How Cisco Achieved Environmental Sustainability in the Connected Workplace

Cisco Connected Workplace aspires toward a green office environment.

Cisco IT Case Study / Office Design / Green Office Design: Cisco® IT and Workplace Resources have begun to deploy a new office design to support better collaboration among employees and improve productivity. The new design leverages IP telephony and wireless technology to enable this environment. While improving collaboration, it also saves money by increasing office space utilization 40 percent and reducing the total number of per-capita IT-related hardware devices 22 percent. Total per capita IT equipment wattage has been reduced by 44 percent, lowering greenhouse gas emissions. Less hardware reduces consumption of materials and eventual e-waste. Cisco customers can draw upon Cisco IT's real-world experience in this area to help support similar enterprise needs.

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>
> —Christina S. Kite, Vice President, Cisco Global Work Place Resources and Enterprise Risk Management

Background

Environmental sustainability is a major global trend for the 21st century. Governments, companies, and consumers are more aware and taking action on energy and climate change, air and water pollution, resource depletion, human health and safety issues, waste disposal, and biodiversity. Government intervention to promote environmental sustainability is increasing around the world through international agreements, national policies, regulatory mandates, and government purchasing.

Commercial buildings are one focus of environmental sustainability. According to the U.S. Green Buildings Council (www.usgbc.org), buildings account for:

- 62.5 percent of total U.S. electricity consumption
- 36 percent of total U.S. primary energy use
- 30 percent of total U.S. greenhouse gas emissions
- 136 million tons of construction and demolition waste in the United States
- 40 percent (3 billion tons annually) of raw materials used globally

Corporations are increasingly adopting standards and implementing initiatives to improve the environmental performance of their operations by reducing energy, transportation, and waste. These standards and initiatives include green building

standards, environmental management systems, and environmental initiatives.

EXECUTIVE SUMMARY
BACKGROUND
• Corporations are increasingly adopting standards and initiatives to improve environmental performance
CHALLENGE
• Reduce consumption of materials and equip.
• Improve energy efficiency
• Increase space utilizaiton
SOLUTION
• Deployed Connected Workplace work env.
RESULTS
• Substantial improvements in the sustainability of the new environment
• 50% fewer Ethernet ports
• 33% employee increase in space
LESSSON LEARNED
• Important to follow etiquette when occupying workspace
NEXT STEPS
• Expand new office design to various locations in San Jose and across the globe

Challenge

Increasing operati Cisco is rethinking its fundamental approaches to the role of its real estate in its business. The company wants to design and manage its real estate to enhance worker productivity and satisfaction while reducing its demands on the environment. Cisco believes that the successful integration of information technology, networking, and building operations systems will result in workplace environments that both empower its workforce and reduce resource consumption.

After recognizing that traditionally assigned office space is vacant about 65 percent of the time while meeting rooms are often in short supply, Cisco developed the Connected Workplace, which successfully reconciles business demands with environmental responsibility. This initiative creates more effective work environments that house more people in less space. Over the long term, it also saves money and resources. The Connected Workplace virtually eliminates dedicated workspaces and increases shared spaces available to everybody, adapting to the increasingly mobile and collaborative work styles of Cisco employees and contractors. It raises productivity, enhances collaboration, and increases employee satisfaction, while reducing real estate and technology costs.

"A properly designed workplace requires less building infrastructure, which takes up less space, produces less heat, and consumes less power than traditional workplaces—while supporting employees more effectively," says Christina S. Kite, vice president of Global Work Place Resources and Enterprise Risk Management at Cisco.

As part of its return on investment (ROI) analysis, Cisco wanted to quantify the environmental sustainability of the Connected Workplace compared to traditional office environments. Cisco commissioned a study with a team of experts led by Richard Hodges at GreenIT and Andrew Armstrong of WSP Environmental Strategies. The study sought to prove the following potential environmental benefits of transitioning to the Connected Workplace:

- Reduce consumption of materials and equipment

- Improve energy efficiency

- Increase space utilization

- Reduce electronic and office waste

These savings lower greenhouse gas emissions from the electric utility company supplying power to the workplace and from everyday workplace operations. Measuring this reduction was beyond the scope of this study, as were potential reductions in greenhouse gases consumed during building material fabrication, construction, and long-term operations. An analysis by WSP Environmental Strategies has demonstrated that a 40-percent increase in employees assigned to a 100,000-square-foot office space could save 1500 tons of concrete, 280 tons of steel, and 2850 tons of greenhouse gas emissions—the equivalent of taking 560 passenger cars off the road for a year.

Solution

The proof-of-concept Connected Workplace project was located in Building 14 of the Cisco San Jose, California campus. Designed for general administration employees (about half the Cisco workforce in San Jose), the Connected Workplace addressed environmental sustainability by reducing the number of electronic devices per employee, leading to reduced

equipment wattage and eventually, less e-waste disposal. (For more information on the design and technologies used in the Building 14 Connected Workplace project, see the internal case study *Cisco Connected Workplace Enhances Work Experience and Cuts Costs* at http://www.cisco.com/web/about/ciscoitatwork/downloads/ciscoitatwork/pdf/Cisco_IT_Case_Study_Connected_Workplace_POC.pdf)

The team compared the Connected Workplace in Building 14 with a comparable, traditional environment in Building 18 nearby. Building 14 supports 400 employees. Building 18 is designed to support 300 employees. Both buildings have a wireless LAN (WLAN) and Cisco IP telephony systems. Employees in both buildings primarily use laptop computers. (Should an organization replace desktop computers with laptops when it transforms its real estate into a Connected Workplace, there would be a greater power savings than this study indicates.)

Comparing actual power consumption between Building 18 and Building 14 would be difficult and expensive, because the spaces are only portions of larger buildings, and Building 14 had no long-term usage with the new design. However, calculating published watts of connected load for each device, the analysts could compare potential wattage and BTUs (British thermal units) of heat between the two spaces.

Results

The study demonstrates substantial improvements in the sustainability of the new environment of Building 14, compared to the traditional environment in Building 18. These efficiencies reduce real estate cost per employee, protecting long-term operating profitability and freeing up budget that can be reinvested into strategic projects that generate revenue. With the successful conclusion of the project, Cisco is extending the Connected Workplace approach throughout its San Jose campus.

Reduce consumption of materials and equipment

Table 1 lists the number of electronic devices found in Building 18, compared to the number of devices designed for Building 14. The higher employee density in Building 14 leads to more devices overall, but fewer devices per employee, an improvement of 22 percent. The primary differences in Building 14 are: 50 percent fewer powered Ethernet ports; a reduced number of common-area devices such as printers and copiers; elimination of "personal" gadgets such as refrigerators, stereos, and microwave ovens; and a higher density of WLAN Access Points. Personal gadgets do not appear in the new building because there are virtually no assigned workspaces. The study does not account for the negligible impact of small personal items such as mobile phone or iPod chargers.

Table 1. Devices per Employee

	Standard Cisco Office - Building 18	Connected Workplace - Building 14
Printing and copying equipment	28	8
Desktop equipment	961	1032
Audiovisual equipment	22	47
Networking equipment • **Cisco Catalyst® 6509-E with dual power supply** • **Cisco Access Points** **Total number of network elements**	2 4(350)	1 7(1200)
Total number of devices	1050	1095
Number of employees	300	400
Devices per employee	3.5	2.8

Cisco also reduced the building infrastructure required to support the IT equipment in Building 14. By wiring two Ethernet drops per station (instead of the usual four drops) and increasing the density of wireless networking service, Building 14 uses 54 percent less cabling than a similar deployment in Building 18.

Improve energy efficiency

Based on published power ratings for the devices in Table 1, the analysts calculated an estimated power load of each building, including wattage, BTUs of heat generated, and total cooling tonnage required to remove equipment-related heat from the environment. Even with more devices, the efficiency of the Connected Workplace results in a projected 44 percent savings in energy load (from 2.6 to 1.7 watts per square foot) by reducing nominal electric load in every equipment category (Table 2 and Figure 1). Because of increased headcount and more efficient systems, the Connected Workplace has only 179 watts of connected load for office equipment per employee compared to 424 in the traditional space.

Table 2. Comparison of Traditional and Connected Workplace

	Traditional Cisco Office Building 18	Connected Workplace Building 14	Percent Change	
Number of employees	300	400	33% increase	
Wattage per square foot	2.6 W / ft2	1.7 W / ft2	36% reduction	
Wattage per employee	423.9 W	178.7 W	58% reduction	
Total Wattage	127,169 W	71,476 W	44% reduction	
Total BTUs	433,646	243,733	44% reduction	
Total Cooling Tonnage *	36 Tons	20 Tons	44% reduction	

* Note: the 44% reduction in cooling tonnage is a reduction potential, not an actual reduction as with wattage.

Figure 1. Reduced per-Employee Energy Wattage in the Connected Workplace
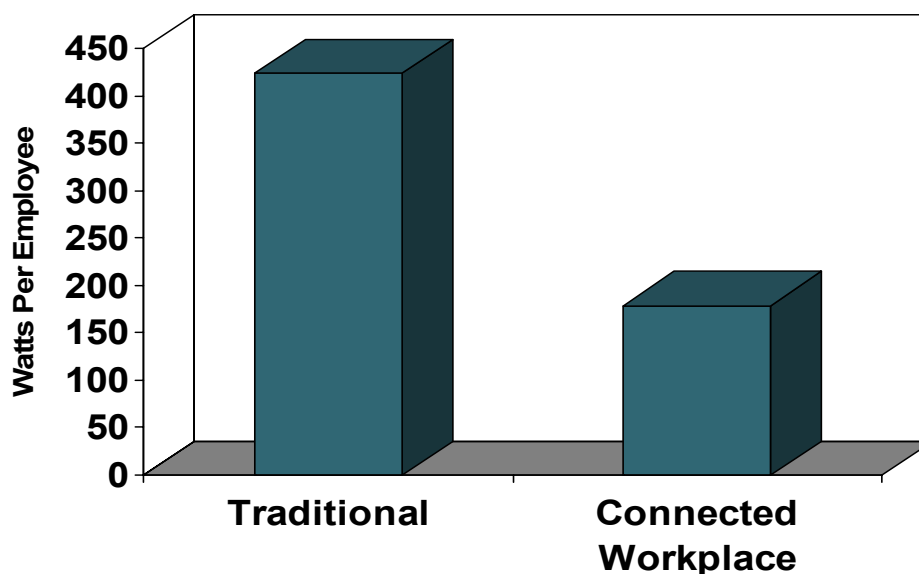
Increase space utilization

The Connected Workplace proof-of-concept project reduces square footage per employee from 160 to 106 square feet, approximately 40 percent less space for a population of general administrative personnel. As a corporation with thousands of employees worldwide, Cisco could adopt the Connected Workplace model to substantially reduce its real estate expenditures such as land, construction, and building operational costs over the life of a building—while increasing the effectiveness and comfort of its workforce and planning for future growth.

Reduce electronic and office waste

Using 22 percent fewer electronic devices per employee (3.5 down to 2.8) and 54 percent less cabling results in less overall e-waste. It should be mentioned that, from an environmental perspective, the materials used in standard data cables represent a significant environmental hazard. Most standard data cables are jacketed with polyvinyl chloride (PVC) plastics that may contain lead, creating a disposal hazard at end of life. Every 1000 feet of cable brings 11 pounds of flammable PVC plastic into a building. Data cables are also a major demand factor for the mining of virgin copper. And data cables are a significant life safety hazard within a building. The plastic cable jackets are a perfect "ladder fuel" for fires and can emit toxic smoke under high heat conditions.

Another practice that can reduce e-waste over time is investing in products with a longer useful lifespan, such as Cisco networking and telephony gear that can support periodic firmware upgrades to accommodate new features rather than requiring new hardware. Estimating a realistic percentage change in e-waste over the life of a building was not feasible within the scope of this study, but it is obvious that a reduction occurs, and Cisco plans to conduct additional research to demonstrate it.

The Connected Workplace should also fulfill a failed promise of the computer age: reducing paper waste. Paper and cardboard account for more than 60 percent of the total waste produced by office buildings. Furthermore, the energy consumed to manufacture the paper requires more energy than is consumed by the operation of all copiers and printers. The cost of waste disposal is increasing, so waste reduction initiatives are important to companies and their bottom lines. The legacy Cisco environment used individual and shared desktop printers with no central control or page count monitoring, making it impossible to obtain accurate measurement of actual paper usage. The Connected Workplaces uses centralized printing services—reducing printers and copiers from 28 to 8. Anecdotal observation indicates that this centralized model results in less printing and less paper waste.

Sustainability: A New Way of Thinking

With over 18 million square feet under management and 53,000 employees, Cisco realizes that the Connected Workplace will have a significant impact on the cost of doing business and the benefit to the environment. The Connected Workplace is just one of many efforts under way at Cisco to reduce the environmental impact of its business practices. It is part of the EcoFocus@Cisco initiative, Cisco's commitment to change its energy management and environmental practices. This initiative emphasizes three areas:

- Product stewardship—reduces the environmental impact of Cisco products and solutions through improvements that extend their useful life and manage power more efficiently.

- Combined IT and building solutions—improves the reach and effectiveness of building and IT operations by integrating IT and building operations systems into a single network infrastructure. These emerging solutions also reduce power consumption and waste.

- The "network effect"—uses the network in place of traditional transportation. It reduces greenhouse gas emissions by using broadband technology to enable advanced communications such as Cisco Telepresence,

substantially reducing the need for employee travel.

The EcoFocus@Cisco initiative is an environmental management philosophy that reduces energy and resource consumption. This long-term commitment will reduce operating costs at Cisco and also provide model practices for using our natural resources in a wiser, more sustainable manner.

FOR MORE INFORMATION

To find out more about the Cisco Office Designs, go to:
http://www.cisco.com/web/about/ciscoitatwork/case_studies/real_estate.html

For additional Cisco IT case studies on a variety of business solutions, go to Cisco on Cisco: Inside Cisco IT
www.cisco.com/go/ciscoit

Note:
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