

## Minimizing Greenhouse Gas Emissions

Climate change is a complex global challenge that requires an innovative and collaborative response. Projected GHG concentrations in the atmosphere suggest the need for significant improvements in energy efficiency and a global transition to a low-carbon economy. There is general agreement that increasing concentrations of greenhouse gases in the atmosphere are caused by human activity and are mostly a byproduct of the combustion of fossil fuels. The substantial increase in fossil fuel use since the beginning of the industrial revolution has changed the carbon balance between organic material and the atmosphere that is driven by photosynthesis and various decay mechanisms. Inventories of carbon from dead plant and animal deposits, such as oil and coal, are being recovered for fuel and converted to carbon dioxide at a rate exceeding available sink mechanisms, such as photosynthesis.

Mitigating climate change requires reducing GHG emissions, especially the emissions from energy generation and from land use change. Energy use is the largest source of GHG emissions for Cisco and for most companies and individuals. According to the International Energy Agency's [World Energy Outlook 2008](#), global energy-related GHG emissions are projected to increase by 45 percent from 2006 to 2030 if business continues as usual, with over 70 percent of the projected increase coming from the power generation and transport sectors. Climate change demands unprecedented focus on mitigating GHG emissions.

Cisco is committed to addressing the climate-related risks and opportunities affecting its business and to working collaboratively to develop a low-carbon economy. As a leading provider of networking technology hardware, software, and services, our material climate change risks and opportunities stem from:

- Greenhouse gases emitted as a result of our operations, including energy usage at offices, labs and data centers, and business travel
- Greenhouse gases emitted as a result of the operations of our business partners
- Greenhouse gases emitted by our customers as a result of the electricity used by our products
- Greenhouse gas emissions abated as a result of our solutions being applied to transportation, buildings, and energy management

Climate change poses limited direct physical risk to Cisco's business in the short term due to our geographic dispersion and global customer base. Although Cisco is not a heavy emitter of greenhouse gases, and therefore is less sensitive to changes in regulations than companies in carbon-intensive industries, regulatory risks and market access risks are increasing. Regulations and standards have been issued or are in process that could impact Cisco's operations, products,

and supply chain. For example, Cisco is affected by energy-efficiency requirements for the design and operation of network products; efficiency specifications for new or existing buildings, vehicle fleet, diesel generators, or other “direct” sources of emissions in Cisco operations; and regulations that change the price of energy. Similar changes in the supply chain could affect Cisco’s direct and indirect procurement, potentially increasing costs.

At the same time, Cisco is well positioned to contribute to the global effort to reduce GHG emissions. Cisco’s intelligent networking technology provides solutions that Cisco can test and apply in our own operations and that our customers can adopt to reduce the impacts of their own GHG emissions. Using technology-based alternatives to traditional ways of working and living requires a fundamental change in perceptions and a cultural shift at an individual and organizational level. Just as the Internet radically changed the way the world communicates, networking technology is enabling the world to work, live, play, and learn in new and more sustainable ways.

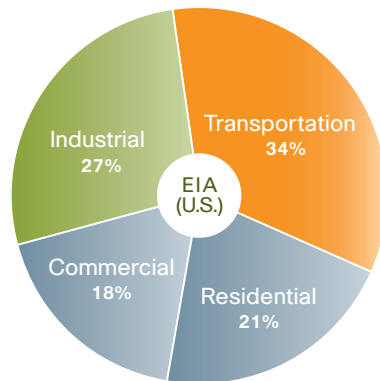
## Our Approach

Our approach to minimizing GHG emissions spans three categories of activity that are discussed in greater detail in this subsection.

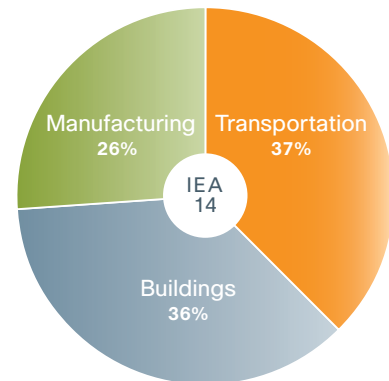
- **Network-Enabled Solutions.** Bringing the resources of the Cisco network to bear on addressing the challenge of climate change. Cisco innovates, develops, and deploys ICT solutions that displace emissions-intensive activities and reduce energy demands in critical areas of global society such as transportation, buildings, and power generation.
- **Efficient Products.** Cisco works to improve the energy efficiency and climate-related impacts associated with product use.
- **Sustainable Operations.** Cisco technologies are applied to our own operations, reducing our energy use and business travel, and improving energy efficiency in our facilities. We are also purchasing electricity from renewable sources.

Fundamental to our approach is the belief that the ICT sector can play a critical role in the global response to climate change. Per both International Energy Agency (IEA) and U.S. Energy Information Agency (EIA) data summarized in the following figure, about 75 percent of energy-related GHG emissions are from buildings and transportation.

### Breakdown of U.S. and IEA14 Energy-Related Greenhouse Gas Emissions



Source: U.S. Energy Information Agency (EIA) Emissions of Greenhouse Gases Report Table 6 (U.S., 2007, preliminary)



Source: International Energy Agency (IEA) Energy Use in the New Millennium Figure 2.3 and p.24 description (IEA14, 2004)

Although the use of ICT products such as computers, data center devices, and network equipment consumes energy, there is substantial opportunity to use ICT products to reduce global energy-related GHG emissions and make the world more energy efficient. In FY09, Cisco sponsored and contributed to the [SMART 2020](#) report, published by The Climate Group and GeSI, which identified opportunities for the ICT sector to develop and apply network technologies to reducing annual GHG emissions by 15 percent, which is a substantial positive impact considering that the ICT sector is projected to be responsible for only 3 percent of global emissions in 2020. Potential abatements are concentrated in the areas of transportation, buildings, power/energy, and industry. Innovative application of network technologies promotes change through our solutions, our products, and our operations.

## Network-Enabled Solutions

Cisco customers are looking for ways to reduce their energy-related costs and their carbon footprint. This creates market opportunities for Cisco. Cisco is researching, developing, piloting, and delivering network technologies that can help reduce GHG emissions by:

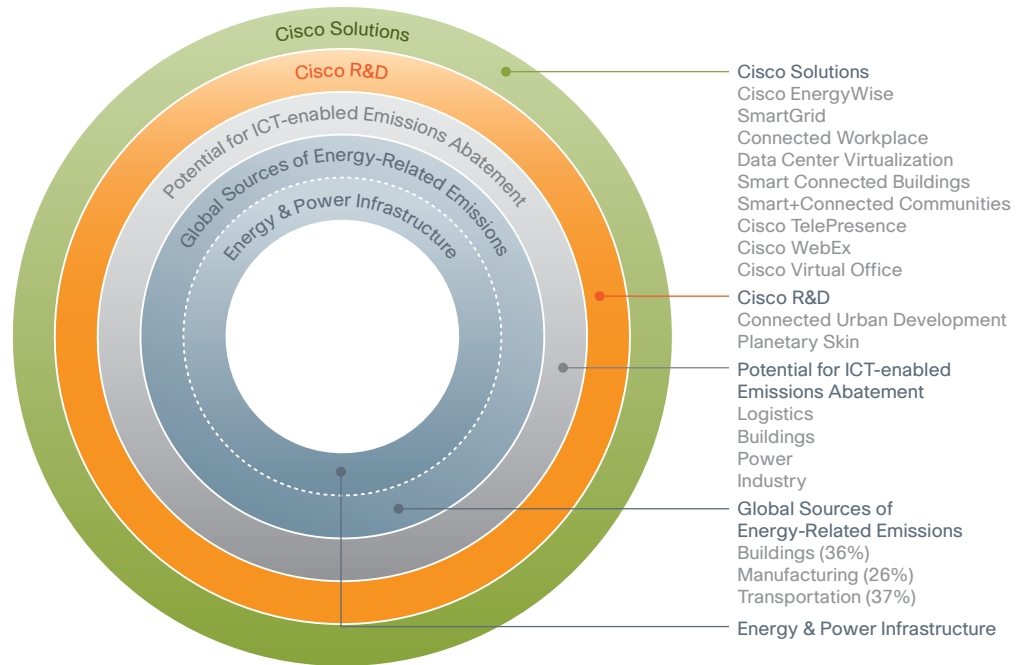
- **Offering low-carbon ways of learning, working, and traveling:** Customers are rethinking their behaviors and finding innovative, network-enabled alternatives, such as web-based collaboration rather than travel, and telework rather than daily commuting.
- **Providing connected energy management:** Customers can employ the network as the platform to measure, monitor, report, and plan for greater energy efficiencies.

The following figure demonstrates how global emissions are addressed by Cisco network solutions that actively displace emissions-intensive activities. As shown in the innermost ring, GHG emissions from energy use are separated into transportation, buildings, and manufacturing emissions, which are all affected by an underlying power and energy distribution infrastructure. Energy use shown is from IEA 14 data. U.S. EIA data shows essentially the same division among buildings, transportation, and manufacturing. The gray middle ring illustrates the abatement potential for the ICT sector, as described in The Climate Group and GeSI Smart 2020 report, which identified opportunities in the energy- and GHG-intensive areas of logistics, buildings, power, and industry. Cisco's network solutions and research initiatives, shown in the outermost rings, are directly taking advantage of these abatement opportunities by reducing emissions in one or more of the key sources of GHG emissions: transportation, buildings, and manufacturing.

"Over the next three to five years, as more people around the world migrate to urban centers, 3 billion individuals around the world will connect to the Internet. Cisco envisages a future where successful communities and cities will run on networked information, and where information technology will help the world better manage its energy and environmental challenges. Cities of the future, and many innovative cities now, are addressing the issues and opportunities of this new world by thinking about the network as the platform for economic development, better city management, and an improved quality of life for citizens."

— Wim Elfrink  
Chief Globalization Officer and Executive Vice President,  
Cisco Services

**Cisco Network-Enabled Solutions Addressing Greenhouse Gas Emissions**



At Cisco, we are developing solutions for both mitigating and adapting to climate change. To help mitigate avoidable emissions, we are looking for ways to increase energy productivity or energy efficiency, slowing growth in energy demand and reducing the rate of increase in global GHG emissions from energy usage increase. Cisco data center virtualization technologies, for example, significantly reduce the number of data center components. Fewer components means less electricity used to operate both the ICT equipment and the HVAC equipment used for data center cooling. Fewer components also reduce emissions from the manufacture of underutilized equipment.

In addition, we are investing in solutions that promote energy restraint, or solutions that decrease the long-term energy demand by eliminating energy-intensive activities. These solutions are fundamentally changing behavior, challenging traditional approaches, and creating alternative low-carbon paths for working, living, playing, and learning. For example, Cisco TelePresence and Cisco WebEx enable dynamic, network-based meetings and online collaboration that replace the need for business travel, dramatically reducing a company's GHG emissions.

Cisco recognizes that the application of technology alone will not result in a drop in emissions. It has to be coupled with changes in culture, management practices, and business processes in order to achieve the full potential of the technology. However, this evolution to collaborative technologies, smart buildings and work spaces, and connected energy management creates additional benefits, including faster decision making, improved cross-cultural communications, broader dissemination of information around the world, and increased ability to efficiently deploy scarce internal resources.

The following table highlights Cisco customer solutions and R&D programs that not only address the key sources of energy-related GHG emissions, but also address the challenges associated with adapting to climate change.

**Cisco Solutions and R&D programs that Mitigate GHG Emissions**

Emissions Addressed	Cisco Solution or R&D Program	Description	Impact
Transportation Building Manufacturing	Planetary Skin	<p>Public and private sector leaders have agreed that in addition to appropriate target setting and predictable large-scale financing, meeting the challenges of climate change will require the creation of transparent and trusted mechanisms for monitoring, reporting, and verifying changes to environmental conditions.</p> <p>Planetary Skin is a cross-sector partnership to develop a collaborative, online, global monitoring system that captures, collects, analyzes, and reports data on environmental conditions around the world. Planetary Skin will increase decision-making capabilities and provide a platform for open collaboration between public and private sectors around the challenge of climate change. Collecting data from space, airborne, maritime, terrestrial, and people-based sensor networks and other sources of structured and unstructured data, Planetary Skin will help model, analyze, and report on environmental conditions in a standardized usable format over an open and adaptable cloud computing platform that is governed as a global public good.</p>	<p>Planetary Skin will be developed based on the fundamental scientific and other research and development strengths of a number of world-class global institutions. The Planetary Skin R&amp;D Program will focus on codeveloping three core capabilities:</p> <ul style="list-style-type: none"> <li>• Manage resources (such as energy, biomass, food, water, and land) productively and effectively</li> <li>• Manage risks related to climate change such as rising sea levels that affect coastal infrastructures, drought-related crop yield reductions, and disease proliferation and pandemics</li> <li>• Enable new environmental markets for carbon, water, biodiversity, and other resources</li> </ul> <p>See the "Reflections on Planetary Skin" sidebar for more information, or visit the <a href="#">Planetary Skin website</a></p>

<p>Transportation Building</p>	<p>Connected Urban Development (CUD)</p>	<p>As a result of our commitment to the Clinton Global Initiative, Cisco has partnered with select cities around the globe to reduce global carbon emissions while simultaneously promoting economic development by fundamentally changing the way cities operate and use natural resources. Networked architecture, applications, devices, and online services are fundamental to the CUD vision and approach. The integration of mobility, work, buildings, energy, and citizen services with information provision and dynamic decision making for city planners and authorities presents a unique opportunity for cities to operate more intelligently.</p> <p>Pilot projects underway in Amsterdam, San Francisco, Seoul, Birmingham (U.K.), Hamburg, Lisbon, and Madrid are proving the power of network technologies to reduce carbon emissions in urban environments by addressing service delivery, traffic management, public transportation, real estate, and carbon footprint monitoring tools.</p>	<p>In 2006, Cisco committed \$15 million to the CUD program over a five-year period, and we report on this commitment annually to the Clinton Global Initiative. In 2008, the European Commission recognized the program as a Benchmark of Excellence in its Covenant of Mayors program, and in 2009 CUD has become an official partner of Sustainable Energy Europe.</p> <p>Cisco has developed a CUD Solutions Toolkit that includes lessons learned, best practices, economic and environmental value case models, and CUD project outcomes.</p> <p>See the "Case Studies from Connected Urban Development" sidebar for initiative descriptions and discover more by visiting the <a href="#">CUD website</a>.</p>
<p>Transportation Building</p>	<p>Smart+Connected Communities</p>	<p>Cisco has launched the Smart+Connected Communities initiative globally to leverage the thought leadership, ideas, and solutions incubated by the CUD program and drive economic, social, and environmental sustainability to our customers around the world. Through a holistic approach with solutions, services, learning academies, and an ecosystem of partners, Cisco's Smart+Connected Communities initiative will leverage the network to deliver integrated offerings across real estate, transportation, safety and security, utilities, health, education, and government to improve community management, economic growth, citizen quality of life, and sustainable development.</p>	<p>Smart+Connected Communities is our newest initiative, launched in FY09. Building on the innovations of the CUD program, we believe our Smart+Connected Communities initiative will demonstrate similar positive impact on a larger scale.</p>



<p>Transportation Building Manufacturing</p>	<p>SmartGrid</p>	<p>This network infrastructure helps utility companies construct "smart grids" that optimize power supply and demand by routing power more efficiently and allowing demand-side management and two-way, real-time information exchange with customers. This information is critical for implementing dispersed renewable generation and adding hybrid/electric vehicles to the utility grid. Combined with smart meters, smart grids also allow customers to see how power is being used in order to influence behavior to reduce energy consumption or shift demand in time to permit use of lower-carbon sources of electricity.</p>	<p>Pilot projects, including one sponsored by the U.S. Department of Energy's Pacific Northwest Laboratory, have shown a 10–15 percent reduction in household energy use with smart grid technologies. Cisco is partnering with General Electric, Florida Power &amp; Light, and Silver Spring Networks on Energy Smart Miami, a pilot to build the most comprehensive smart grid deployment in the nation. Cisco is participating in the Pecan Street Project to make the city of Austin, Texas, a test bed for clean energy and the smart grid goals. Cisco is also a member of the <a href="#">GridWise Alliance</a>, advocating for the adoption of smart grid technologies. To learn more, visit Cisco's <a href="#">website</a>.</p>
<p>Building</p>	<p>Cisco EnergyWise</p>	<p>Cisco EnergyWise is an energy management technology that allows organizations to report and reduce the energy use of their IT resources. Cisco EnergyWise is embedded into the Cisco Catalyst® switching portfolio and helps improve operational efficiency and reduce energy costs and greenhouse gas emissions across the corporate infrastructure, potentially impacting any powered device.</p>	<p>Cisco EnergyWise won the Best of Interop 2009 award in the Green category for leadership in improving corporate energy efficiency and lowering operational costs with its energy-management architecture. For the average size Cisco customer, EnergyWise could reduce energy usage by 20 percent in the first phase of the Cisco EnergyWise deployment and realize significant cost savings.</p>
<p>Building</p>	<p>Smart Connected Buildings</p>	<p>Cisco's Smart Connected Building systems transform the way buildings are built, operated, and experienced by integrating building systems (like HVAC, lighting, and elevators) with the IP network. This helps companies reduce energy consumption across global operations and enables demand management on a global scale. These solutions have benefits beyond reduced energy consumption. For example, Building Mediator, a product in the Smart Connected Buildings portfolio, enables faster notification and diagnosis of faults, enabling maintenance staff to pinpoint and properly diagnose problems.</p>	<p>Cisco's Smart Connected Buildings solutions are well positioned to help customers achieve significant reductions in GHG emissions by being able to access a broad range of the energy consuming systems, analyze the data from these systems, and then act on that data to reduce energy use. Early adopters have experienced a 25 percent reduction in energy consumption by optimizing the interactions of building systems over the IP network.</p>
<p>Building</p>	<p>Cisco Connected Workplace</p>	<p>Cisco Connected Workplace is a flexible work environment designed to support employee mobility and improve collaboration by providing a variety of workplace settings and enhanced technology tools. The initiative takes advantage of the fact that workplaces today are vacant up to 60 percent of the time because people are working away from their desks, collaborating formally and informally in person, and using rich remote technologies such as Cisco WebEx and Cisco TelePresence.</p>	<p>Cisco Connected Workplace case studies show reduced costs associated with real estate, furniture, workplace services, and IT infrastructure. Such environments typically support 40 percent more employees than a traditional layout, thereby substantially reducing footprint demands and associated costs.</p>

Transportation Building	Data Center Virtualization	Power and cooling are two of the biggest issues that data center managers and IT organizations face. Data center virtualization improves the utilization of data center equipment, reducing emissions from the manufacture of unnecessary equipment and facilities.	According to a Forrester Consulting study Cisco commissioned in 2008, firms initially deployed virtual servers to improve hardware utilization, allowing them to greatly reduce their server purchasing. But today these firms cite improved power and cooling efficiency as important motivators for adopting virtualization technology. Cisco data center solutions achieve resource savings of up to 70 percent through virtualization.
Transportation	Cisco TelePresence	Incorporating high-quality spatial audio and video, Cisco TelePresence enables live, face-to-face interactions over the network, reducing the need for travel to in-person meetings and allowing for faster decision making. It has the potential to greatly decrease the need for business travel and the associated GHG emissions.	By the end of FY09, over 170 Cisco TelePresence units had been installed across our company in more than 21 countries.  For information on how we are using Cisco TelePresence to reduce our GHG emissions, see Sustainable Operations.
Transportation	Cisco WebEx	Cisco WebEx offers the ability to host dynamic web-based meetings, stimulating real-time collaboration without the need for travel to one location. Designed to enable people anywhere in the world with an Internet connection to connect and collaborate efficiently, Cisco WebEx helps save the time, money, and GHG emissions associated with traveling to meetings in person.	In 2009, there were more than 3 million registered users of Cisco WebEx, hosting an average of over 200,000 meetings each day. More than 10 million meeting participants connect through WebEx each month.  For information on how we are using Cisco WebEx to reduce our GHG emissions, see Sustainable Operations.
Transportation	Cisco Virtual Office	The Cisco Virtual Office solution boosts flexibility and productivity and extends the enterprise by delivering secure, rich, and manageable network services to teleworkers and employees working outside the traditional office environment. By providing full IP phone, wireless, data, and video services, Cisco Virtual Office offers a smooth, office-caliber experience to staff, wherever they may be located. This solution helps limit the emissions associated with travel and enables energy savings for office buildings and real estate.	More than 16,000 Cisco employees use Cisco Virtual Office. Based on a FY09 Teleworker Survey of Cisco employees, the average user gains 2.4 hours per week by reducing commute time and saves approximately 23 travel miles per day. On average, this equates to over 19,000 metric tonnes of avoided CO2 emissions annually. In addition, the majority of teleworkers report a significant increase in work-life flexibility, productivity, and satisfaction as a result of their ability to work remotely.  For information on how we are using Cisco Virtual Office to reduce our GHG emissions, see Sustainable Operations.

### Reflections on Planetary Skin

Maintaining and expanding global rural carbon sinks — natural and manmade reservoirs that remove carbon from the atmosphere and store it for an indefinite period — represents roughly half of the total cost-effective mitigation of carbon emissions required to reach global emissions targets and prevent dangerous climate change. In other words, cost-effective carbon sink management would contribute about the same as lowering greenhouse gas through global decarbonization of energy supplies and energy-efficiency measures. The problem today is that, measured solely in terms of monetary value, trees in the rainforests are “worth more dead than alive.” Reversing that attitude requires capturing the true value of the carbon sink that rainforests provide.

Together with our partners, we have estimated that the economic value of eliminating deforestation globally is in excess of \$400 billion per year. In contrast, funding the associated opportunity, monitoring, protection, and transaction costs are likely to be in the range of \$40 billion per year. This opportunity for high returns is ripe for innovation through the creation of a “Rainforest Skin.” This will take the form of an open network platform for near real-time, highly distributed mass remote sensing, measurement, risk-profiling, and continuous monitoring of carbon stocks and flows that generates trust and enables collaboration among the players in all sectors. This platform will use a combination of georeferenced satellites, unmanned aerial vehicles, participatory networks, and multiple ground-based sensor networks to estimate the forest’s carbon stock dynamics and its risk profile.

### Case Studies from Connected Urban Development

**Personal Travel Assistant** (Seoul, Amsterdam): The Personal Travel Assistant (PTA) is designed to help make on-the-go travel decisions in complex urban environments that take into account time, cost, and carbon impact. Streamlining information on available routes, transactions, and potential travel “disruptions” (like traffic congestion), PTA delivers dynamic, real-time support through several information devices, including PCs and mobile phones. Piloted in Seoul and Amsterdam in 2009, PTA aims to both reduce carbon emissions and increase users’ satisfaction with their urban mobility options, particularly public transportation.

**Urban EcoMap** (San Francisco): A pilot codeveloped with the city of San Francisco, the Urban EcoMap enables citizens, businesses, and policy makers to visualize and monitor their carbon footprints in their communities and build action plans for reducing their emissions. The forthcoming development of the Amsterdam Urban EcoMap scales the application globally.

**Connected Bus** (San Francisco): The Connected Bus is a public transportation innovation aimed at enabling people, traffic, and public transit vehicles to flow more efficiently. With real-time information on bus locations and wait times, riders can reach their destinations more reliably. The cost-benefit analysis of the Connected Bus pilot in San Francisco demonstrated long-term environmental and economic benefits due to increased ridership and more efficient traffic flow. In San Francisco, for example, Connected Bus is projected to increase ridership by 12,000 people per year, reducing the number of individual cars on the road and carbon emissions from transportation.

**Smart UrbanEnergy for Schools** (Lisbon): A partnership with the city of Lisbon and the Portuguese Ministry of Education, this project showcases how technology can improve global energy efficiency in both the physical environment and in energy networks. Energy savings of 33.4 percent were achieved during the first few months of the pilot.

**Smart Transportation Pricing** (Seoul): Currently being run as a technical pilot in Seoul, Smart Transportation Pricing encompasses a set of technology-based pricing reforms to encourage more efficient travel behavior and demand management solutions.

**UrbanEnergy Management** (Madrid): This pilot with the city of Madrid explores how energy is generated, managed, and consumed. A 33-unit apartment building is being outfitted with bioclimatic design and design innovations based on a broadband infrastructure that shares information about energy generation, consumption, and usage.

**Smart Work Centers** (Amsterdam): Being piloted in Amsterdam, Smart Work Centers is a new form of office center that provides flexible and scalable workplace options so people can reduce commute times. Thus far, users have saved an average of 66 minutes of commute time per day.

## Efficient Products

Rising energy and resource demands affect the environment and a company's profits. Cisco recognizes that gains in energy efficiency for our network-based products will result in savings for our customers and the environment.

Energy conservation in networks, as in other areas, requires a number of distinct but complementary approaches: measure the current energy usage of the network, understand the productive function of the network, analyze the architecture and components of the network, and compare products at particular points in the network.

In FY09, we convened a team of product engineers to further explore opportunities for developing products that use less energy and products that create smarter systems. Advances in the energy and resource efficiency of Cisco products in FY09 included the following areas.

### Standards Development

There is currently rapid and significant movement around "green standards," especially around energy efficiency, bringing together customers, vendors, governments, and nongovernmental organizations. Product energy efficiency regulations impacting Cisco products may increase compliance costs or affect time to market. All Cisco product categories will be potentially affected, including:

- Electronics for domestic/home use, including audio/visual equipment
- Wireless access points
- Set-top boxes
- External power supplies
- Data centers
- Service provider and enterprise routers and switches
- Small-business and home-office routers and switches
- Servers
- Displays and monitors

Cisco engages with regulatory and standards bodies, either directly or as part of industry groups, to ensure that regulations are clear and effective. Cisco's engineering, value chain, facilities, compliance, regulatory affairs, government affairs, and corporate affairs teams are involved in these efforts. We believe these regulatory and standards activities bring clarity and consistency to the global marketplace, creating predictable requirements and a level playing field that reduces risk.

Cisco is actively involved in work with many organizations to set standards. These organizations include ATIS (North America), Australia and Korea MEPS, ETSI (Europe), EU/EUP (Europe), IEEE (worldwide), ITU (worldwide), METI (Japan), U.S. Department of Energy and Environmental Protection Agency (U.S.), and WRI/WBCSD GHG Protocol (worldwide).

Cisco is committed to taking a standards-based approach to measuring product and solution energy efficiency and embedded GHG emissions. Product configuration, operating conditions, and carbon content of a product's electrical power supply pose significant challenges to reporting its GHG emissions. Standards, like the U.S. EPA's ENERGY STAR standard for personal computers, must be developed to take into account these measurement variables.

Cisco has been an integral part of efforts to develop network equipment power measurement standards. Cisco was coeditor of the Alliance for Telecommunications Industry Solutions standard [Energy Efficiency of Telecommunications Equipment: Methodology for Measurement and Reporting for Router and Ethernet Switch Products](#), which was released in July 2009.

## Product Energy Profiles

While standards mature, Cisco has developed a methodology for profiling product power consumption and efficiency metrics for Cisco products. Our objective is to quantify improvements in energy efficiency and GHG emissions across product generations. We have integrated energy-saving features into product roadmaps. Energy profiling of products is an ongoing task, and we intend to have a large set of products profiled by the end of FY10.

## Product Design Criteria

Cisco works to maximize product efficiency through the product design process. Cisco has introduced environmental sustainability requirements into its Product Development Methodology and product requirements document. This step formally inserts sustainability considerations into the design of all future Cisco products.

Through modular design and upgrade design criteria, Cisco is also working to minimize the emissions associated with product disposal. Opportunities for reducing GHG emissions at end of life include:

- Maximizing original product life
- Optimizing manufacturing processes such as testing, handling, and shipping to lower energy use
- Minimizing packaging and printed documentation
- Maximizing product reuse through return, repair, and redeployment
- Maximizing recycled commodity streams

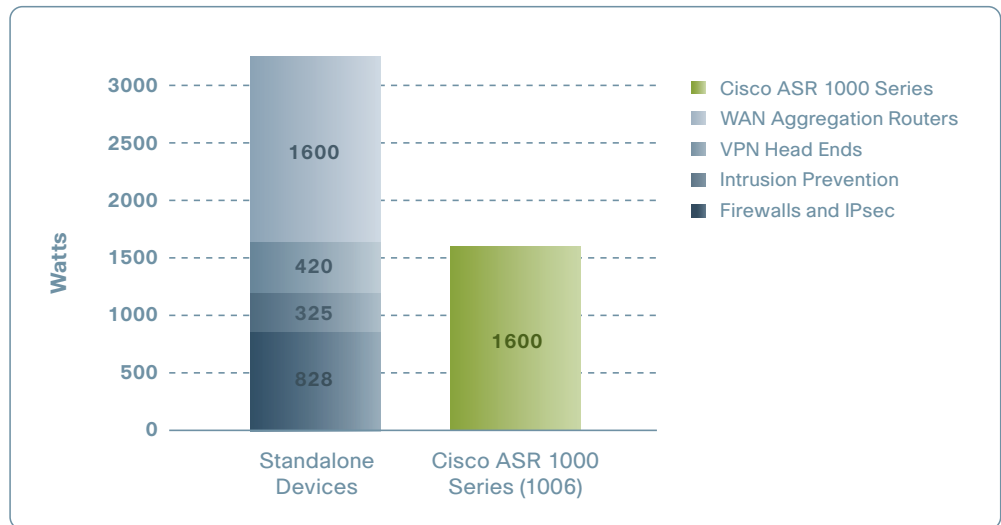
Our service network offers customer return services for all Cisco products. Although take-back, reuse, and recycling programs consume energy, the net effect is substantial energy savings, given the energy required to produce new product from raw materials. Learn more about Cisco's waste management programs under Reducing Waste.

## Energy Savings through Device and Function Integration

Energy savings of 50 percent or more within network infrastructure are possible through service integration, where one device integrates the work previously done by many devices. The figure below illustrates the substantial energy savings of the Cisco ASR 1000 Series, as compared to purchasing standalone devices that serve the same need.

By reducing the number of components in a system, Cisco's service integration efforts have the added benefit of cutting waste.

### Sample Energy Comparison: Multiservice Devices vs. Multiple Single-Function Devices



## Sustainable Operations

Cisco believes that the global problem of climate change requires a significant reduction in emissions in absolute terms. For our operations, Cisco has made the following public commitments:

- Clinton Global Initiative commitment to reduce GHG emissions from all Cisco business air travel worldwide by 10 percent absolute (against a FY06 baseline)
- EPA Climate Leaders commitment to reduce all Scope 1, 2, and business-air-travel Scope 3 GHG emissions worldwide by 25 percent absolute by CY12 (CY07 baseline)

Cisco used EPA criteria and worked with EPA to ensure that our 25 percent absolute reduction goal was significant, challenging, and compared favorably to industry sector benchmarks. According to EPA, "The sector benchmark is a combination of projected average energy intensity improvement and any projected process-related emissions intensity changes. EPA expects every goal to be significantly better than the projected benchmark performance for the Partner's sector."

Based on collected Scope 1, 2, and 3 emission data, Cisco has identified opportunities to reduce GHG emissions. Investments and activities in FY09 were focused on the following areas:

- Continue to improve the completeness and accuracy of energy use measurement and reporting
- Increase the energy efficiency of labs, data centers, and office facilities
- Decrease indirect emissions associated with business travel
- Support development of renewable and low-carbon electricity through "green power" purchases

## Greenhouse Gas Emissions

Cisco's total global GHG emissions over the last four fiscal years are shown in the following table. Cisco reports emissions by fiscal year and uses fiscal-year emissions for initiative planning.

Indicators	FY06	FY07	FY08	FY09
<b>GHG EMISSIONS</b>				
Total gross* GHG emissions: Scope 1 (metric tonne CO <sub>2</sub> e)	27586***	52,498	52,084	53,216
Total gross* GHG emissions: Scope 2 (metric tonne CO <sub>2</sub> e)	317666***	467,478	550,312	579,183
Total contractual* GHG emissions: Scope 2 (metric tonne CO <sub>2</sub> e)	316,893***	403,188	310,961	226,733
Total air travel GHG emissions: Scope 3 (metric tonne CO <sub>2</sub> e)	190,940	205,797	197,872	115,995
Change in air travel GHG emissions from FY06 (CGI global goal: 10% absolute reduction against FY06 baseline)		+8%	+4%	-39% (goal met)
Total contractual* GHG emissions: Scope 1, 2, and 3 metric tonne CO <sub>2</sub> e	535,419***	661,483	560,917	395,944
Change in Scope 1, 2, and 3 from FY07 EPA global goal: 25% absolute reduction against CY07 baseline**			-15%	-40% (goal year is 2012)

\* Gross and contractual are used consistent with Carbon Disclosure Project 7 survey terminology. Gross GHG emissions figures do not include reductions from Cisco's renewable energy purchases. Contractual GHG emissions figures include the impact of buying low-carbon electricity.

\*\* Cisco's EPA Climate Leaders 25 percent reduction goal is measured against a calendar-year baseline per EPA requirements, but all public Cisco reporting is on a fiscal-year basis. We are reporting progress against the EPA goal using fiscal-year emissions, although officially 2009 progress will be reported to EPA based on emissions tallied by calendar year. Cisco does not publically report calendar-year emissions to avoid confusion with previously reported fiscal-year data.

\*\*\* In our FY06 CSR report, we only reported Scope 1 and 2 emissions data actually collected from Cisco sites and separately noted the estimated completeness of the data. We now collect actual emissions data for over 90 percent of our real estate portfolio and estimate the balance based on building square footage and type of usage. We do not believe the Scope 1 and 2 data collected for FY06 is sufficient to support extrapolation to 100 percent. Therefore, FY06 Scope 1 and 2 data in the table should not be trended against FY07 or later data.

All prior-year Scope 1, 2, and 3 emissions data vary to some extent from previously reported values, either in CDP7 or our 2008 CSR Report, because of updates to emissions factors, methodology, and correction of minor errors found upon repeated review. (No significant error has been found.) Cisco continues to invest in improving the accuracy of our GHG emission calculations. To support standardization and benchmarking across companies, Cisco uses the [Greenhouse Gas Protocol Corporate Accounting Standard](#) as the basis for our Scope 1, 2, and 3 (business air travel) emissions calculations. The EPA Climate Leaders program provides additional [program guidance](#).

All emissions calculations and data are reviewed in June of each year by a representative of U.S. EPA as part of the EPA Climate Leaders Partnership. Cisco has also received technical assistance from EPA in determining organizational and operational boundaries, in identifying the most appropriate emission factors for Cisco's business, and in documenting these decisions in an Inventory Management Plan (IMP) that is designed for consistency and transparency in the inventory over time. EPA performs desktop reviews of both the inventory data and IMP to verify that EPA quality standards are met. EPA also conducts a risk-based on-site IMP review to test that the IMP is being implemented at the facility level.

"We're very pleased with the 40 percent reduction in GHG emissions compared to the base years of our CGI and EPA reduction commitments. Going forward, we'll be increasing our focus on reducing energy consumption. After all, the cleanest and cheapest energy is the energy you do not use."

— Rob Rolfsen  
Cisco Director of  
Workplace  
Solutions, Cisco



Cisco's internal ISO 14001 team audits the emissions reporting process. The latest internal audit occurred in April 2009. Our processes for determining our GHG inventory were also externally audited in September 2009 by a third party as part of Cisco's ISO 14001 certification processes.

Cisco is now focusing resources on developing standards to better characterize, measure, and report indirect emissions categories, including emissions from Cisco's supply chain and product use. Key activities in FY09 include participation in the development of the Scope 3 Accounting Standard of the Greenhouse Gas Protocol, being led by the World Resource Institute and World Business Council for Sustainable Development.

Cisco has reported to the Carbon Disclosure Project (CDP) in all seven years of the CDP's existence. CDP is an independent, not-for-profit organization that holds the largest data base of GHG emissions in the world. Cisco was ranked the #1 Information Technology company in 2009 based on our [responses](#) to Carbon Disclosure Project's CDP7 survey, which was submitted in May 2009. The CDP questionnaire and our answers provide a comprehensive view of the following topics related to climate change: risks and opportunities, actual emissions, reduction goals, avoided emissions, and regulatory and policy activities.

## Reducing Emissions from Operations

The following table summarizes Cisco's global energy and electricity usage.

Indicators	FY06	FY07	FY08	FY09
<b>ENERGY AND ELECTRICITY USAGE</b>				
Energy usage (GWh)	889*	1281	1438	1507
Electricity usage (GWh)	749*	1053	1203	1275

\* In Cisco's FY06 CSR report, we only reported electricity usage actually collected from Cisco sites and separately noted the estimated completeness of the data. We now collect actual electricity usage for over 90 percent of our real estate portfolio and estimate the balance based on building square footage and type of usage. We do not believe the data collected for FY06 is sufficient to support extrapolation to 100 percent. Therefore, FY06 electricity usage in the table should not be trended against FY07 or later data.

As can be calculated from the GHG emissions table from the previous section, Scope 2 emissions from electricity consumption make up slightly more than 75 percent of our total worldwide Scope 1, Scope 2, and Scope 3 business air travel emissions. Therefore, reducing GHG emissions from electricity use is a priority. A reduction in emissions can be made by reducing electricity consumption as well as purchasing electricity from low-carbon sources, including energy generated from renewable sources.

### Purchasing Renewable Energy

Purchasing electricity generated from renewable and non-carbon sources has been an important component of Cisco's initial GHG reduction strategy. Cisco purchases renewable power where it is available in the local power market. Cisco currently purchases power from non-carbon sources in both the United States and Europe and plans to support non-carbon energy sources in other regions of the world as they become available in the marketplace. Cisco's global renewable electricity purchases is summarized in the following table:

Renewable Electricity Purchases	FY06	FY07	FY08	FY09
Electricity from renewable sources (GWh)	2	110	342	466
Electricity from renewable sources (%)	<1%	10%	28%	37%
GHG emissions avoided (metric tonne CO <sub>2</sub> e)	773	64,290	239,351	352,450

The percent of electricity purchased from renewable energy sources for various regions is shown in the following table.

Region	Percent of FY09 Electricity from Renewable Sources
Global	37%
United States	41%
Europe	61%

Cisco has increased renewable power purchases since FY06 by buying Renewable Energy Certificates (RECs) and entering into green power contracts with various electricity suppliers in the United States to reduce GHG emissions from Cisco operations. Purchased RECs are certified by Green-e, an independent auditor of renewable energy products, and are generated from hydropower projects in Washington; wind projects in Iowa, Texas, North Dakota, and New Mexico; and biomass projects in Tennessee and Kentucky. In addition, Cisco purchased approximately 76 million kWh through various European green power suppliers. We follow the [guidelines](#) from the United Kingdom's Department for Environmental and Rural Affairs (DEFRA) and use a grid average rate when calculating emissions associated with this power.

Cisco participates in the U.S. EPA's [Green Power Partnership](#). As of July 2009, Cisco was listed ninth among the National Top 50 and seventh among Fortune 500 companies in the EPA's [green power ranking](#). This ranking is updated quarterly by the U.S. EPA.

### Reducing Electricity Consumption in Facilities

Roughly 70 percent of our electricity is used to power equipment in labs, with the balance roughly equally split between our data centers and office space. Through joint efforts of Cisco's Green Engineering Task Force and Workplace Resources team, Cisco is working to improve power efficiency in our engineering labs and data centers.

Efforts include implementing Cisco's proven data center virtualization technologies and installing IP-enabled power distribution units (PDUs), or smart power strips, to permit remote shutdown of unused lab equipment through the network. Early tests of smart PDU devices demonstrated the potential to achieve 20 to 30 percent savings in energy use. In FY10 and FY11, Cisco will work to implement this technology across the company.

Cisco is also an active participant in the Green Grid initiative, a global consortium dedicated to advancing energy efficiency in data centers and business computing systems.

Buildings at Cisco's headquarters in San Jose, California, represent over 31 percent of Cisco's global real estate space. All of the buildings in San Jose surpass [California Title 24, Part 6](#) energy standards by 12 to 15 percent, and buildings outside California have implemented similar technologies to reduce energy and operating cost. These technologies include:

- High-efficiency chillers
- Variable air volume systems
- High-efficiency lighting systems
- Motion sensors
- Building Automation System to control air conditioning and lighting operations
- Energy-efficient window and glazing systems

In addition to technological innovation, Cisco has reduced lighting levels in cafeterias, de-energized water fountain pumps, and installed energy-saving vending machines that reduce Cisco's total energy demands.

We are also working to incorporate environmental standards into new site design and existing site retrofits. As specified in Cisco's 2009 Global Green Building Policy, Cisco is committed to having all new construction certified under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System. As of January 2009, Cisco was evaluating, designing, constructing, or applying for LEED certification for 29 buildings. We achieved our first Gold Certification in August 2009 for the new Cisco LifeConnections Center, an integrated childcare, medical center, and fitness facility located at our headquarters in San Jose, California.

Cisco estimates that our energy efficiency programs in California avoided 11 million kWh of energy consumption in FY09, representing approximately 5490 metric tonnes of CO<sub>2</sub>e and savings of approximately \$1.2 million in energy costs. In addition, Cisco received nearly \$600,000 in rebates from local utilities for implementing these measures, all of which have a payback of three years or less.

Although these programs make clear business sense and are critical to reducing Cisco's environmental impacts, it remains a challenge to roll out programs across the company. Cisco recognizes that there is still untapped opportunity for making a larger impact within its labs, data centers, and other facilities. We will continue to expand existing initiatives and pilot new efforts across our global real estate portfolio.

### **Reducing Emissions from Air Travel**

As part of the Clinton Global Initiative, Cisco committed to reducing its worldwide Scope 3 GHG emissions associated with business air travel by 10 percent, using FY06 as a baseline. To replace physical travel and meet our goal, Cisco is relying on the rollout and implementation of Cisco remote collaboration technologies, including Cisco TelePresence, Cisco WebEx, and Cisco MeetingPlace® web conferencing.

Worldwide utilization of general-use Cisco TelePresence units remains just under 50 percent based on a ten-hour day. Many Cisco TelePresence units are booked at or over 100 percent capacity based on a ten-hour day. Further utilization is constrained by room availability or because of substantial time differences between endpoints. The table below illustrates our rollout of Cisco TelePresence across the company since September 2006, which was the first quarter of FY07.

**Cisco TelePresence Room Deployment**

Cumulative, as of end of fiscal year	Total number of TelePresence rooms	Total number of cities	Total number of countries
2007 (general use units)	72	50	20
2008 (general use units)	179	109	37
2009 (general use units)	369	156	44
2007 (private or EBC units)*	26	6	3
2008 (private or EBC units)	53	12	7
2009 (private or EBC units)	179	47	21

\*EBC stands for Executive Briefing Centers, regional meeting facilities that Cisco uses for presentations to customers.



Cisco CTS-500 TelePresence unit (1-2 users)

We have installed various Cisco TelePresence models at many locations to accommodate the different requirements of each site. This includes models that accommodate anywhere from one or two users in a private office setting to larger group meetings of up to 18 people. By having a range of Cisco TelePresence units available, more types of interactions can be virtualized, avoiding more physical travel and reducing travel expenses and GHG emissions.



Cisco CTS-3000 TelePresence unit (6 users) with CTS-3200 TelePresence (on screen, 18 users)

In addition to Cisco TelePresence, Cisco WebEx and Cisco MeetingPlace products are also part of the suite of solutions used by Cisco employees to avoid physical travel by using remote collaboration within Cisco and with our customers, partners, and other stakeholders. As shown in the following table, our use of Cisco MeetingPlace and Cisco WebEx has doubled each of the last two years, mirroring a similar growth in Cisco TelePresence use. A "people-hour" is one person attending a remote meeting for one hour, either by teleconference or via the web and a personal computer. Five people attending a two-hour meeting would equal ten people-hours.

**Cisco WebEx and MeetingPlace Usage**

Year	Total web conferencing (millions of people-hours)
FY07	3.7
FY08	7.2
FY09	15.0

Use of web conferencing is pervasive at Cisco because of the global nature of our collaborative business processes and management practices. (See the CSR and Governance section for a discussion of Cisco's Collaborative Management Model.) In the last fiscal quarter of 2009, Cisco employees conducted approximately 1.25 million meetings using Cisco WebEx sites. In July 2009, the last month of our fiscal year, more than 40,000 unique Cisco employees hosted WebEx meetings on these WebEx sites, indicative of the broad adoption of these technologies within Cisco.

Using Cisco TelePresence and web conferencing, Cisco has piloted and developed the business processes and management practices for remote company meetings, executive operational reviews, our annual sales meeting, and our annual senior leadership "offsite" meeting, thereby expanding the types of interactions that can effectively be completed remotely. This real-world

experience guides product development and supports rollout of the supporting management practices. Use of and familiarity with these and related products will continue to expand at Cisco for more functions and business activities. As more organizations transform their operations to fully leverage our remote collaboration technologies, air travel emissions and associated expenses will be further reduced, while employee productivity and work-life balance will improve. Cisco has found that a workforce fully versed in remote collaboration is more effective overall than a culture requiring travel for face-to-face meetings. Decisions are made faster, cross-cultural communications are improved, stakeholder and customer feedback from around the world is better disseminated within the company, and products move to market faster.

The employee skill sets developed to reduce business air travel and the accompanying business processes and management practices are also used to reduce employee travel between home and work, as well as between buildings at a Cisco site. The wide availability of sophisticated collaboration tools within Cisco permit employees to become well versed in integrating these technologies into daily business activities. Several Cisco technologies permit flexible working environments, including [Cisco Virtual Office \(CVO\)](#). As shown in the following table, employees have rapidly adopted Cisco Virtual Office technologies, which include an integrated services router and IP phone, to effectively work remotely. Although telecommuting or working in a flexible office space does not directly reduce air travel, it does afford opportunities to become more proficient in using collaborative technologies. This proficiency can be applied directly to business activities where remote collaboration does reduce air travel.

#### Cisco Virtual Office Usage

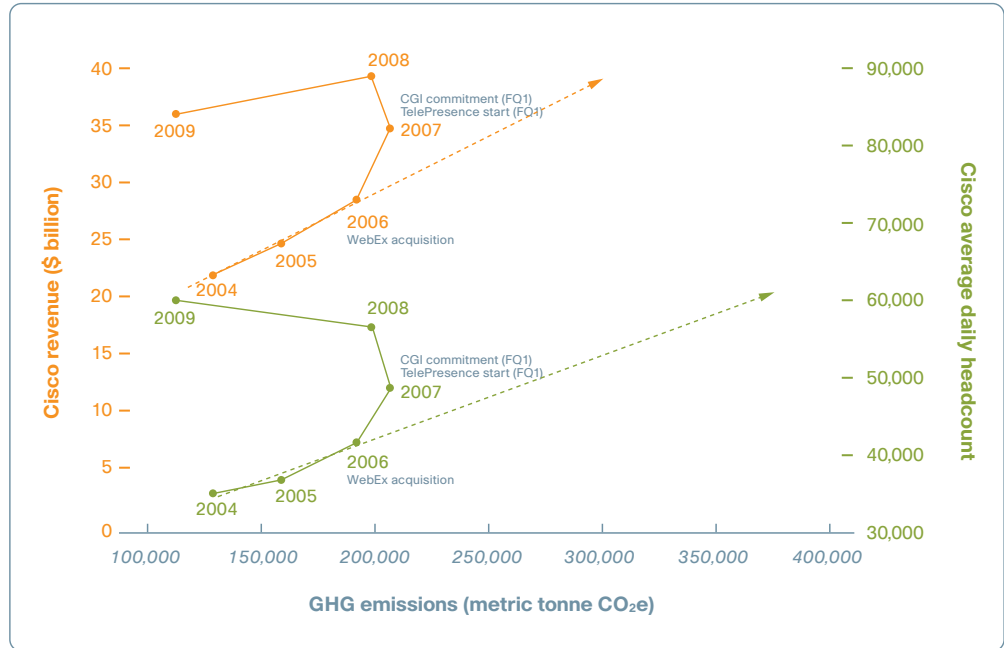
Calendar Year	Total users
2005	1,467
2006	5,006
2007	8,234
2008	13,052
2009 (through October)	16,890

#### Avoided CO<sub>2</sub> Emissions

It is difficult to project with certainty what might have happened to Cisco air travel emissions without widespread use of these collaborative technologies. However, in response to stakeholder inquiries, Cisco has compared changes to our actual air travel emissions against changes to revenue and headcount. Revenue and headcount are the two factors believed to be the primary drivers of air

travel. In the following figure, actual emissions are plotted against headcount (green line, right axis) and revenue (orange line, left axis).

**Avoided CO2 Emissions from Use of Collaborative Technologies**



The timing of Cisco’s WebEx acquisition in mid-FY06, as well as the start of Cisco TelePresence use and our CGI air travel emissions reduction commitment in early FY07, are also shown. From FY04 to FY06, changes to GHG emissions were roughly proportional to changes in revenue and headcount. This observation is consistent with the fact that about two-thirds of Cisco’s air-travel emissions were from our sales and service organizations, both “high touch” business functions. The more products sold and the more customers Cisco serves, the more the potential for business travel.

The case for collaborative technologies to reduce physical travel and GHG emissions is unambiguous. With a 27 percent increase in revenue and more than 40 percent increase in headcount compared to FY06, FY09 air-travel emissions have dropped almost 40 percent on an absolute basis compared to FY06, which exceeds our CGI goal of a 10 percent absolute reduction. In prior years, Cisco worked to first overcome upward pressure on travel from business growth, and then achieve absolute reductions in emissions compared to the base year. As a result of this earlier effort, we experienced an initial reduction in air-travel emissions starting in FY08. Because of the economic downturn first seen toward the beginning of FY09, the emissions-reduction emphasis changed to growing customer relationships in spite of restrained travel. The net effect of our collaborative technologies has been a reduction in travel, carbon emissions, and travel costs and an increase in employee productivity and work-life integration while maintaining and growing the customer relationships needed for continued revenue growth when the worldwide economy improves.

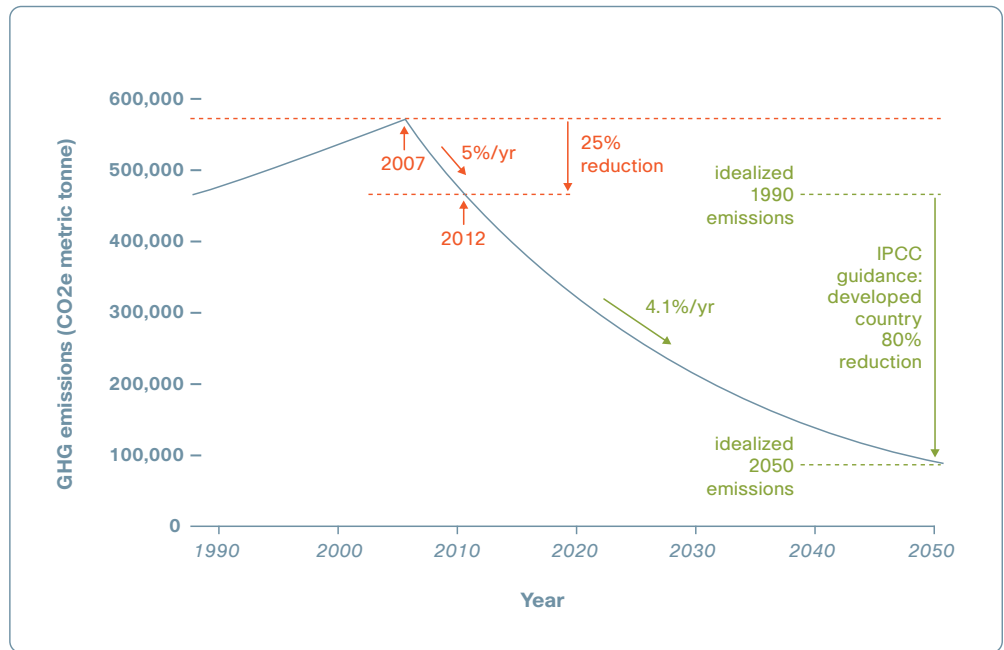
Replacing business air travel with remote collaboration requires more than just installing more technology. Business processes, management practices, and culture must change to adapt to, and take full advantage of, the new network technologies. As experience with remote collaboration technologies increases, both within Cisco and among our customers and partners, remote interactions will progress from the exception of a few years ago, to standard practice within Cisco, to the expected behavior worldwide in the future.

**Looking Ahead**

Cisco has met its FY06 commitment to CGI to reduce absolute emissions from Cisco's worldwide business air travel by 10 percent. Cisco's EPA Climate Leaders goal of a 25 percent absolute reduction by CY12 includes emissions from Scope 3 business air travel as well as Scope 1 and 2 emissions. Therefore, Cisco will need to sustain the current low level of GHG emissions from business air travel as the economy recovers. To maintain similarly reduced levels of Scope 1 and 2 emissions through 2012, Cisco will direct investment to initiatives that improve electrical energy efficiency and reduce consumption when equipment is not used or not fully utilized.

Some stakeholders have requested reduction goals beyond 2012. We believe our focus on executing existing commitments is best practice given the five-year horizon (2007 to 2012) of existing goals and the substantial existing challenge to the business. However, we have reviewed global reduction goals and Cisco's potential role in meeting the global challenge of climate change. The following figure places our 25 percent reduction goal in the context of the 80 percent goal for developed countries highlighted by the [Intergovernmental Panel on Climate Change \(IPCC\)](#). More discussion will be needed to better understand how developed and emerging country emissions allocation will affect future Cisco reduction goals.

**Idealized Greenhouse Gas Emissions Reduction Model**



To generate Cisco's 1990 emissions levels in the above figure, we assumed the average worldwide rate of emissions growth from 1990 to 2007 and calculated a generic 1990 baseline. Cisco's actual 1990 emissions levels are not available and would be unrealistic to use as a baseline given how rapidly our business has grown; our FY1990 revenue was only 0.2 percent of FY2009 revenue.

In addition Cisco will continue to develop products that leverage network technologies and implement the recommendations of the [Smart 2020](#) report issued by The Climate Group and the Global e-Sustainability Initiative. Roughly 75 percent of energy-related GHG emissions are from buildings and transportation. By advancing Cisco solutions discussed in this section, we are well positioned to reduce not only our own building and transportation emissions, but also the aggregated emissions of all of our customers.