# The Green behind Going Green: A Financial and Ethical Analysis of the Eco-Revolution


## Abstract

The objective of the paper is to provide an examination of the financial and ethical factors that affect corporations in determining sustainable business practices. Sustainability is defined as the interactions between social, economic, and environmental factors that aim to fulfill current needs while preserving the environment for the needs of future generations. Increased awareness concerning worldwide issues such as global warming and toxic pollution have intensified the demand for large corporations and industries to comply with more environmentally-conscious methods of production and reporting. The technology industry was the focus of the project due to the overall emphasis on emissions disclosure and the product life-cycle analysis (LCA). A five-year case study covering the 2004-2008 fiscal periods was conducted for each of the five major companies that were selected. The companies' annual corporate responsibility reports and financial reports served as the major resources for the analysis.

## Literature Review

### Sustainability/ External Pressures on Sustainability

Sustainability can be generally defined as the "assurance that development meets the needs of the present without compromising the ability of future generations to meet their own needs" (Gray 281). The concept assumes that through sustainable practices, society can continue thriving at a rate that will not affect its future generations' equal ability to thrive. The collective goal for society is to live in a way that the present generation "cleans up" after itself instead of leaving a mess for its descendents to handle. Sustainability is composed of an analysis of the actions between interdependent social, environmental, and economic factors (also known as the "triple bottom line") that exist between society and the physical environment. Therefore, sustainability represents a gauge that can be used to measure the severity of human actions and their consequences on the planet.

The concept of sustainability is a newer one, the term itself originating in the Brundtland Report ("Our Common Future") in 1987 that focused on the consequences of human development on the environment and the 1992 Earth Summit; some dispute still exists concerning whether sustainable development is a relevant cause to modern society (Bartlemus 1). The concept as a whole conflicts with Western culture, which is dependent on ideas such as consumerism and the belief that humankind has complete sovereignty over its external environment. Naturally, since the Western civilization is considered more economically advanced compared to other cultures of the world, some argue that the success of sustainability relies on the ability of the Western civilization to address the

issues at stake. "Economic wealth is needed to fund the remediation and investment necessary to achieve 'green' economic activity" (Gray 285). However, the economic growth needed to create sustainable development originates from the same force that caused many of the earth's growing issues.

For example, the spread of American culture to other countries has caused an explosion in consumerism. Tom Burke, co-founder of the group Third Generation Environmentalism states, " [B]y 2030, we will have gone from a world of two [Americas] to a world of eight or nine" (Friedman 56). The concept of consumerism, the affinity for the American lifestyle conflicts with the idea of sustainable growth and environmental stewardship. A society cannot easily take into account its impact on the environment when its culture causes a great accumulation of waste for its "cheap, fast, and easy" products: the trash generated from fast food wrappers, electronics that are quickly made obsolete and contain harmful chemicals, and the vast amounts of paper used and thrown away during normal daily activities. Therefore, the rise of organizations and businesses that are promoting sustainability in the United States provides an interesting outlook on changes in the American perspective dealing with its external relationships with the environment.

Sustainability is a considerably vague concept that encompasses a multitude of factors and does not provide any generally accepted periods or means to measure sustainable growth concerning unsustainable growth. Therefore, sustainability is used as a broad framework for which many organizations such as the Environmental Protection Agency and Ceres have specified a variety of indicators for measurement. Those indicators rely on the measurement of critical natural capital (the essential elements of the

environment that must remain unharmed), other natural capital (elements of the environment that are renewable) and artificial capital (elements of the environment that were created by humankind) in relation to one another (Gray 290). Organizations are measuring sustainable growth by using indicators ranging from the Ecological Footprint to the life-cycle analysis of certain products.

Many external factors have pressured and shaped the need for sustainable development. The most obvious factor would be the rising concern about global warming, especially the level of human involvement in its development. Although some argue that the earth's temperatures have normally fluctuated over the ages, there is a strong correlation between society's actions and the effect on the ozone layer. "By pumping man-made greenhouse gases into the atmosphere, humans are altering the process by which naturally occurring greenhouse gases . . . trap the sun's heat near the earth's surface before that heat radiates back into space" (Friedman 35-36). Therefore, humans are causing an "enhanced" greenhouse effect, which is to blame for factors of rising concern including increased temperature changes, the melting of glacial regions in the Artic, and natural disasters such as hurricanes.

However, a myriad of other applicable environmental risks exists affecting the relationship between man and nature. Other issues involving environmental stewardship include limited natural resources, the increased cost of energy, pollution, health problems and risks caused by unsustainable growth, and the generally rising awareness about global issues (Hitchcock 13-14). However, the true problem is not the identification of these critical issues, but the resolution of them. Involvement with sustainability in relation to improving the environmental condition has increased over the years but a wide

range of reactions (including the "ostrich with its head stuck in the sand" mindset and the full-hearted acceptance and promotion of the "green lifestyle") to the concept exist in society.

Sustainability may seem irrelevant by some because humankind itself is not a sustainable species taking in consideration the number of humans that die from environmental disasters including famine or floods. The issue is very critical because the world population is rising at alarming rate as well; Michael V. Hayden, the director of the Central Intelligence Agency, stated that his analysts now believe that the most worrying trend in the world is not terrorism but demographics (Friedman 29). "By 2053, the United Nations projects that there will be more than nine billion people on the planet, thanks to improvements in health care, disease eradication, and economic development" (Friedman 28). In general, the planet will become extremely crowded which in itself is a critical societal problem that must be dealt with immediately. A higher level of population will result in the higher generation and accumulation of waste. The rise in population will also cause a related growth in the demand for certain resources, which are already becoming depleted in the present generation.

**Corporate Sustainability**

Sustainable business procedures have been a major concern for companies due to the extent of the environmental impact from their production and manufacturing. Corporations also have a large external impact financially; "the combined sales of the world's top two hundred corporations are bigger than the combined outputs of all but the world's top ten richest countries" (Savitz 55). However, corporations faced a standard

measure of uncertainty. "Business and industry face the very real problem of a fundamental dichotomy between their power to act in the environment and their ability to predict the consequences of those actions through science and technology" (McKinney 99). Unless businesses could develop a sturdy methodology to assess and predict key performance indicators, it would be impossible to gauge any level of environmental impact and make any improvements. From shareholders, nongovernmental organizations (NGOs) to environmental lobbyists, pressure has been placed on companies to adopt more environmentally-acceptable means of operations. Consumer feedback is also a central influencing factor in business decisions. Based on the second annual Edelman goodpurpose survey that included 6,000 respondents from ten countries, "consumers say that if two products are of the same quality and price, commitment to a social purpose (42%) trumps factors like design/innovation (30%), and brand loyalty (27%)" (Edelman 3). Therefore, sustainability can be used to establish a competitive business advantage.

However, the choice to go "green" is not one based solely in the desire for expand company morals; sustainable business development can benefit company wellbeing and profitability. The findings to a Towers-Perrin questionnaire found that "CSR-related activity accounting for 3 of the top 10 drivers on employee engagement. The same study found that a 5% increase in engagement was equal to a $47.2 million financial gain" (ADC Partners 8). Therefore, "sustainable companies find areas of mutual interest and ways to make 'doing good' and 'doing well' synonymous" (Savitz 21). By embracing an environmental agenda, companies can improve both employee engagement and financial returns.

**Environmental Ethics**

The human species is able to abstain from instant gratification for the sake of harvesting a possible greater good in the future (Ferré 3). Sustainability is a matter that involves human morality and therefore involves the matter of ethics, namely environmental ethics. Humans are considered the stewards of the earth (especially in religious terms), making the concept of sustainability a very applicable concept. "Environmental ethics research began hesitantly in the 1970s as philosophers made tentative efforts toward the creation of a field with professional philosophy. It gained speed at the end of the decade with the founding of the journal *Environmental Ethics*" (Hargrove 16). In 1970, the United States Environmental Protection Agency was created and in 1974, the German scientist Paul Ehrlich wrote *the End of Affluence* which included a prediction that society would face energy crises and a shortage circa 1985 (Sagoff). With the growing awareness about the consequences, it became increasingly important for society to start monitoring its impact on the environment.

There is also a conflict that exists between the fields of philosophy and science in respect to environmental ethics. The concept of sustainable development involves both the scientific qualitative and quantitative assessments of environmental impacts as well as issues of morality and environmental stewardship that are two vastly contrasting fields of thought. "The values embedded in the economic way of thinking are often at odds with the way of thinking of biologists, ecologists, and other physical scientists. Economists value nature in terms of its benefits for human consumption and its usefulness in promoting economic growth" (Nelson 135). In 1970, the environmental economist Allen

Kneese even testified in Congress that "the economist doesn’t think about ought," which supports the idea that the environmental status should be proven through data instead of ideas (Hargrove 20). Economics focuses more on the human aspects and not the environmental aspects (which are central to sustainable development) and normally concerns the ideas of substitutes and opportunity costs (which neglects "priceless aspects of which nature is considered), treating the environment as a factor in production, and the opposition to the "social infrastructure of production" and governmental interference (Nelson 138-139, 149). One example of a philosophical and scientific conflict could be found in biodiversity surveys that have been distributed in the past:

> "Through such surveys, environmental professionals can determine with great precision that while $2.37 per household is an acceptable amount to justify protecting an endangered species, the addition of another penny might be so excessive that it would be best to just let the unfortunate species go, on the grounds that protecting it is just too expensive" (Hargrove 19).

However, there are some correlations that can be found to support both fields. For example, the "increased economic activity and enhanced trade can certainly increase a nation's carrying capacity, although that increase comes at the expense of other resources (Meyer 13). Therefore, using concepts of morality to create a cost-benefit analysis would be plausible. In addition, it has been estimated that it is possible for the ignorance of climate change could cause damages that are equivalent to 5% of global GDP (Esty 39). Environmental laws have shown to include both instrumental values and values that are considered pleasing ( Hargrove 27).

**Environmental Accounting**

Traditional accounting procedures ignore certain factors that are crucial to sustainable business procedures; accounting "is the basis for success or efficiency" so an incomplete accounting system hinders the ability of management to handle important environmental situations (Gray 21). One example that has been noted for decades is the bias towards the depletion of natural resources. As stated in a WRI report, "a country could exhaust its mineral resources, cut down its forests, erode its soils, pollute its aquifers, and hunt its wildlife and fisheries to extinction" without recording this against its income (Repetto et al., 1989, Ditz 13).

There are a number of areas where green accounting has improved the field; the separate disclosures of different emissions and environmental expenditures, increased reception to the fast-paced changes in the environmental agenda, increased external reporting, and the development of new information systems (Gray 11-12). After all, "environmental issues are business issues. . . . from straightforward cost and P&L issues, to competitive advantage and cost efficiency, to the more complex issues in asset values, contingent liabilities and environmental risk" (Gray 3). Green accounting systems also provide key performance indicators that allow business people to gauge the effectiveness of their policies and strategies (Gray 10). Because environment costs are rising, the raised awareness about environmental costs is very helpful to businesses. "Consider what happens when inaccurate cost allocations misrepresent costs, thus sending the wrong signals to managers and other decision-makers inside the company" (Ditz 18). However, the more sustainable solution is often overlooked; "because measures of profitability

depend on projected revenues and projected costs, and because environmental costs are so frequently misallocated, products with relatively higher environmental costs are often subsidized by those with lower ones" (Ditz 31). Through further improvements in environmental management accounting, companies can receive a more accurate lens into the financial and environmental implications of their operations.

**Environmental Reporting**

"More than three thousand corporations now issue a periodic environmental or social responsibility report, and over seven hundred and fifty voluntarily use the reporting guidelines issued under the auspices of the GRI" (Savitz 211). Companies that use reporting methods are experiencing competitive advantage over companies that do not. "If properly and aggressively used along with stakeholder engagement, the GRI can enable you to spot emerging economic, social, and environmental issues before they become crises" (Savitz 219). The GRI is commonly accepted due to "the rapid increase in the number of companies around the world adopting GRI standards and issuing corporate sustainability reports, along with the fact that the GRI works closely with the United Nations," (Ballou 3). "Sustainability reports are almost exclusively optional, and, even in cases where individual State's jurisdictions require their obligatory publication the only international standards for their drafting are the work of private research bodies" (Manetti 289). Although the GRI can only be accepted with generally limited assurance, it still provides an outlook on corporate involvement in sustainable business procedures.

**The Environmental Audit**

The environmental audit is the analyses of all the interactions and impacts a business has on the environment (or society in general) through the full scope of its operations. The analyses include "the system perspective" survey of a business of which all the inputs and outputs are recorded (Gray 84-85). Some companies choose to perform the environmental audits by themselves with the creation of auditing teams, some with the help of special consultants, and others with a balance of the two (Gray 87). The audit is essential for establishing and managing an environmental management system.

**Eco-Labeling**

The draft regulations for the "eco-label" and the "eco-audit" were created in 1991 (Gray 95). It was initially created as a voluntary program. Companies earn eco-labels for the products and processes that show the most responsibility in respect to operations and life cycle. Although many types of eco-labels exist for multiple countries, one of the most notable is the ENERGY STAR Program. The ENERGY STAR program is a partnership between the United States Environmental Protection Agency (EPA), the United States Department of Energy and technology companies with the purpose of creating office equipment that is more energy efficient. The program estimates that "if every home office product purchased in the U.S. this year (2009) were ENERGY STAR qualified, Americans would save $200 million in annual energy costs while preventing almost 3 billion pounds of greenhouse gases – equivalent to the emissions of 250,000 cars" (ENERGY STAR). Through taking product design actions like lowering the watts used by idle

computers and adjusting processor speeds, technology companies can have a major impact on product environmental impacts.

**Supplier Audits**

The purpose of supplier audits is to ensure that suppliers comply to a similar level of corporate responsibility that the central company or corporation follows. The audits force companies to recognize both the upstream and downstream impacts of their activities, especially in the means of life-cycle assessments (Gray 100). Areas for supplier audits include the restriction of certain chemicals, environmental waste and emissions, and employee welfare. Supplier audits usually involve compliance signatures, surveys, and audits performed by a third party.

The EICC (Electronic Industry Citizenship Coalition) was created in 2004 with the purpose of improving the environmental and working conditions of global supply chains. The members of the industry coalition include Apple, Dell, HP, IBM, and Intel. It was the first corporate responsibility collaboration in the industry. Through the EICC, members improve CSR supply chain reporting and develop tools to monitor supplier performance. The tools include a supplier audit program that is conducted by a third party, a risk assessment tool used in monitoring supplier compliance, a self assessment questionnaire for suppliers to fill out annually, and an electronic tool for accountable supply chains (E-TASC) that aids in the management of data (EICC). Through the involvement of the EICC, environmental responsibility has become an industry standard for technology companies.

**Accounting for Energy**

Energy consumption remains one of the central environmental issues. Through the reduction of energy usage, businesses can reduce generated waste, harmful emissions (especially the emissions that are indirectly created by the utility companies themselves), and the fuel usage of transportation while decreasing energy costs. Although energy can be found in renewable (wood, wind, solar, hydro sources), Western society attains its fuels primarily from nonrenewable (oil, gas, coal, nuclear) sources (Gray 111). The nonrenewable sources are harmful to the environment because it depletes a natural resource and uses a great deal of energy when they are transported and processed (which creates waste, heat and emissions).

Also, "*per capita* consumption of energy in the developed countries is approximately seven times higher than in the lesser developed countries" (Gray 112). Therefore, the developed countries should be the focus of energy reform; energy is used in greater volumes often for reasons other than necessity and a large proportion of it is generally wasted. There are already a number of energy-related coalitions and organizations in the United States (the EPA's "Climate Change" program for example). Companies take the initiative and in many cases, have cost savings that compensate for their energy programs in the long run. "Organizations, if they do not ignore the matter altogether, seem to follow one of three routes: piecemeal, in-house initiatives; a comprehensive top-down approach; or a combination of the two" (Gray 116). One of the most important primary steps in improving energy efficiency and lowering energy costs is to create a method to monitor all flows of energy in and out through the scope of all existing business operations. Energy costs should also be isolated in the accounting procedures and treated as a separate cost instead of general overhead; through this

method, accountants can even raise energy awareness from employees and management (Gray 119). Energy units (a better measurement of  should also be measured as well as the costs so that the company has reliable data when it assesses its energy consumption; the idea of using energy units in bookkeeping originated in the 1970's (Gray 120).

One way of accounting for emissions is through the use of a "cap and trade" program which is a "market-based approach in which 'allowances' or 'credits' are used to provide incentives to companies to reduce emissions by assigning a monetary value to pollution (Fornaro 1). For example, a single allowance may be equivalent to the allowable emissions of one ton of CO2.

**Accounting for Waste, Packaging and Recycling**

The minimization of the waste and packaging used by companies can lead to substantial financial savings. "Under typical management accounting practices, many costs avoided. . .  are not credited to the successful manager, so pollution prevention projects often compete on an unequal footing with projects reliant on the existing pollution control and waste disposal infrastructure" (Ditz 33). With the reduction of waste, companies can also reduce the increasing disposal fees and governmental fines. A key aspect of reducing waste is reducing the amount of resources used in business operations (Gray 130). By using fewer resources, there is less material that will be converted into waste. The first step is to assess the inflows of resources in relation to the outflows of waste in an environmental audit. There are three major ways of addressing the issue: change policy to correspond with desired changes in actual and potential costs,

record the physical quantities of waste, and charging waste costs to line management (i.e. the “Polluter Pays Principle) to motivate management to reduce waste (Gray 133-5).

Innovations in packaging, including resource substitution and material minimization, can also create savings for businesses. Since the packaging is typically useless to a company after it is shipped, it is essential to reduce its cost. Although recycling is an important issue for companies to address, the ratio of products sold to products recycled remains rather low.

**Environmental Management**

The goal of environmental management is to adjust policies and systems to reflect the benefits and consequences of business procedures. Steps for optimal environmental management systems include using cross-functional teams, maintaining full managerial support, benchmarking successful plans, and using total quality management (TQM) tools to identify and execute plans (EPA 21-22). One of the most important factors of an environmental management system is the environmental review that is used to make assessments (especially focusing on the key performance indicators). Based on the reviews, companies can create information systems (which deals with the problem of the lack of raw data that would have existed otherwise). Important functions of the environmental management system is to reduce operational costs and environmental expenses, identify and reduce risks, increase revenue through more environmentally-friendly products, and to create intangible brand value (Esty 103-104). Successful environmental management procedures can help a company establish a competitive advantage over other companies in the industry.

Sustainable environmental management is not merely a short-term public relations stunt to garner attention. It is a commitment that must be embraced all the way up to senior management, 'the tone from the top.' Unless the higher levels of management accept the principles, the change required to maintain more sustainable procedures would be difficult to attain. "The openness of the organizational culture has usually been the determining factor of successful developments along these lines" (Gray 49). One of the first steps for a company pursuing corporate responsibility is to create an (worldwide) environmental policy as well as charters. The environmental policy should serve the purpose of supporting the general mission and policies as well as providing additional policies in its area (Gray 61-62). Therefore the company can tie the environmental aspects of its operations to its most central causes.

The ISO 14001, released by the International Organization for Standardization, is the most commonly accepted standard for environmental management systems in the technology industry. The management tool requires companies to " identify and control the environmental impact of its activities, products or services, and to improve its environmental performance continually, and to implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved (ISO). The ISO 14001 standard provides a general overview of acceptable environmental management systems, but is not aimed to address the needs of each specific industry.

**Life Cycle Analysis**

The life cycle analysis (LCA) became very well-known in the 1990s. It is defined as “an objective process used to evaluate the environmental burdens associated with a product, process, or activity. . . ; extracting and processing of raw materials; manufacturing, transportation and distribution; use/re-use/maintenance; recycling; and final disposal (Fava 1991, 19, Gray 165). "It is easy for materials managers to overlook environmental costs and benefits during decision making because they tend to occur upstream or downstream of the immediate decision, e.g., a purchasing action can have materials handling, storage, and disposition repercussions" (EPA 17). All aspects of the product’s impact, including energy, ecological consequences, emissions, disposal, packaging and all inputs and outputs, must be considered. One of the major improvements in the LCA is dematerialization; "dematerialization is based on the surprising-yet ultimately obvious- realization that consumers don't necessarily *want* the physical materials used in manufacturing, shipping, and using many products" (Savitz 239). The reduction of materials and volume in earlier stages of the life cycle of a product greatly impact the environmental impacts that the product has during its intended and in disposal or recovery.

The three stages in the LCA methodology are life cycle inventory (initial review of impacts), life cycle impact analysis (identification of impacts) and the life cycle improvement analysis (improving the LCA) (Gray 168). Therefore, companies need a standard approach for assessing and reviewing factors in the life cycle. Some possible complications of the LCA include bounding the system, attaining and handling the information, and scientific uncertainty (Gray 172). Although the LCA may seem complicated, improvements can be made by simply taking a pen and paper and drawing

all the possible interactions and impacts a product has from the development of raw materials to its end-of life.

## Thesis

Companies that release annual corporate responsibility reports have more awareness over issues such as emissions and hazardous waste (since these issues are used as key performance indicators (KPIs) in the actual reports). Therefore, the companies listed with the Global Reporting Initiative (Dell, HP, IBM, and Intel) will have more environmentally-related savings than companies that are not GRI-listed (Apple); even though Apple has been using environmental practices since 1990, the company could improve its management and accounting databases by creating and issuing sustainability reports. Even though Apple is releasing "greener" Macbooks, it trails behind the other companies in terms of sustainable business practices.

## Methodology

The technology company was chosen to provide the opportunity to study the life cycle of its products; technological products become obsolete and are disposed at a very rapid rate, so it is important for the manufacturers to keep end-of-life in mind while designing newer products. Four major American technology companies were selected from the Global Reporting Initiative's Reports List. Apple was chosen as the fifth company for research for several reasons: it does not release GRI-listed annual reports although it has been promoting sustainability for nearly two decades, Apple has received

one of the lowest ratings on Greenpeace's "Guide to Greener Electronics, and its sustainability efforts have come under fire by Dell.

Through the conducted literature review, several key areas were chosen for analysis; environmental management systems, corporate accountability and ethics, the life-cycle analysis, energy and emissions, hazardous and nonhazardous waste, water management, and supplier audits. All of the information used for the purposes of the project were found in the company's annual sustainability reports (fiscal years 2004-2008), company websites, the U.S. Securities and Exchange Commission (SEC) annual 10-K financial files, and websites of sustainability-related organizations (such as the EPA, REACH, and RoHS). Using the company information, a five-year case study was compiled for each company. After the studies were conducted, inventory turnover ratio/ Scope 1 and Scope 2 greenhouse gas (GHG) emissions ratios were calculated in attempt to determine a correlation between inventories and the levels of related emissions. The final form of analysis was the examination of the company rankings that were conducted by the Greenpeace and Climate Counts organizations.

## Company Highlights

### Corporate Accountability

All five companies follow a "tone from the top" method; sustainability principles are embraced by corporate management. Environmental policies and goals have been set and monitored. The companies aim to promote an acceptance of environmental ethics and global citizenship.

Apple released its environmental policy in 1990. Apple does not release an annual corporate responsibility report; however the company's performance has recently become indexed by the Global Reporting Initiative (GRI) Sustainability Reporting Guidelines.

Dell's goal "is to create a company culture where environmental excellence is second nature." Dell's key goals for sustainable business function include working with management to identify the corporation's environmental and social impact, engaging stockholders, creating key indicators that will allow for monitoring and measuring impacts, and working with internal groups to set goals to reduce the environmental impacts and improve the social impacts. The Soul of Dell is the name of Dell's corporate philosophy. The key factors of the Soul of Dell are "customers, the Dell Team, direct Relationships, global citizenship, and winning (with integrity)." During 2007, Dell made the ambitious goal of wanting to become the greenest technology company on the planet.

Even during the 1940s, Dave Packard was interested in the relationships that the company held with its employees, customers, suppliers, and society in general. The focuses of the global citizenship objective are the environment, privacy, and e-clusion and education.

Intel follows Corporate Business Principles (CBPs) as well as its Principles for Responsible Business. To stay on track with GRI listing, Intel has a special policy set.

In 2003, IBM founded the Global Leadership Network for Corporate Citizenship with nine other companies. From 1999-2005, IBM invested $278 million in capital and $546 in operating expenses to reduce its environmental impact.

**Environmental Management**

A focus on the ISO 14001 certification is central to the environmental management systems of the five selected companies. The systems are composed of specialized teams and groups that are focused on the different aspects of sustainable development. The companies also have an ethics committee that is capable of dealing with matters related to sustainability.

Apple's management system became ISO 14001 certified in 2000. Environmental management has been supported by the founders of the company. Although Former Vice President Al Gore Jr. has been involved with the company, the amount of information available remains very limited.

Dell's sustainability management system consists of five teams; the Reporting Core Team, the Asset Recovery Core Team, the Public Affairs Sustainability Team, the Sustainability Policy Team, and Employee Teams. Dell has a Global Ethics Council, which is supported by Regional Ethics Committees. The five committees that are most

related to sustainability efforts are the  Environmental, Sustainability, Ethics, Audit, and Diversity committees. ISO 14001 was adopted by the company during 2005-2006 The purpose of Dell's EHS management is to identify potential risks, set goals and measure progress, set means to reduce risks, improve communication and training, maintain documentation, and audit performance (2005).

HP’s business groups are the Customer Solutions Group, Imaging and Personal Systems Group, and the Technology Solutions Group. The Environmental Strategies and Sustainability Council is key for assessing corporate responsibility issues. There is also an Ethics Committee. HP has an environmental, health and safety management system that is based on ISO 14001 and OHSAS 18001.

Intel has an Ethics and Compliance Oversight Committee (ECOC) as well as a Business Practice Excellence (BPX) training program for its employees. During 2004, the Working Group took the responsibility of improving Intel's environmental impacts; the group includes community members, critics, environmentalists, and Intel's representatives. In 2008, Intel created a Corporate Sustainability group run by a vice-president. Dell's EHS organization created the vision "Protecting Today, Creating a Better Tomorrow, Together." It announced that in 2008, employee compensation will be calculated as a factor of company environmental performance.

IBM had a Corporate Citizenship Council, which focuses on the sustainability aspects across the company's divisions. IBM has standardized process flow documentation and tests its control points of over one hundred processes quarterly. Internal controls include on demand scorecards to help monitor its systems. The company has followed a written code of conduct since the 1960s.

## Life-Cycle Analysis

Through the life-cycle analysis, the companies can monitor the impact of their products at every stage in their life. The five companies follow similar procedures in assessment, although the four GRI-listed report the LCA in much greater detail. The most emphasis on the LCA stages is placed at design, production, logistics, and end-of-life.

### Design

With the rise of European legislature such as REACH (Registration, Evaluation, Authorization and Restriction of Chemical substances) and IPP (Integrated Product Policy) industries are required to continually improve their performance. In addition, due to the global nature of most manufacturing processes, monitoring the product life cycle has become complicated.

Apple's production accounts for 95% of its total emissions and business operations account for the other 5%. Apple's life cycle analysis procedure has been verified by the highly qualified Fraunhofer Institute in Germany. Apple is the only electronics company that discloses detailed Product Environmental Reports for each of its products.

To address these issues, Dell has created a Design for the Environment (DfE) Program to analyze the environmental impacts at each stage of a product's life. The products are graded with a scorecard that evaluates the packaging, energy use, and environmental impact. Dell believes in product dematerialization and materialization methods (i.e. chassis models and multifunctional printers) which reduce the amount of

resources used during production. Product integration allows for a longer facility life-span, reduced waste, and increased factory capacity.

HP had an early start on its Design for Environment (DfE) program that was developed in 1992; its focuses are energy efficiency, materials innovation, and recyclability. The HP TouchSmart IQ 500 series PCs uses 55% less metal and 37% less plastic than standard PCs. Since 1989, the HP Nonstop server has delivered more than 80 times the performance per mass. HP uses recycled polyethylene terephthalate (RPET), which is made from recycling print cartridges and plastic bottles, in certain products. During 22004, 40.6 tonnes of RPET was used in production. HP also uses bioplastics that contain vegetable polyactic acid. To allow more product recyclability HP has improved product designs including using snap-in features instead of adhesives, dematerialization, using single plastic polymers, and using molded-in colors instead of paint.

**The ENERGY STAR Program**

The Energy Star Program is a joint program between the U.S. Environmental Protection Agency (EPA) and technology companies to decrease the power consumption of office products. Cooling accounts for more than half of the power needs of a data center and cooling power savings can amount to 5,000 tonnes of carbon dioxide emissions a year.

All of the MacBooks that are shipped comply with EPEAT and ENERGYSTAR 4.0 standards; Apple's products have met ENERGYSTAR requirements since 2001. In 1992, Apple was even a founding member of the program. During its idle mode, the 13 inch MacBook consumes less than a fourth of the energy that would be required by a 60W light bulb. The MacBook Air power adapter uses less than .2W (during no load).

The Apple website has an Energy Usage Calculator to help customers figure how much energy their products are using.

Dell has been a member in the program since 1993. The reduction of power consumption decreases harmful carbon dioxide emissions and the enhancement of the global warming process. In 2007, Dell implemented the Energy Smart program to provide information to customers. In 2008, Dell had 15 desktops, 9 notebooks, 70 monitors, and 5 workstation systems that met the Energy Star 4.0 requirements.

More than 1000 HP products have received ENERGY STAR ® certification. HP has worked with the ENERGY STAR guidelines since 1992. More than 94% of the Personal Systems Group products and 98.5% of the Imaging and Printing Group products are qualified. While the program's limits for power usage are 15 watts, HP's laptops use less than a watt of power in low power mode. "Instant on technology" reduces the amount of heat needed for the LaserJet toner and has saved an estimated 6.5 million tonnes (1.4 million cars) of carbon dioxide emissions between 1993-2007. Power management features save up to 381 kWh per monitor and 294 kWh for a desktop PC each year; for every 12 consumers, the savings is equal to removing an automobile from the road.

Intel has been working on the power efficiency of its products. Through its Our Instantly Available PC (AAPC) technology, PC energy use has been reduced up to 71%. Between 2002-2010, the EPA estimates that this technology will reduce 159 million tons of carbon dioxide emissions (equal to the emissions of 5 million cars. The EPA made a prediction that Intel's strategy would reduce electricity usage more than 16 billion kWh,

reduce over 10 million tons of CO2 annually, and have annual cost savings of $1.25 billion.

In 2004, 100% of IBM's personal computers met ENERGY STAR requirements. The BladeCenter products have virtualization capabilities to allow multiple workloads on a single server that annually saves 300 square meters and $300,000 per year. IBM has PowerExecutive software, which lets clients measure the power usage of their data centers. The "airgap" process used in manufacturing microprocessors saves 15% in energy. Cooling doors on server heating exchanges reduces server heat by 60%. Through Project Big Green, which was announced in 2007, an additional billion is donated to improving energy efficiency. Also during 2007, the Inaugural Green500 list ranked nine of IBM's computers in the "top ten most energy-efficient supercomputers in the world."

**LCD Technology**

LCD technology has helped in the process of sustainable production. A normal 24-inch television weighs the equivalent of 2.68 23-inch LCD (light-crystal display) televisions. The use of LCD displays instead of other types of displays reduces energy usage by as much as 30%. Less material, energy, and mercury are reasons why companies have been switching from manufacturing (cathode-ray tube) CRT displays (which contain two pounds of lead) to manufacturing LCD displays (which contain a few grams of lead).

In 2006, Apple was the first to completely replace CRT displays (which contain lead) with the more efficient LCD displays.

Dell is saving a considerable amount of material in the production of LCD televisions. As announced in the 2004 CSR, Dell was working to reduce and eliminate the mercury included in the monitor backlight.

**Restricted Chemicals**

The companies have faced pressure from the European Union's REACH and RoHS regulations to reduce or remove certain chemicals and substances from the production of its products. Most of the companies have stated that they have taken extra precaution and have phased out certain harmful materials before some regulations were even in effect.

Apple's products have complied with the European Union's RoHS Directive and REACH program concerning harmful substances since 2006 (initial phase out started in 2004). Apple has phased out materials such as lead in cables (1999), cadmium in cables (1999), PVCs in packaging (1995), and lead batteries (1991). The MacBook, MacBook Pro, and MacBook Air (the world's thinnest notebook) are manufactured with recyclable aluminum and glass as well as materials that are free of PVCs, BFRs, mercury, and arsenic. In 2007, the MacBook Pro was the 15.4 inch LED display in the industry that did not contain mercury.

Dell has restricted more than fifty harmful substances from use in production to meet both legal requirements and customer satisfaction. In 2002, a chemical management process was created and in 2003, corporate goals regarding the materials were created. In 2005, Dell created a chemical use policy. Dell planned to meet the requirements of the European Union's Restrictions on Hazardous Substances (RoHs) before July, 2006. The two main substances that have been focused on in the electronics industry are lead and

bromine. Dell planned to meet the requirements of the European Union's Restrictions on Hazardous Substances (RoHs) before July, 2006.

HP's first fully RoHS compliant products were shipped in 2005. PVC is only used in wires and cables; substitutes are costly but HP is researching alternatives. In 2006, HP made BFR-free external cases and PVC-free packaging. HP is also compliant with the European Union REACH program concerning chemicals. The PVC content of inkjet tripacks have been replaced with recycled plastic (1,100 tons of PVC were replaced with 300 less tonnes of PET plastic). From 2005-2007, over 200 million HP inkjet print cartridges were made with 2,300 tonnes of recycled plastic.

In 2005, Intel announced that it had reached its goal of eliminating 95% of the lead used in its products, which was reached. Intel has been working with the European Union's Restriction of Hazardous Substances since 2000. In 2007, Intel replaced isopropyl alcohol (IPA) due to its tendencies to create smog. It also announced the reduction of halogens in its products, setting a goal that most of its 44nm processors would be halogen free by the end of 2008.

All products that IBM released after July 1, 2006 were compliant with RoHS standards. IBM also uses powder coatings instead of paint on its metal covers (which avoided 870,000 pounds of volatile organic materials in 2004). From 1993-2005, IBM reduced the levels of chemicals on the U.S. Toxic Release Inventory list by over 85%.

**Logistics and Packaging**

Air transportation creates approximately eight times as much harmful emissions as ground transportation. Therefore, companies are focusing on logistics to reduce the amount of transportation needed for product shipments.

Dell has improved its ground networks as well as created a manufacturing facility in North Carolina (2005) to reduce the need for air transportation. The company is also a member of the EPA's SmartWay Program, which focuses on transportation. During 2004, 90% of the U.S. shipments were made through SmartWay certified carriers. Dell reported in 2004 that it had reduced air transportation from 25% to 14% of its parcel tonnage. During 2008, 86% of the IBM shipping in the Americas was spent with SmartWay carriers.

**Packaging**

The companies have started packaging reduction programs to decrease packaging spending. All of the companies listed below have employed engineers to perform tests and assessments on the efficiency and durability of their packaging materials and innovations.

During 2005, Dell replaced its wooden pallets with plastic (recyclable) slips. In 2005, it was estimated that in two years "this program will account for over 25,000 tons of wood reduced, and shipping reductions of over 6500 truck trips, over four Pacific ocean vessel trips, and over 30 full trains moving across the United States."
In 2008, the size of the slips were reduced 14%, which will save 720 tons of material annually. Another shipping innovation, the Eco-Delivery Project is a reusable crating system for large deliveries. Using the system has reduced the deployment time from four days to 2.5 hours and has saved $22 per shipment.

During 2004, HP saved more than 10,000 tonnes of materials by using “clamshell” packaging made of 30% recycled material for its inkjet cartridges. During 2004, HP also saved more than $1 million by using a new polyethylene packaging

method for some of its cameras. In 2005, HP published a packaging study guide and the ROSe (Robust Orientation Size effect) calculator for its engineers.

In 2004, Intel saved more than $1.5 million dollars from its 70 packaging projects, which led to the reduction of more than 250,000 pounds of paper, 2,000 pounds of plastic, approximately 34,000 pounds of wood, and 47,000 of non-recyclable material. Fuel consumption was decreased due to the 66% increase in product shipment.

IBM created Packaging Guidelines in 1990 with the goal of minimizing waste. IBM uses bundling solutions to reduce the space needed for its products. For over ten years, the company has restricted the use of PVCs, free-flowing cushioning materials, and in most instances, commingled packaging. IBM is also involved with the EPA's EPEAT (Electronic Products Environmental Assessment Tool).

**End of Life**

All of the companies in the project provide recycling programs for the majority of their consumers. Recovery and recycling reduce electronic waste (which is often shipped overseas and disassembled in unsafe working conditions). Through the programs, the companies can use a fraction of the recycled materials in the manufacturing of newer products.

Since 1994, over 83 million pounds of Apple's electronic waste has been diverted from landfills. In 2007, the annual recycling rate increased 57% as Apple collected almost 21 million pounds of electronic waste; the recycling rate for the year was 18.4%. In 2008, Apple recycled 30.5 million pounds of products with a recycling rate of 38% (a 47% increase over 2007). Product end-of-life management is available in 95% of the countries that sell Apple products. There is a free recycling program for United States

customers for old products with the purchase of a Mac. The free iPod recycling program accepts all models and manufacturers (and even cell phones) and offers customers a 10% discount on new models.

Dell's motto for its consumer awareness campaign is "No computer goes to waste" and the company has been offering recovering services since 1991. Dell offers asset recovery services, donations, recycling events and lease returns. Dell has consumer recycling days to promote the recovery of its products (including printers).

Since 1987, HP has been recycling computer and printer hardware. HP offers asset recovery and leasing services. In 1997, HP created a recycling program for its inkjet cartridges. In 2003, HP provided postage-paid envelopes with its inkjet cartridges. The HP Planet Partners program operates in more than 40 countries. All of the materials in the inkjet cartridges are recycled and used to make new products as well as trays, hangers, shoe soles, roof tiles, and wire spools. The HP Renew Program earns more than $500 million from remanufactured products. HP is compliant with the 2005 European Union Waste Electrical and Electronic Equipment (WEEE) legislation.

Intel participated in the new EPEAT (Electronic Product Environmental Assessment Tool) which helps federal purchasers measure the environment effect of electronics products. In 2005, Intel teamed with eBay to create a way for customers to recycle their electronics. Intel also announced that it follows the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive. During 2007, Intel collected more than 2 million pounds of waste. In 2008, Intel collected more than 1.5 million pounds of electronics from nine events.

IBM offers asset recovery services in more than 57 countries , which includes overwriting, refurbishing, and recycling. During 2007, 44,332 metric tons of products were recycled and was equal to 42.4% of the new products made and sold. During 2008, 42,302 metric tons of products and product waste was processed; 96.9% of it was salvageable.

**Energy and Emissions**

There is a correlation between energy consumption and harmful emissions because most of the energy is used and most of the emissions are released during production. All of the companies have discovered innovative ways to reduce energy through facility improvements or the participation in green energy programs.

Apple started disclosing its emissions information for each of its products in October 2008. During 1992, Apple started plans for phasing out harmful CFC emissions. Since 2006, the company has been monitoring greenhouse gas emissions as part of the life cycle analysis of its products. Apple does not use ozone-depleting substances (ODCs) in any of its functions. Since 2006, the improvements in the efficiency of lamps and lighting motion sensors (which trigger automatic shut-off) has save more  than 2 million KWh. Apple  has been a part of the "Green Choice Power Program" for more than a decade. Around 44 million KWh of renewable energy was produced in the last five years, which is equivalent to 29 million kilograms of carbon dioxide emissions.

All of Dell's facilities have environmental-impact measuring technology. Its greenhouse emissions mainly come from product energy consumption, manufacturing energy consumption, product distribution and employee transportation. During 2004, Dell

addressed the issue through reducing the testing of emergency generators, purchasing at least 10% (6.2 million KWh and an avoidance of 94.2 million pounds of CO2) of its energy sources from the Green Choice Program, and promoting carpooling. Global energy reporting was added to the CSR in 2005. The new North Carolina manufacturing facility incorporated several key energy saving features, including energy efficient lighting fixtures, a system to reclaim heat from the air compressors to assist in heating the facility during cooler months, state of the art air compressor controls and equipment, and a high-performance building automation system for controlling heating and cooling.

More than 85% of the company's climate impact comes from electricity use and 97% from energy use in general. HP plans to reduce its impact through lighting, heating, IT, ventilation and cooling improvements. HP's goal is to reduce electricity use by 50 GWh a year (equal to powering the Eiffel Tower for nearly seven years). In 2006, Carpet is being replaced with carbon-neutral tiles and the carpet is being recycled. HP joined the EPA's Green Power Purchase program and purchased 11 million kWh of renewable energy. In addition the company made contracts with SunPower Corp (which will install 5,000 solar panels in the California site that will save 454 tonnes of carbon dioxide emissions per year) and Airtricity (estimated to save 40,000 tonnes of carbon dioxide emissions annually).

In 2005, Intel began to publish quarterly EHS indicators, declared a focus on energy efficient (and reduced LCD energy consumption by 40% and reduced 15% consumption per unit), reduced lead, and recycled 57% of its chemical waste and 75% of its solid waste. In 2004, Intel spent more than $4 million on energy conservation projects that were projected to have a five-year cost savings of $7.4 million as well as reductions

of 25.5 million kWH of electricity usage and 226.6 cubic meters of water consumption. Intel became a member of the Chicago Climate Exchange (CCX), which is the world's only voluntary and binding reduction registry. It requires 2010 reductions that are 6% below the baseline of average emissions from 1998-2001. In 2008, Intel received recognition from the EPA's Green Power Partnership when the company decided to start buying renewable energy certificates (RECs) as a part of a contract. The EPA recognized Intel as the largest national purchaser of green power for the year.

IBM's operations do not lead to significant greenhouse gas emissions, although it recognizes the impact that its electricity that is provided from utilities causes an indirect release of carbon dioxide. From 1998-2004, IBM saved more than $115 in energy costs and stopped more than 1.28 million tons of carbon dioxide emissions (equivalent to 51,600 cars traveling 10,000 miles per year). IBM is also a member of the EPA's Climate Leaders Program. The company outperformed the program's 2000-2004 goal of 4% when it reduced its emissions by 6.4%. In 2008, IBM purchased 8.6% (450 million kWh) of its electricity from renewable energy sources. IBM is also investing in solar technology, appropriating its scrap silicon wafers to be used in solar panels, and smart grids (which can be used with wind or solar energy). During 2008, carbon dioxide emissions were reduced by 3.4%.

**Business Transportation**

The transportation of employees in regard to work and business conferences creates significant emissions. The companies listed below have addressed the issue and have created methods to reduce the need for employee travel through methods such as carpooling and web conferences.

Apple has transit programs including the Apple U.S. Commute Alternative program which offers rewards like a transit subsidy (up to $100 a month) to promote carpooling. The transit programs have saved an equivalent to the emissions (53, 523 kilograms) of 4,500 cars on the road every business day.

In 2007, HP joined the EPA's SmartWay program. It was estimated that in 2007, 36,000 tons of GHG emissions were avoided through the company's logistics programs.

In 2004, Dell was named the top company in the EPA's list "Best Workplaces for Commuters from the Fortune 500 Companies" for its available carpooling and transit options, which reduce the climate impact.

To reduce the impact of transportation, IBM has carpooling (which saved an estimated 63,000 tons of carbon dioxide emissions) and working-at-home programs for its employees. In 2005, IBM was ranked 17th on the EPA's Top 20 Best Workplaces for Commuters list. In 2006, the working-at-home program saved an estimated 8 million gallons of fuel. During 2007, over 1,000 web conferences were held, saving the fuel that would have been used in travel.

**Waste**

All of the companies have addressed waste as an important concern of their facilities. The companies have used various techniques ranging from reducing paper towel use to reselling salvageable portions of their waste.

Although there is not a considerable amount of solid and hazardous waste, Apple has recycling and composting programs to reduce the amount of waste.

Dell is concerned with its levels of nonhazardous waste, which includes cardboard, paper, plastic, cans, pallets, and bottles. The company has a Reduce, Reuse,

and Recycle (R3) program to reduce waste. Each manufacturing facility has implemented the R3 program to deal with its nonhazardous waste. During 2005, the reuse/recycling rate was approximately 85%. During 2006, the recycling rate was 79% and the reuse rate was 11%. In fiscal year 2005, Dell's Round Rock campus began replacing its existing carpet with recycled carpet. By the second quarter of fiscal year 2005, it is our goal to remove and recycle 1 million square feet of carpet (weighing approximately 423.5 tons), thereby diverting it from Austin area landfills. The new carpet being installed has non-
PVC backing and can either be completely reused or recycled.

HP's Dilute ink waste evaporation systems reduce waste by 44% (more than 700 tonnes of incinerated waste). During 2006, HP saved $4.9 million by recycling more than 87% of its solid waste. During 2005, 37,000 tonnes of paper (560,000) trees was recycled which avoided 1 billion liters of water and 170 GWh of electricity. HP urges employees to use reusable mugs and cups and has reduced paper napkin use by nearly 24%. 60 tonnes of coffee grounds are used by a coffee recycling program for landscaping. In 2005, tool reuse systems were improved and more than 600 wafer fabrication process tools were reused which along with other reused tools avoided 650 tons of waste.

Intel found a way to dry and sell the copper oxide portion of its waste. 55% of all chemical waste was recycled and more than 1 million gallons of waste was reused. In 2006, 80 tons of food was composted and more than 110 tons of material were reused as packing supplies. Intel supported a fuel substitution for chemical recycling.

In 2005, IBM's hazardous waste output had been reduced 19% from 2004 (847 metric tons). During the year, 43% of its waste was recycled. From 2006-2007, hazardous

waste indexed to output was reduced by 8.4%, avoiding 302 metric tons of waste. However, hazardous waste generated increased 14% due to the management of contaminated soil and sludge. During 2007, 78% of the waste was recycled.

**Supplier Audits**

The companies all believe that sustainable practices should apply to their suppliers. All of the companies have Supplier Codes of Conduct and are members the EICC industry collaboration.

During 2005, Apple initiated its Supplier Code of Conduct for which suppliers are required to comply. The code is similar to the EICC code but is more regulatory in several ways. All final assembly suppliers were required to create quarterly reports focusing on 23 key performance indicators (KPIs).

Dell applies its environmental and sustainable practices to the suppliers that the company chooses. The Dell Supplier Principles were first introduced in March 2004; the principles focus on the environment, employee health and safety, and labor rights. In 2006, Dell introduced a BPI (Business Procurement Improvement) methodology, which involves skilled Dell manager being teamed with global suppliers to identify and analyze issues and actions. During 2008, BPI was expanded to 17 additional facilities. All Tier 1 suppliers are required to sign an EICC code commitment letter. A Supplier Review Board was created in 2008 to handle supplier noncompliance issues.

HP has a $53 billion supply chain; the company's top 500 suppliers (which represent 99% of the total amount spent) are the main concern of the Supply Chain Social

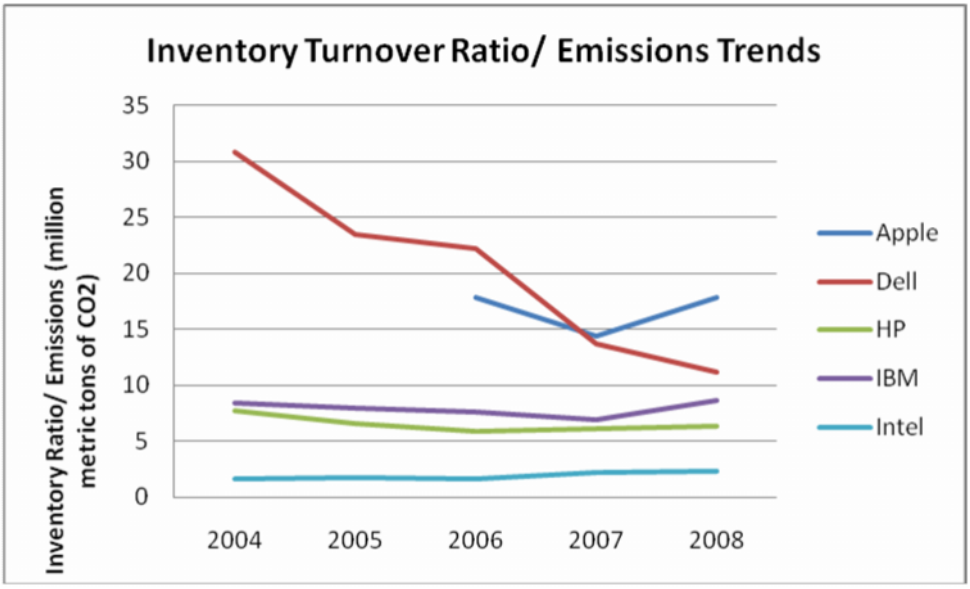
and Environmental Responsibility (SER) Policy. During 2008, HP audited 142 suppliers. In 2008, HP was the first IT company to disclose a list of its top suppliers.

Intel has been placing expectations on suppliers since 1998. Supply Chain management consists of 3 vice presidents and 12 directors. Intel has annual Supplier Days and Supplier Awards to promote awareness. In 2006, Intel chaired the EICC coalition and provided training and review for its suppliers. In 2008, Intel performed a top-tier site assessment and 84% of the suppliers were medium-low risk.

IBM has a $39 billion global supply chain with suppliers in over 60 countries. The company manages its supply chain through the establishment of standards and communication, supplier assessments, industry collaborations, and compliance and improvements. IBM spends nearly $2 billion a year on supplier diversity. In 2004, the IBM's Supplier Conduct Principles were released. In 2009, the company plans to exchange its code for the EICC code of conduct and will perform audits according the EICC Validated Audit Process.

**Inventory Turnover Ratio/ Emissions Analysis**

Corporate sustainability reporting is a relatively new practice; there are few means of measurement that exist for cross-industry comparison. The objective of the analysis was to determine whether a correlation existed between the inventory turnover ratio and the level of emissions (Scope 1 and Scope 2) that are related to electricity usage or operations. The inventory turnover ratio is defined as a measurement of how quickly a company can sell and replace its inventory; it is calculated by dividing cost of goods sold by average inventory. The reason that the calculation of the inventory turnover ratio was selected is that companies that are able to manage inventories better would have lower rates of emissions (because company reports stated that approximately 90-95% of all electricity consumption is directly related to manufacturing and the majority of emissions are directly related to electricity consumption).




Dell has a direct business model and therefore has a lower inventory turnover rate in comparison of the overall technology sector. Over the five year period, the relationship between Dell's inventory turnover rate and emissions was negative and showed a significant decrease, a sign that Dell has been improving its emissions on the basis on its inventory management. HP, IBM, and Intel were stable during the period. Of the five companies, Apple had the lowest performance. It is assumed that Apple does not have a strong ratio because it did not measure emissions prior to 2006 and therefore has less experience with dealing with emissions reductions than the other companies.

**Rankings Analysis**

Greenpeace and Climate Counts are two organizations that maintain company rankings and include all of the focus companies except for Intel. The findings of the two organizations were chosen for examination to provide a basis of company assessment outside of the corporate sustainability reports that may provide a new perspective on the companies.

Greenpeace releases its "Guide to Greener Electronics" multiple times a year. The guide focuses on fifteen different factors that are mostly involved with the life cycle analysis. Dell, HP, and Apple are included in the rankings. HP and Dell have been penalized in 2009 for not meeting their goals concerning PVC and BFR phase-outs. Apple's only good score for June 2009 concerned BFR and PVC phase-out and the company's overall score was 4.7/10. The bad scores include no use of recycled plastic content, no global GHG emissions reduction support, and no amounts of renewable energy used. Dell's ranking was a 3.9/10. The company's strongest points included the precautionary principle, chemicals management, GHG emissions reduction commitment, and amount of renewable energy used; the worst points were the timeline for PVC and BFR phase-out, timeline for additional substances phase-out, and global GHG emissions reduction and support. The score for HP was 3.5/10. The strongest points included the precautionary principle, chemicals management, and carbon footprint disclosure; the worst points were no PVC and BFR-free models, timeline for additional substances phase-out, and global GHG emissions reduction and support.

Climate Counts has ranked IBM, Dell, Hewlett-Packard and Apple from 2007-2008. Climate Counts measure 22 areas in categories concerning review, reuse, report, and policy stance specifically regarding emissions. IBM was the strongest company with a score of 77/100 (+7 increase from 2007). HP received a 68 (+9) and Dell received a 49 (+8). Apple performed the worst with a score of 11 (+9). Apple received no point for the review and policy stance sections and low points for the reuse and report sections.

**Conclusion**

As awareness concerning critical environmental issues continues to rise, corporations will face more pressure to reduce the environmental impacts of their operations and manufacturing: multinational regulations, shareholders, nongovernmental organizations (NGOs), and environmental lobbyists are only a few of factors that influence company policies and business standards. However, there is a serious "green" behind corporations "going green." All five of the selected companies experienced a range of financial benefits from choosing to adopt sustainable business practices. From the decrease in harmful chemicals which helps avoid environmental fines, the recycling of waste in production that reduces the need for the purchase of new raw materials, to reduced product packaging that increases the efficiency of each shipment, sustainability benefits are only limited by the amount of innovation each company invests. However, a completely "sustainable" technology product does not exist yet. Considering the rankings of Greenpeace and Climate Counts, there is room for a great deal of improvement from these companies. These companies are on the right track by addressing and assessing corporate responsibility, but there is a long road ahead for the optimization of green technology.

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