the amount of printing and photocopying done in the three pilot courses. The second was to determine if using this technology in the classroom could equal (or better) the typical classroom experience where more traditional readings were used. The third sought to explore the strengths and weaknesses of current e-reader technology to provide suggestions for future devices. The goal of printing less in the pilot courses was achieved: pilot participants printed just over half the amount of sheets than control groups who did not use e-readers. The classroom experience was somewhat worsened by using e-readers, as study and reference habits of a lifetime were challenged by device limitations. This pilot suggests that future e-book manufacturers may wish to pay more attention to annotation tools, pagination, content organization, and in achieving a more natural "paper-like" user experience.[32]
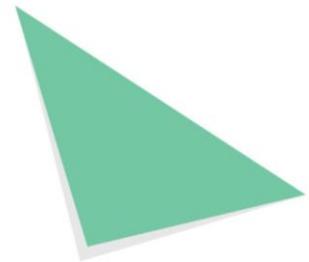
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[29] WWF, 2010.
[30] Neilsen, J., 2009.
[31] O'Hara, K. and Sellen, A., 1997.
[32] Princeton University, 2010.

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- Our survey [Bull and Bull] shows that while there is a perceived shift from papers to pixels, paper media still has a strong relationship with the marketplace. Consumers are willing to pay for paper media, find it an effective and credible source, and in certain product categories, indicate that they will continue to consume paper media even in light of digital alternatives. It's clear that the best case scenario in each industry [paper and IT] is dependent on several things: a transparent and measured supply chain; research and development of new technologies to avoid hazardous materials and waste streams; a robust end-of-life management strategy that recovers the value embodied in a product and avoids releasing hazardous waste into the biosphere; and an effort to identify and mitigate the variables that have most influenced the environmental burden of a media product. We find that forestry has the potential to be a self-sufficient and renewable industrial system, and that best-case scenarios that exist with today's technology and management are very "green" relative to the benchmarks of industrial ecology. IT, on the other hand, faces a greater challenge given its dependence on non-renewable e-sources, the pace of innovation and product replacement, and the difficulties associated with E-waste.[33] [Bull and Bull surveyed more than 1400 consumers in North America, half in Canada and half in the United States. Responses matched the latest census results for age and gender. On average, the respondents had 2.1 computers per household, 1.8 mobile phones per household and had been using the internet for 4.8 years.

- *(Two Sides Summary)* Paper also has special haptic features that people appreciate. Haptic perception involves both the tactile perception through our skin and the perception of the position and movement of our joints and muscles. In short, the reading process and experience of a digital text are greatly affected by the fact that we click and scroll, in contrast to a tactilely richer, immersive experience when flipping through the pages of a printed book. [34]

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[33] Bull, J. and Bull, G., 2010.
[34] Mangen, A., 2008.

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