Building a Long-term Strategy for IT Sustainability

Intel IT is engaged in developing a broad, ongoing sustainability strategy to help Intel consume fewer resources and emit less waste. In analyzing the business case for IT sustainability, we identified the bottom-line benefits and defined the metrics that enabled us to effectively reduce our environmental footprint. Successful sustainability initiatives are now being incorporated beyond the IT organization, and we will continue to take a structured approach to identifying solutions and instilling long-term sustainability.

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April 2009

IT@Intel

Executive Summary

Intel IT is focused on developing sustainable practices that will allow us to lower our resource consumption and produce less waste while saving resources throughout the company.

We analyzed the business case for IT sustainability—including bottom-line benefits, risk assessment, brand value, and definition of metrics—to determine which programs would yield the greatest benefits to Intel while actively engaging with industry to promote sustainability.

Throughout our assessment, we found that the business case for IT sustainability includes changing IT practices to save resources and improve operational performance as well as developing and promoting ways in which IT can help reduce our environmental footprint. We also realized the importance of instilling change throughout the IT organization.

We developed a sustainability framework and defined associated IT sustainability initiatives along with a set of metrics to measure and help ensure success. Our challenge to develop sustainable IT practices encompassed:

- Establishing a roadmap and baselines.
- Addressing consumption and waste.
- Setting challenging goals.
- Redesigning our business processes.
- Encouraging participation.

Intel IT is firmly committed to reducing Intel's environmental impact and carbon footprint, and we continue to provide innovative leadership to contribute to Intel's corporate sustainability.

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Background

The environmental impact of conducting business, especially in the area of IT, continues to receive increased attention on all fronts—from customers and employees to regulators and local communities. In many corporations, environmental considerations have become explicit criteria for making decisions, right alongside financial considerations. Applying an environmental lens to strategic decision making is becoming more commonplace, focusing on the "win-win" benefits associated with balancing what might once have been seen as competing interests.

Despite the fact that many corporations want to be proactive and reduce their impact on the environment, determining the best approach can be challenging. To date, there are few commonly accepted or clearly defined methodologies for making long-term strategic decisions regarding sustainability. Since all corporations have financial targets to achieve and shareholders to satisfy, any proposed initiative must be balanced with pragmatism and corporate goals.

IT impacts the environment and increasingly propels corporate sustainability initiatives to improve efficiency, reduce resource consumption, and help combat climate change.

Intel and IT Sustainability

Intel has long recognized the importance of sustainability as a business driver and has taken a proactive role in maximizing energy efficiencies and addressing the company's environmental impact. Management understands both the opportunity and the responsibility of being part of the solution—by identifying sustainable practices and addressing the challenges presented by the environmental issues we all face.

From the ubiquitous carbon footprint factor to energy efficiency, our strategies focus on reducing consumption and generating less waste, with IT serving as a basis for those strategies. Our efforts include working with industry leaders and governments around the world to establish sound standards and policies, developing energy-efficient products, improving supply chain performance through reduced material usage and improved efficiency, and creating a number of corporate sustainability programs.

Intel IT is a key contributor to Intel's strategic sustainability agenda and the company's goals.

Developing an IT Sustainability Strategy

IT sustainability encompasses the study and practice of using information and computing technology resources efficiently and effectively in ways that the planet can support indefinitely. As we developed a cohesive Intel IT sustainability strategy, we needed to incorporate practices that:

- Established our roadmap and baseline measurements.

- Addressed consumption and waste while creating a sense of urgency across Intel and the IT organization.

- Set challenging goals with action plans to measure and monitor Intel IT's environment.

- Redesigned our business processes from the top down to reinforce sustainability principles and practices in everyday actions and decision making.

- Encouraged creative involvement and innovation from employees.

Our Approach to IT Sustainability

Intel IT has long practiced what is now termed sustainability, investing in and implementing technologies that could result in increased efficiency and lower costs. Early implementation strategies matured into the sustainability programs we use today to manage and measure our efforts on a holistic basis across the entire enterprise, integrating sound practices, efficient technologies, and improved metrics.

Early Initiatives

Our sustainability initiatives began over a decade ago; we recognized the importance of simply getting started, and we created our own programs, establishing baselines and metrics for success.

Each of our initiatives offer direct benefits to the bottom line while lowering Intel's environmental impact. Table 1 includes an overview of some of the programs and their results. As some have longer life spans, we continue monitoring, reporting, and improving upon them.

Establishing the IT Sustainability Program Office

The Intel IT Sustainability Program Office began as a grass roots initiative when executives asked the question, "What is sustainable IT?" Our global team came back with an array of answers that reflected their diverse experience and areas of expertise and provided many opportunities to contribute. The complexity of the response led to analysis, research, and the development of models and methods for capturing and measuring environmental impact—tools that could be applied throughout the organization to establish baseline measurements and identify improvements.

Establishing these metrics created strategic value to Intel and now drive the definition and measurement of sustainability initiatives—a critical step for verifying program success. Corporate management recognized that our expertise in measurement and the use of technology could be used in collaboration with groups across the enterprise to more effectively reduce Intel's overall carbon footprint.

Our efforts formally became the IT Sustainability Program Office in the fourth quarter of 2008. Through this endeavor, we've defined several strategic initiatives, all targeted to benefit the organization and align with corporate sustainability efforts. The IT Sustainability Program Office initiatives and goals are:

- **Strategy development and education.** Develop an IT sustainability strategy and roadmap to educate and provide leadership to the organization on the principles and importance of sustainable business practices.

- **Develop and deliver sustainability metrics.** Apply appropriate metrics and communicate sustainability performance while accommodating regional needs.

- **Drive the IT project and innovation portfolio.** Define and drive IT's sustainability project and innovation portfolio, which includes "enabling Intel sustainability" projects.

- **Support external events.** Deliver or enable external communications to customers, industry forums, and media.

- **Platform design team value opportunity input.** Share IT key results, ideas, and needs relating to sustainability and value-add opportunities with platform design teams.

- **Align Eco-Technology and corporate affairs.** Drive and influence the partnership between Eco-Technology (see sidebar), Intel Corporate Affairs, and IT.

Intel's Eco-Technology Platform

Intel strives to serve as an environmental role model through our operations, policies, and industry collaboration. Our Eco-Technology platform encompasses both how we produce our products in a sustainable way and what our products deliver: ever-improving energy-efficient performance and contributions to environmental solutions.

As part of overall Intel strategy, various organizations participate in Eco-Technology initiatives, and, collectively, we are all part of the solution. Within this organizational framework, Intel IT specifically has two roles:

- An active, contributing role in reducing Intel's environmental impact

- An innovative, enabling role by providing the information systems to manage and improve Intel's environmental performance

Table 1. Intel IT Sustainability Initiatives

Sustainability Initiative	Strategies	Anticipated Benefits and Key Results
Server Refresh	• In 2004, Intel IT adopted an accelerated server refresh strategy across the entire design computing environment, removing less energy-efficient servers that were more than four years old.	• In 2008, we saved USD 45 million by consolidating almost 20,000 older servers into more powerful platforms that use newer Intel® Xeon® processors; we avoided data center construction at four locations and delivered greater energy efficiency while sharply reducing energy consumption and cost.[1] • IT studies demonstrate an increase of 7x the compute capacity in the same space, using less power, since 2004.[2] • An Intel site received a USD 250,000 rebate from a local power company after demonstrating that new machines performed the same amount of work while consuming less power.
Client Refresh	• Intel IT maintains a regular client PC refresh cadence, deploying new machines with Intel® vPro™ technology.	• We have provisioned more than 31,000 Intel vPro technology-enabled PCs through 2008, enabling reduced support costs through remote diagnosis and repair capabilities.[3] • Intel vPro technology provides increased security and manageability capabilities, thereby enabling increased productivity and lower overall cost. • The latest generation Intel vPro processor technology improves energy efficiency by 46 percent.[4]
Mobility Drive	• Intel IT drove adoption of mobile computing as a corporate-wide strategic initiative.	• Transition to mobile computing with notebook computers consumes 25 to 35 watts less power compared to desktop computers.[5] • About 83 percent of Intel employees now use notebooks as their primary business device. • By replacing 6,400 desktops with notebooks, we achieved productivity gains valued at USD 26 million (three-year net present value).[6]
Data Center Efficiency Program	• In 2007, we began implementing a data center efficiency program. Key elements include: data center consolidation, accelerated server refresh, implementation of server virtualization and grid computing, standardization of processes and design specifications, reduction of server and storage platform reference designs, use of power-efficient servers, and energy-saving data center design.	• Through 2008, we saved more than USD 95 million through our data center efforts.[7] • We reduced the number of data centers by 22 percent through consolidation— from 96 to 75.[8] • We reduced data center space requirements from about 458,000 square feet to approximately 330,000 square feet and expect to achieve a nominal cost savings of close to USD 1 billion (net present value of USD 500-750 million).[9]
Data Center Virtualization and Asset Utilization	• Intel IT's data center virtualization initiative enables Intel design engineers to transparently use compute server resources worldwide, increasing server utilization and reducing expenses. • Ongoing programs ensure that Intel IT enables only essential applications and supporting infrastructure, eliminating redundant or unused applications and freeing valuable IT resources.	• In 2008, we achieved and maintained 80 percent server utilization, approximately 10 percent higher than in 2007, and avoided close to USD 33 million in costs.[10] • Since 2007, we have reduced the number of applications in our environment by almost 37 percent, making steady progress towards our overall goal of 50 percent. We expect that retiring applications will result in a net present value of more than USD 50 million.[11]

Table 1. Intel IT Sustainability Initiatives (Continued)

| Sustainability Initiative	Strategies	Anticipated Benefits and Key Results
Data Center Design Optimization	• Thermal storage systems provide cost-effective, temporary cooling in high- and medium-density data centers. • Air-cooled data center designs complement our primary strategy of achieving high density at lower cost. • Wet side economizers at two medium-sized high-density data centers achieve high levels of cooling system efficiency, reducing energy consumption and expense.	• Using an air economizer to cool production servers yielded a potential reduction in annual operating costs of up to USD 2.87 million for a 10-megawatt data center.[12]
Data Center Metering and Manageability	• Intel IT chartered an enterprise-wide program to investigate, develop, and evaluate design options for integration of data center IT and facility asset management systems to optimize performance and improve enterprise-wide monitoring and management.	• Specific proof points indicate that integrated data center manageability practices have the potential to increase energy efficiency in the data center by up to 10 percent.[13]
Collaboration Technologies	• Intel IT enables global teams to collaborate through a combination of unified social media strategy and tools. • Use of real-time office collaboration technologies—including high-definition video, rich audio, and other interactive elements—create an experience comparable to meeting in person.	• Collaboration technologies help employees achieve work-life balance while reducing travel costs and Intel's carbon footprint.
Dematerialization	• Intel IT's focus on reducing the raw materials required to provide customer solutions began with early instantiations of the enterprise resource planning (ERP) system and eBusiness adoption. From human resource services to financial services, along with customer and business-to-business applications and processes, IT solutions have changed how we do business.	• We have reduced our use of material assets through electronic document management systems, integrated information management, and retrieval capabilities. • In 2008, we passed the halfway point in the complete upgrade of our ERP system, which will create an agile and scalable solution to support our growth.
Industry Engagements	• Intel has taken a leadership position and initiated several industry engagements.	• Intel has a long history of working with the U.S. Environmental Protection Agency (EPA) on a range of initiatives, including ENERGY STAR* and Climate Savers*, to reduce emissions and increase computing energy efficiency. • Intel has been a core team member in developing Data Center Codes of Conduct in collaboration with the Green Grid; the European Union; and the Bureau of Energy Efficiency, Government of India, among others. • Intel is an active member of Digital Energy and Climate Solutions (DECS), a coalition of leading information and communications technology (ICT) companies and energy conservation groups working together on initiatives to educate and promote how ICT strategies can improve energy efficiency.
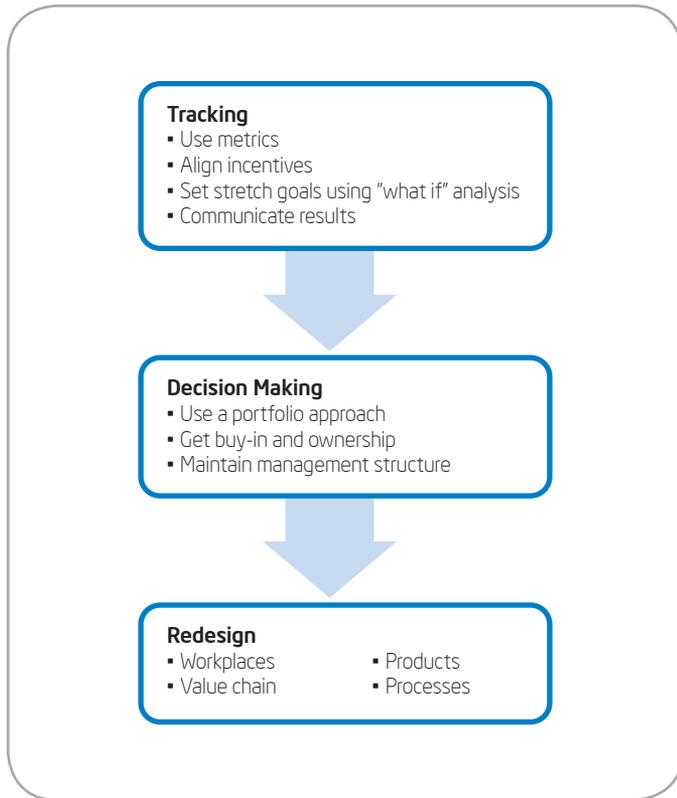
Figure 1. Steps to building a sustainability mindset across the IT organization.

Building a Sustainability Mindset

Building a sustainability mindset strengthens business efficiency, reduces consumption and waste, and enhances the Intel brand. We knew we would need to influence corporate culture, including decision making processes and employee involvement, to be more sustainability-focused and to adapt to new thinking and methodologies. Figure 1 outlines the steps we took. Our goal was to develop a cohesive, integrated strategy that created awareness along with a sense of urgency within our organization and across Intel.

Sustainability Framework

We established a sustainability framework as a mechanism for organizing sustainability programs and projects and making sure we stayed focused on critical activities. The framework, shown in Figure 2, guides projects that have an impact on energy efficiency with regard to data centers, office and productivity, business capabilities, and IT for buildings. The framework includes:

- Providing data and information to meet global regulations and standards.

- Using new technology to improve sustainability on Intel® platforms

- Improving education, communication, and decision making by following the IT sustainability principles.

- Sharing best known methods (BKMs) to influence industry.

- Establishing baseline metrics and goals for resource and waste reduction.

Figure 2. Intel IT's sustainability framework. We established the framework as a mechanism for organizing sustainability programs and projects and making sure we stayed focused on critical activities.

IT Sustainability Principles

Our IT sustainability principles, summarized in Table 2, play an important role in decision making and are included in measurement models, standards, and processes. These criteria can also influence the selection of programs and suppliers toward those with sustainable business practices.

Developing Metrics

In developing the scorecard and metrics for gauging Intel IT's performance, we focused on sustainability factors, incorporating industry knowledge and lessons learned. This approach allowed us to:

- Review market trends and use existing research and industry methodologies.
- Develop relevant measurement options.
- Assess our practices, policies, and performance, and set our baseline.

We know that the metrics must be comprehensible and actionable. In addition, potential initiatives must yield both financial cost benefits as well as environmental value. We stay focused on making sure that every initiative we adopt is measureable, justifiable, and practical.

Measuring the Baseline

Throughout development and implementation, it was critical to understand how to create baselines and leverage successes into further action and involvement across Intel. Once we set baselines, we could then establish metrics, monitor progress, measure the financial impact, and adjust organizational processes to better embrace our sustainability principles.

To quantitatively measure, calculate, and predict the overall environmental impact of IT activities, we developed a tool called the Sustainability Baseline Model. This comprehensive tool helps to analyze data for data centers, client computing, and travel, and performs calculations to help make sound business decisions in critical areas such as:

- Power consumption
- Carbon (CO_2) emissions
- Electronic waste (eWaste)

Carbon Emissions

Power usage and associated CO_2 emissions originate throughout the enterprise, which includes worldwide office environments and data

Table 2. IT Sustainability Principles

Principle	Description
Select sustainable suppliers	Utilize suppliers who adhere to sustainable business practices and provide capabilities that enable Intel's sustainability strategy.
Consciously manage the capability lifecycle	Embed sustainability standards into capability development, delivery, and end-of-life processes.
Promote Intel IT's sustainability innovations across Intel	Actively share sustainability-related concepts, results, and innovations to further develop Intel® platforms.
Reduce travel	Reduce direct travel and enable collaboration alternatives.
Measure, monitor, and reduce energy consumption	Measure and monitor resource consumption—including reuse, recycle, and waste—based on industry standards.
Enable sustainable facilities	Partner with other organizations throughout Intel to enable energy-efficient buildings around the world.
Promote sustainability within the industry	Share sustainability strategies, best-known methods (BKMs), and results with industry peers.
Enable Intel to meet global sustainability compliance	Work with business partners to identify, assess, and enable corporate sustainability regulations that require IT capabilities.
Facilitate dematerialization	Reduce the raw materials used in conducting business; for example, substitute high-carbon products and processes with lower carbon alternatives.
Enable sustainable behavior	Educate, encourage, and enlist employees by sharing BKMs, successes, and challenges and by inviting their input into programs and projects.
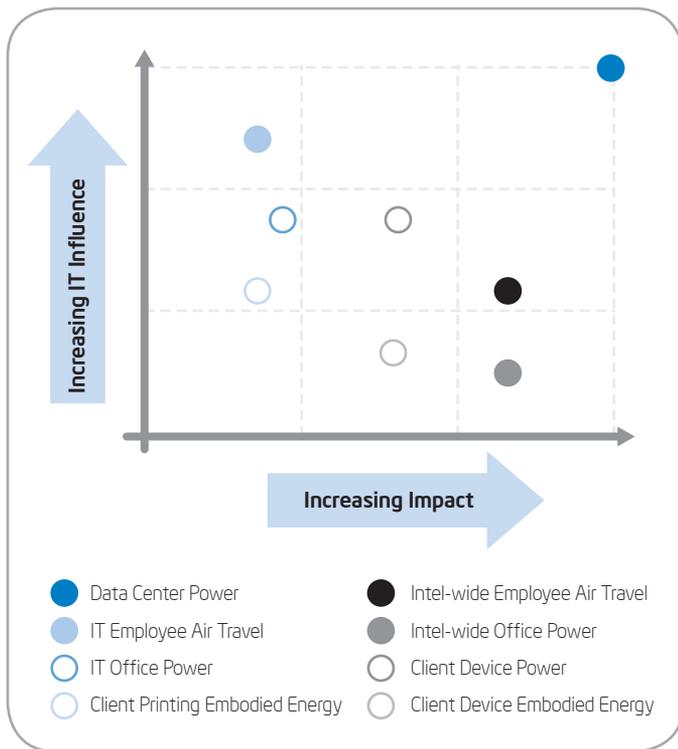
Figure 3. Intel IT focuses sustainability initiatives on the highest impact areas.

centers. Employee air travel also contributes to CO_2 emissions. The Sustainability Baseline Model categorizes these costs and calculates predicted energy consumption and CO_2 emissions for a given year. The tool can then be used to determine strategies to reduce CO_2.

eWaste

eWaste comprises PCs, printers, servers, and other electronic equipment that can be recycled, donated, sold, or reused in different capacities. The volume of eWaste is entered into the Sustainability Baseline Model, which calculates the total weight of outbound equipment. The tool can help identify strategies for disposing of equipment in the most sustainable manner.

Assessing Risk

In recent years, governments around the world have increasingly enacted environmental regulations, which in turn have stimulated sustainability-focused business innovations. As a worldwide organization, we consider risk management with regard to regulations focused on:

- Imposed processes
- Data tracking
- Data storage

Intel IT is taking a broad reaching, long-range approach to identify the risks and challenges associated with sustainable IT practices and how they impact our business.

Results

We identified and evaluated business areas within our organization and across Intel that would provide the highest impact in terms of:

- Sustainability benefits
- Cost considerations
- Potential results

Table 1 summarizes some of our initiatives as well as their key and anticipated results.

The highest impact areas of IT influence, shown in Figure 3, represent rough approximations using publicly available, average benchmarks scaled to the size of Intel IT. The metrics for IT influence consider operational control, buying power, degree of IT enablement, availability of viable alternatives, and other similar factors as part of the decision making process. Not all initiatives identified can be undertaken, but our analysis of possible opportunities helped us determine the best places for investment.

High Impact: Data Centers

Like many companies, we focused first on our data center environment to reduce energy consumption and increase efficiency. Since more than half of IT's direct energy use is related to these facilities, reducing power consumption in all of our data centers is a key goal. We refresh servers on a four-year cycle to deliver new, more powerful and more energy efficient systems. Older, obsolete units are then reused, recycled, or judiciously disposed of.

Several pilot projects are underway to enhance data center power usage effectiveness (PUE) performance. Those focused on heating, ventilating, and air conditioning (HVAC) have returned outstanding results. Also, through application virtualization and application end-of-life (EOL) efforts, we are working to better utilize the assets in our environment and reduce the need for purchases.

High Impact: Productivity

In our office computing environment, we emphasize mobility and refreshing equipment; this has increased overall productivity and also decreased energy use through incorporating new products and technologies.

Reducing the accumulation of personal printers, fax machines, and copiers; incorporating double-sided printing; and using digital distribution methods have significantly lowered operating costs and reduced energy consumption. Additionally, implementing virtual conference capabilities and increasing the use of collaboration tools help bring the world closer—improving communications and reducing the need for local and international travel.

Community Collaboration

Intel IT is also active with efforts to collaborate and improve results beyond the enterprise. We share our data center experience directly, and Intel IT engagements also provide the opportunity to work with established communities—both onsite and online—to exchange techniques and strategies. For example, Intel IT is an active member of Climate Savers*, working on mutual commitments with this growing industry forum. We publish relevant white papers and participate in key events to further these efforts.

Conclusion

As our initiatives prove to be successful, several are being extended beyond the IT organization and implemented throughout the enterprise. While a number of these are already underway, additional work remains.

We continue to take a structured approach to sustainability with our IT policies, practices, and investments as well as managing the risks of non-compliance, which include operating viability, regulatory risks, tort liability, and public perception.

Overall, Intel IT will:

- Enlist the broad IT talent base by sharing benefits, applying BKMs, collaborating, and using these results to create further initiatives.

- Share a key role in Intel product development, serving as a strategic partner to drive growth and deliver solutions.

- Develop external strategic relationships to share BKMs, work with industry leaders to create new solutions, and encourage a global, collaborative community.
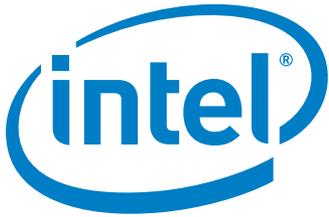
For More Information

- IT@Intel Program: www.intel.com/it
- Intel Corporate Responsibility: www.intel.com/intel/finance/social.htm
- Intel Environment Site: www.intel.com/intel/environment

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Acronyms

BKM	best-known method		ERP	enterprise resource planning
CO_2	carbon		eWaste	electronic waste
DECS	Digital Energy and Climate Solutions		HVAC	heating, ventilating, and air conditioning
EOL	end of life		ICT	information and communications technology
EPA	Environmental Protection Agency		PUE	power usage effectiveness

[1] See the *IT@Intel Information Technology 2008 Performance Report.*

[2] See the IT@Intel paper "Accelerated Server Refresh Reduces Costs."

[3] See the *IT@Intel Information Technology 2008 Performance Report.*

[4] www3.intel.com/cd/channel/reseller/asmo-na/eng/403012.htm

[5] See the case study "Verizon's Monitor and PC Power Management Initiative could Save $7 Million Annually."

[6] See the IT@Intel brief "Client PCs as Strategic Assets."

[7] See the *IT@Intel Information Technology 2008 Performance Report.*

[8] See the *IT@Intel Information Technology 2008 Performance Report.*

[9] See the IT@Intel white paper "Transforming a Global Data Center Environment."

[10] See the *IT@Intel Information Technology 2008 Performance Report.*

[11] See the *IT@Intel Information Technology 2008 Performance Report.*

[12] See the IT@Intel white paper "Reducing Data Center Cost with an Air Economizer."

[13] Intel Internal measurements, April 2009.