CLIMATE WEEK NY°C

Green Information and Communication Technologies (ICTs) for a Sustainable Future

(Sept. 24, 2010)

International Telecommunication Union

GeSI GLOBAL e-SUSTAINABILITY INITIATIVE

Programme

Welcoming remarks:

- **Joan Krajewski, General Manager, Safety, Compliance & Sustainability, Microsoft**

Panelists:

- **Cristina Bueti, Programme Coordinator, ITU "Using ICTs to Tackle Climate Change and Environmental Challenges"**
- **Jean Manuel Canet, Senior Manager, France Telecom and ITU-T study Group 5 Rapporteur Question 18 "Methodology of environmental impact assessment of ICT"**
- **Joan Krajewski, General Manager, Compliance & Sustainability, Microsoft will present the new GeSi study "Enabling the Carbon-reducing Impacts of ICTs"**
- **Darrel Stickler, Sustainable Business Practices, Cisco Systems, "Case Study 6: Cisco TelePresence System"**
- **Catalina McGregor, Co-Chair UK Local Government Green ICT Working Group and ITU Study Group 5 Editor Green ICT & Cities Methodology Working Group "How will we evolve the next generation International Sustainable Cities Agenda in 2011?"**
- **Gary Cook, Climate Policy Analyst for Greenpeace International's Cool IT Campaign**

Using ICTs to Tackle Climate Change and Environmental Challenges

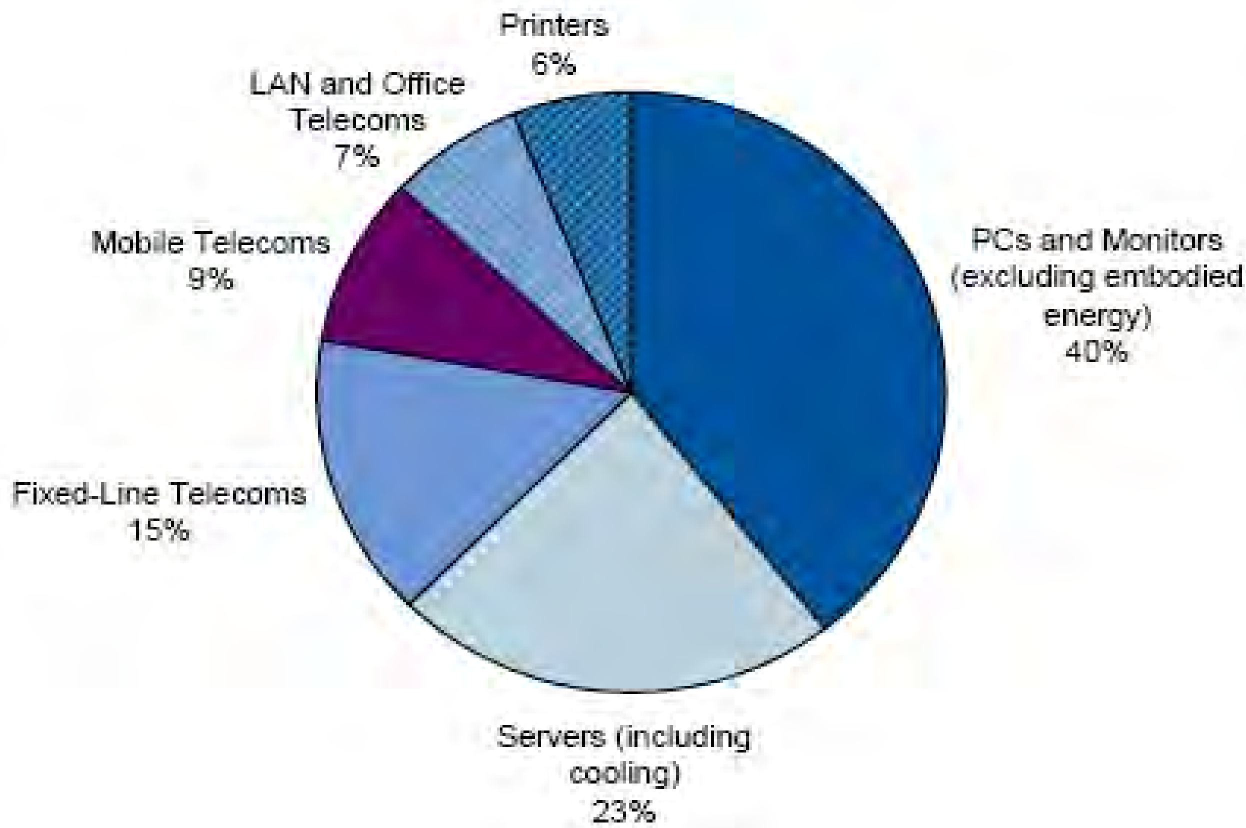
ITU-GeSI Event on "**Green ICTs for a Sustainable Future**"

24 September 2010

New York, USA

Cristina Bueti
Programme Coordinator

Why ICTs Matter



- ICTs (excluding broadcasting) contribute an estimated 2-3% of global Greenhouse Gas emissions
- Around 0.9 ton $GtCO_2e$ in 2007
- Telecoms contribute around one quarter of this total
- Airplanes and shipping about 3% each

Source: Gartner Group

What trends do ICTs have at the device level?

- Market doubles every 5 years
  - E.g. Broadband expanding to more users
  - Until market saturates
  - Then upgrades replace "obsolete" devices
- New devices become a "must have"
  - E.g. HDTV, Smartphones
- Annual growth rate of internet traffic is high
  - 1.8 billion Internet users worldwide
  - Highest growth in data traffic; Internet of things
- **All three trends increase ICT demand for energy**
  - the GeSI Smart 2020 report predicts growth in ICTs energy use of 70% over the period 2007-2020

REDUCING ICT SECTOR EMISSIONS

PCs:

> Efficiency gains and longer product life.

> Shift from desktops to laptops

> Shift from CRT to LCD screens

> Potential breakthroughs – solid state hard drives, new LCD screens, new battery technology, quantum and optical computing

Data Centres:

> Higher rates of virtualisation; more efficient virtualisation architectures

> Low energy cooling

> "Utility"/"cloud" computing, Software as a service

REDUCING ICT SECTOR EMISSIONS

Telecoms Devices :

> "Smart" chargers

> 1W or lower standby devices

> Broadband routers and IPTV boxes' footprint increases over timeframe due to higher penetration from small base today

Telecoms Infrastructure:

> New network management tools

> Network optimisation packages

> Solar-powered base stations

> Potential breakthroughs – night battery operation, natural ventilation, "network sharing"

Mitigating the impact

- **Directly**, e.g. through energy-saving
  - Next-Generation Networks (NGN) should reduce GHG emissions by 40%
  - Modern radio technologies reduce energy consumption by transmitters ~ 10 times
- **Indirectly**, e.g. ICTs for carbon abatement
  - Video-conferencing to reduce business travel in Europe by 1% would save 1 m CO_2 ton
- **Systemically**, e.g. by "dematerialisation"
  - Intelligent Transport Systems could reduce vehicle carbon emissions below 130 g per km

WHAT IS **GREEN ICT ?**

Green ICT covers all activities on
"Green of ICT" & "Green by ICT"

Green of ICT	Green by ICT
CO_2 reduction of infrastructure and products in ICT industry	**CO_2 reduction through convergence with ICT in other industries**

The ICT Enabling Effect

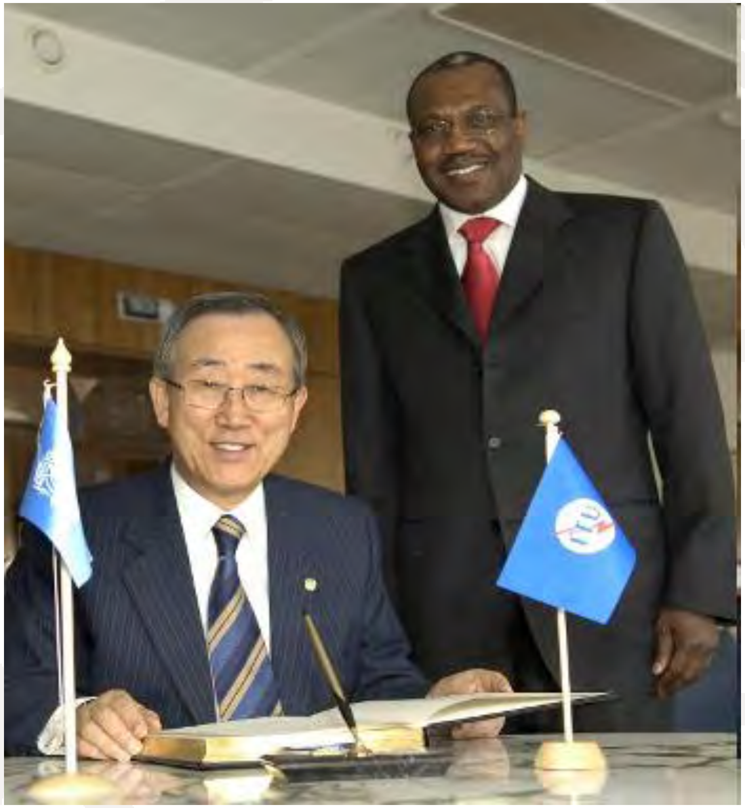
- ICT responsible for 2-3% of global CO_2 emissions
  - How can we reduce ICT own emissions
    - Next Generation Networks

- ICT key to reduce the other 97% of CO_2 emissions
  - The enabling effect by a factor of five
  - ICT as key enabler to reduce emissions in other sectors

Adaptation

- Support to get telecoms up and running after disasters
  - Recent examples Pakistan, Haiti and Chile
- E-Environment Toolkit will help countries to assess the contribution that ICTs can make to reduce GHG emissions
- New Question
  - ITU-D **SG2**, **Q24/2**: ICT and Climate Change

ICTs and Climate Change



- Methodology to describe and estimate present and future user [energy] consumption of ICTs over their entire life cycle
- Smarter standards for greener systems
- Participation in COPs

- UN Secretary-General, Ban Ki-moon:

"ITU is one of the very important stakeholders in the area of climate change."

Importance further identified at top level

- World Telecommunication Standardization Assembly (WTSA)-08, Resolution 73, resolves that CC is a high priority in ITU
- World Telecommunication Policy Forum (WTPF) (April 2009), Opinion 3, instructs promotion of Res. 73.
- Global Standards Collaboration (GSC)-14 (July 2009), Resolution, encourages related collaboration, etc.
- ITU Council (Oct. 2009), Resolution 1307, unanimously decided its importance and active participation in United Nations Framework Convention on Climate Change (UNFCCC) including Conference of Parties (COP)
- World Telecommunication Development Conference (WTDC)-10 (June 2010), Resolution on ICTs and CC, resolves to include, as a priority, assistance to developing countries in strengthening their human and institutional capacity in tackling ICTs and climate change

ITU-T and Climate Change: Setting the Standard

- FG on ICT&CC concluded with 4 Deliverables in March 2009.
  - Inputs from non-ITU members (e.g. academia) were also taken into considerations
- Mandate of SG5 was expanded at the last TSAG (28-30 April 2009)
  - New SG 5 title: Environment and climate change
- SG5 created a new WP 3/5
- All SGs examining impact of recommendations on climate change
- SGs developing standards for new energy efficient technologies
  - E.g. SG 13 on Next Generation Networks
  - NGN estimated to be 40% more energy efficient

ITU-T created Study Group "Environment & Climate Change"

- ITU-T Study Group 5 (April 2009)
  - New Working Party (WP3): "ICT and Climate Change"
  - Continuing and expanding the work of ITU-T Focus Group on ICT and CC
  - **Next meetings:** 27 Sept-1 Oct (WP3 interim meeting) 23 November-01 December 2010 (SG5 meeting)
- All ITU-T study groups to examine impact of recommendations on climate change

ITU-T established Joint Coordination Activity (JCA)

- Objectives:
  - to co-ordinate across ITU study groups
  - to seek co-operation from external bodies including non-ITU member organizations
  - **Next Meeting** will be held during the ITU-T SG5 Rapporteur meeting in Rome (27 Sept. - 1 Oct. 2010)

Universal charger

- ITU standardized-approval process for new Recommendation L.1000
- Delivers 50% reduction in standby energy consumption, eliminates 51,000 ton of redundant chargers, and cuts GHG emissions by 13.6 million ton CO_2 annually
- Current version covers charger for mobile terminals but will cover other ICT devices in future

ITU-T: Building Knowledge on Climate Change

- ITU-T issued major Technology Watch Reports on Climate Change and positive impact of new technologies
  - Next Generation Networks, Intelligent Transport Systems, etc.
- Organizing Major Symposia on ICT and CC
  - 2008: Kyoto and London
  - 2009: Quito and Seoul (virtual event)
  - 2010: Egypt
- ITU-T pioneering energy efficient work methods
  - Paperless meetings, on-line work tools, etc.
- ITU-T leading Dynamic Coalition on Internet and Climate Change as part of IGF

Raising Awareness-

Upcoming events need your support

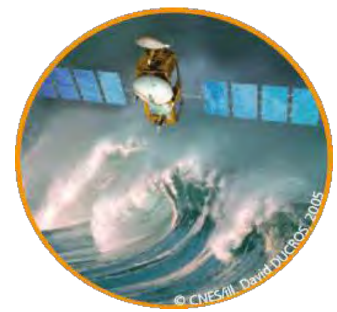
- **5th Symposium on ICTs and the Environment & Climate Change** (2-3 November 2010, Cairo, Egypt) **New**
  - Topics include: adaptation, e-waste, methodology of impact assessment…
  - The "Cairo Road Map", will be issued-
    - a set of recommendations for action on ICT, the Environment and Climate Change.
- **ITU-WIPO Side-Event**: The Effective Use of ICTs and the Intellectual Property System for Mitigating Climate Change (7 October 2010, Tianjin, China) **New**

Next generation electricity

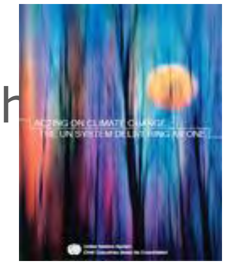
- Chief Technology Officers from the world’s biggest ICT companies highlighted **Smart Grid** as a priority area
- ITU Focus Group on Smart Grid
- Home networking standard feeds intelligence to the network

Radiocommunication

- **Monitor climate change by:**
  - Conducting and managing studies on remote-sensing
  - Providing key climate data via radio-based applications
  - Active monitoring of key climatic variables



ITU and UN Delivering As One on Climate Change



- ITU is contributing to the effort of the UN system to "deliver as one" to address climate change and is taking the necessary steps to deepen the global understanding of the relation between ICTs and climate change.
  - Read the Report: "Acting on Climate Change: The UN System Delivering as One"
  - ITU is co-facilitator in issues related to WSIS Action Line C7: e-environment
- Side events and press conference with Mr. Ban Ki-moon, UN Secretary-General at COP-15 Copenhagen in December 2009
- Ongoing Collaboration with UNFCCC, UNEP, WIPO, WMO and UNIDO
- On 5 June 2010, ITU together with UNEP and other partners celebrated the **World Environment Day**

ITU and climate change

UN "...it's critical"

"Climate Change is a global challenge that the world cannot lose".

Dr Hamadoun I. Touré

ITU Secretary-General, 12 November 2008

"Climate change is the defining challenge of our era. ITU's work to cut greenhouse gas emissions, develop standards and use 'e-environment' systems can speed up the global shift to a low-carbon economy".

Ban Ki-moon

United Nations Secretary-General, 12 November 2008

Conclusions

- We need to promote and publicize the importance of ICTs to combat climate change to all relevant actors: governments, citizens and business; and to establish collaborative partnerships.
- We must ensure ICTs play a key role as an enabling technology to reduce GHG emissions in other sectors.
- We must contribute to global standards, including agreed methodologies to measure the impact of ICTs on climate change and promote more energy efficient ICT products and services.
- We need to ensure our networks are disaster-resistant so increasing the resilience of communities in the event of infrastructure devastation

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Methodologies for assessment of environmental impacts of ICT
ITU-T SG 5

Jean-Manuel Canet,
Rapporteur for Question 18/5 ITU-T

5 recommendations under preparation

- General Umbrella, expected to be consented on October 1 2010
  - Covers definition of different types of environmental impacts, and general principles for the evaluation of ICT environmental impacts
  - focuses, in a first step, on energy and GHG emissions. Other environmental impacts, e.g. raw material depletion or water impact will be tackled later
- Environmental impact of ICT goods, networks and services
  - Covers direct and indirect impacts of ICT
  - Expected mid-2011
- Environmental impact of ICT in organisations
  - Includes 3 scopes of ISO 14064-1
  - Expected mid-2011
- Environmental impact of ICT projects
- Environmental impact of ICT in countries

Impact of ICT goods, networks and services

- Agreement to focus on **energy** and **GHG emission impacts**, over the **entire life cycle**
- Agreement to provide guidance on how to evaluate direct and indirect impacts **when using ICT products, networks and services,** in comparison with a baseline scenario without ICT
- Agreement to establish the recommendation in compliance with **ISO 14040-44** principles
- Draft recommendation in progress, usage of the results of the Focus Group “ICT and Climate Change”

- Recommendation expected mid-2011

Impact of ICT in organisations

- Agreement to focus on **energy** and **GHG emission impacts**
- Agreement to establish the recommendation in compliance with **ISO 14064-1** principles (which comes from GHG Protocol), including 3 scopes
- Draft recommendation in progress
- Recommendation expected mid-2011

Impact of ICT projects

- Scope : **agreement** to evaluate, in a first step, only greenhouse gases involved in **GHG emission reductions** or **GHG removal enhancements**, over the **entire life cycle**
- Agreement to evaluate projects **in the ICT sector** and also projects **using ICT to mitigate** GHG emissions in other economic sectors
- Agreement to establish the recommendation in compliance with **ISO 14064-2**

- Agreement to submit the recommendation to UNFCCC for potential inclusion on CDM-like mechanisms

- Recommendation table of contents available
- Draft recommendation in progress

Impact of ICT projects

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Cooperations include :

GeSI
GLOBAL e-SUSTAINABILITY INITIATIVE

The Greenhouse Gas Protocol Initiative
The foundation for sound and sustainable climate strategies

ISO
Organisation internationale de normalisation

ETSI World Class Standards

ict4ee.eu
ICT for Energy Efficiency Forum

Digital Europe

Evaluating the carbon-reducing impacts of ICT

September 2010

Objectives

Recap objectives of study

Provide an overview of the approach

Explain the recommended assessment methodology

Illustrate the assessment methodology

Share path forward

Study context and objectives

GeSI commitments

1. Develop an agreed ICT industry-wide methodology for the carbon footprinting of ICT products and services

2. Put more emphasis on climate change issues in our supply chain work so we influence the end-to-end manufacturing process for electronic equipment

3. Ensure that energy and climate change matters are fully considered by the organisations that set the technical standards for our industry

4. Work with organisations in the key opportunity areas – travel/transport, buildings, grids and industry systems – to help turn potential CO2 reductions into reality. This will include a strong emphasis on the significant opportunities offered by dematerialisation

5. Work with public policy makers to ensure that the right regulatory and fiscal frameworks are in place to move us all in the right direction.

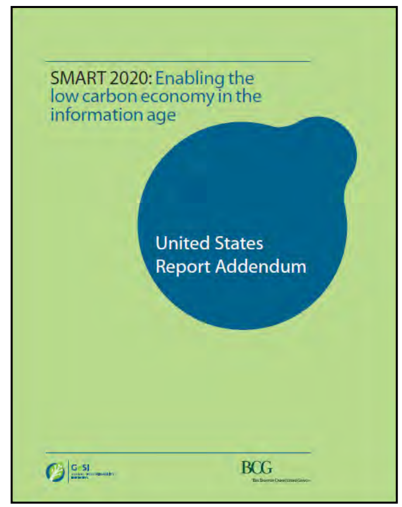
GeSI's SMART 2020 report series identified ICT as a major low carbon enablement opportunity

2008 SMART 2020 Report

- Globally, ICT solutions have the potential to reduce by 15% (7.8 Gt CO2e) of the remaining 98% CO2e emitted

2008 U.S. Addendum

- ICT enabled solutions could cut annual CO2e emissions in the U.S. by 13–22% from business as-usual projections in 2020
- This translates to a gross energy and fuel savings of $140-240 billion dollars. These savings are equivalent to a reduction in total oil consumption by 11-21% and a reduction of oil imports into the U.S. by 20-36%



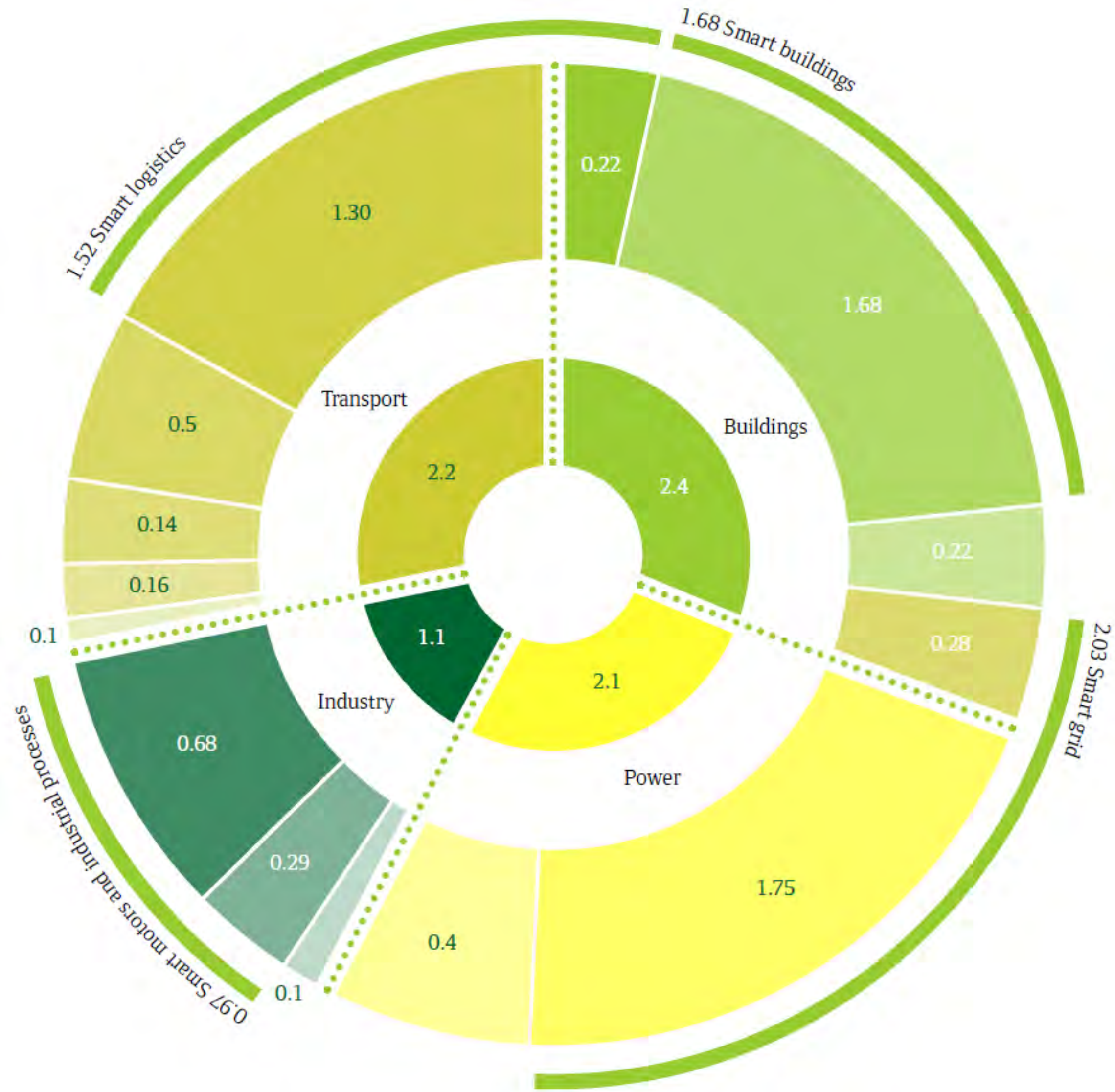
The enabling effect covers four primary areas

Industry
- Smart motors
- Industrial process automation
- Dematerialisation* (reduce production of DVDs, paper)

Transport
- Smart logistics
- Private transport optimisation
- Dematerialisation (e-commerce, videoconferencing, teleworking)
- Efficient vehicles (plug-ins and smart cars)
- Traffic flow monitoring, planning and simulation

Buildings
- Smart logistics†
- Smart buildings
- Dematerialisation (teleworking)
- Smart grid‡

Power
- Smart grid
- Efficient generation of power, combined heat and power (CHP)



The reports identified government support needed to accelerate adoption

Over-arching policies

Create policies that build overarching framework for encouraging CO_2 reduction and ICT solution adoption

Targeted policies

Use targeted policies to accelerate adoption and address specific technical, economic and behavioral challenges

- **Smart Grid**
- **Road Transport**
- **Smart Buildings**
- **Travel Substitution**

Principles for effective government policies

Create an enabling regulatory framework
- Aim for consistent legislation that supports market-based solutions

Enable development of solutions
- Conduct fundamental research benefiting all stakeholders
- Encourage innovation, not specific technologies
- Encourage investment in required infrastructure

Support the business case when necessary
- Create the right incentives
- Ensure that markets create desired environmental and social outcome

Encourage positive behavior change
- Lead by example and support pilot projects
- Facilitate and coordinate the sharing of information

Source: GeSI policy expert interviews; BCG analysis; SMART 2020 United States Addendum Report

ICT Enablement Methodology Study context and objectives

Context

Despite the positive reception of these reports, the lack of policy- and commercially-relevant assessments is preventing the full realization of benefits from smart use of ICT

- ICT industry unable to clearly define the specific benefits of different types of ICT investments
- Policy-makers unable to create appropriate incentives for the government, commercial and residential sectors

Project objectives

- Survey and evaluate existing methodologies relevant for assessing enabling impacts of ICT
- Highlight key characteristics of existing methodologies
- Develop an optimal "next step" methodology
- Apply methodology to selected case studies
- Identify issues for application and path forward for the ICT industry

Representatives from 18 international companies sponsored and provided input to the study, orchestrated by BCG

Alcatel·Lucent
at&t
Bell
BT
CISCO
Deutsche Telekom
ERICSSON
france telecom
GSMA
hp
HUAWEI
intel
Microsoft
Nokia Siemens Networks
RIM
Sprint
verizon
vodafone

In addition to working team members, many industry and academic experts have provided input

1	Ted Reichelt	Principal Environmental Engineer, Intel
2	Kirsty MacDonald	Senior Manager, Global Public Policy, Intel
3	Marissa Yao	Analyst, Intel
4	Charlie Sheridan	Senior IT Consultant, Intel
5	John Malian	Manager, Global Supply Chain Management, Cisco
6	Jens Malmodin	Senior Research Engineer, Ericsson
7	Craig Donovan	Research Engineer, Ericsson
8	Pernilla Bergmark	Researcher, Ericsson
9	Fredrik Jonsson	Researcher, Ericsson
10	Hans Scheck-Otto	Researcher, Nokia Siemens Network
11	Emma Fryer	Head of Climate Change Programs, Intellect UK
12	Anders Andrae	Senior Expert, Huawei Technologies Sweden
13	Sarah Boyd	Researcher, Sustainability Consortium
14	Mattias Höijer	Head of Centre of Sustainable Communications, Royal Institute of Technology, Stockholm
15	Cristina Bueti	Policy Analyst, ITU
16	Keith Dickerson	Head of Global Standards, BT Innovate & Design
17	Ian Mackenzie, Alex Velkov, Peter Thomond	Think, Play, Do, Imperial College London
18	Skip Laitner	Director of Economic and Social Analysis, American Council for an Energy-Efficient Economy
19	Simon Redding	Sustainable ICT Lead & Technology Innovation Consultant, Environment Agency of England & Wales
20	Fu Zhao	Assistant Professor of Mechanical Engineering, Purdue University

The team reviewed numerous parallel efforts to develop methodology for assessing enabling impacts

	Impact focus		Status of methodology recommendation		Report timing	LCA assessment approach			
	"2%"	"98%"	Published	In development		Process	Hybrid	EIO	Description
ITU International Telecommunication Union	✓	✓	✓	✓	Nov 2009, 2010 / 11		✓		Hybrid LCA with general calculation steps for replaced conventional systems
ETSI	✓	✓		✓	June 2010 *(early draft in 2008*	✓		✓	Process for direct ICT emissions; EIO for macroscopic ICT impact (positive and negative)
ict4ee.eu	✓	✓		✓	2012	✓			2%: Limited LCA for ICT processes only 98%: TBD by ReViSITE/GeSi
iNEMI	✓			✓	2011	✓			Modular process-based LCA and tool focused on 2% but with expected use for 98%
ERICSSON	✓	✓	*Not stand-alone methodology; input provided to ICT industry bodies (e.g. ITU, ETSI)*		Late-2009		✓		Hybrid LCA methodology including infrastructure for ICT systems
JEMAI	✓	✓	✓		2006		✓		Hybrid LCA, outlines target activities, excludes some life cycle phases
REVISITE		✓		✓	Late-2010		✓		Hybrid LCA / Capability Maturity Model (CCM)
WWF / CHINA MOBILE	✓	✓	✓		May 2010		✓		LCA methodology for 14 ICT applications

Source: BCG analysis

Developed methodology meets specific needs

Comprehensive	**Captures all major impacts, both positive and negative** (i.e., direct ICT emissions, enabling effects, and rebound effects)
Burden-limiting	**Limits burden of assessment**: Minimizes time and resources required by facilitating exclusion of negligible components of net effect
Communication-friendly	**Supports clear, transparent communication** of methodological approach and findings to broad stakeholder audience
Applicable for varying scope	**Widely applicable for assessing impact of ICT products and services and ICT category levels**
Applicable across geographies	**Effective when applied in both developed and developing world settings**
Flexible	**General and flexible enough for large-scale adoption** – will meet current and future stakeholder needs as sector innovation occurs
Adaptable	**Can adapt as more detailed guidance, industry-wide standards and software assessment tools are developed**
ISO compliant	**Based extensively on ISO 14040-series standard**, but introduces additional guidance specific to assessing enabling effects of ICT

Case studies intended to demonstrate use and applicability of assessment methodology

Case studies utilized to test the relevance and effectiveness of methodology in real-world setting

Diverse set of case studies developed to illustrate applicability across:

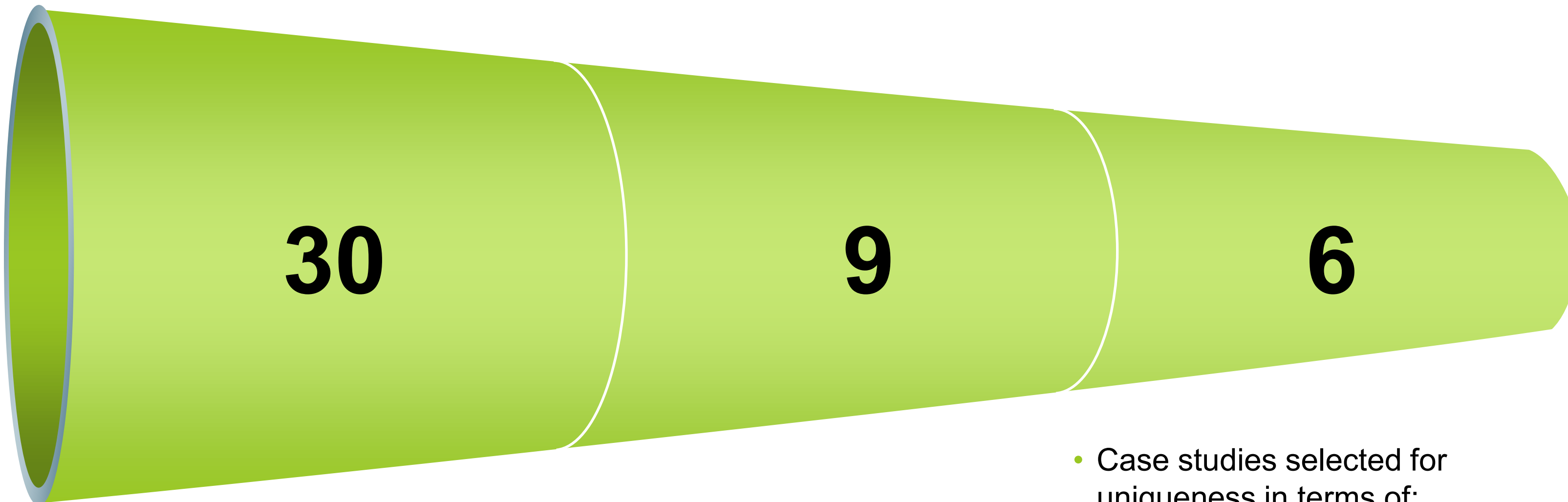
- ICT solution areas (dematerialization, SMART logistics, SMART grids, SMART transportation)
- Unique audiences: end-consumers, business customers, policymakers
- Diverse geographies: developed and developing world

Existing case studies and research data used as starting point

- Studies identified and aggregated from GeSI team members as well as external resources
- Key criteria for inclusion: existing robust quantification of key impacts

6 case studies selected from 30 identified and evaluated

Existing case study?	Sufficient data available?	Illustrates unique application?



- Existing studies identified via:
  - GeSI team members
  - Review of existing literature
  - Discussion with external experts

- Majority of studies eliminated due to lack of sufficient existing data on ICT impacts
  - E.g., emission reductions for key forms of impact

- Case studies selected for uniqueness in terms of:
  - SMART ICT category
  - Geographic scope
  - Scope of measurement

Six case studies included in report

		SMART area	Location	Assessor	Description
1	**Home energy monitoring kit**	SMART grids	United Kingdom	AlertMe	Energy savings in household before and after installation of AlertMe home energy monitoring system
2	**HVAC automation system**	SMART buildings	United States	Cypress	Energy savings in building complex after installation of HVAC automation system
3	**Eco driving software solution**	SMART logistics	United Kingdom	Microlise	Fuel efficiency gains across 350+ vehicle fleet after software implementation
4	**Telecommuting**	Dematerialization	United Kingdom	BT	Assessment of whether telecommuting has positive net enabling effect despite rebound effect of increased home energy use
5	**E-health delivery system**	Dematerialization	Croatia	Ericsson	Emission-reducing impact of e-referral and e-prescription services in Croatia
6	**Telepresence system**	Dematerialization	Multinational company	Cisco	Assessment of net enabling effect from company-wide adoption of telepresence

Source: BCG analysis

Recommended assessment methodology

ICT enablement methodology

1 Define goal and scope	2 Limit assessment	3 Assess and interpret
1a Define goal of study	2a Estimate BAU reference value	3a Rigorously assess significant life cycle processes
1b Define scope of study	2b Limit life cycle processes requiring rigorous assessment	3b Interpret net results

Methodology uses a Life Cycle Assessment (LCA) approach to guide the assessment of changes to an existing system resulting from the adoption of an ICT solution

Source: BCG analysis

1a: Define goal of study

Assessment worksheet

Define | 1a Define goal | 1b Define scope

Step 1: Define goal and scope

1a Define goal of study

Define the purpose of the study and the intended audience for the study. These attributes will guide decision-making on the set of effects to include in further assessment

Q: What is the purpose of the study and the intended audience?

Purpose of study ______________________

Intended audience ______________________

Scale of adoption ______________________

Implications for assessment

[ ]

Illustrative output

Define | 1a Define goal | 1b Define scope

1a Define goal of study

Illustrative example used throughout worksheets

Purpose of study: *Quantify carbon abatements from use of logistics optimization software*

Intended audience: *Business customers*

Scale of adoption: *Use to manage operations of a single organization's 500-truck fleet*

Implications for assessment

Relevant effects to include in calculation of net impact are limited to near-term effects such as primary enabling and rebound effects, or secondary effects that occur over a shorter period of time

For further reference–additional examples

Purpose of study: *Assessment of emission reductions from home energy monitoring system*

Intended audience: *Business-to-business customers (marketing communication)*

Scale of adoption: *Single-business in United Kingdom*

Implications for assessment

Relevant effects from adopting home energy monitoring system likely to be limited to activities and operations of individual businesses; broader secondary effects such as reduced energy plant construction and operation not relevant

Purpose of study: *Communication of macro-scale benefits of telepresence*

Intended audience: *National policy makers*

Scale of adoption: *Adoption and use by all businesses in United States*

Implications for assessment

Relevant effects for ICT solution with broad adoption and targeted at policymakers would be more inclusive of enabling and rebound effects which often will only occur with sufficient time or adoption, such as the ability to reduce the need for travel infrastructure

Illustrative scale considerations by audience

Customers

"Low" scale of adoption

- Impact from adopting ICT solution likely to be limited to one's own activities, operations

Business/Industry

Variable scale of adoption

- Impact from adoption will depend on the size and characteristics of organizations

Policy makers

"High" scale of adoption

- Impact from adoption will include cumulative effects of use by many individuals or businesses

Expected primary enabling effects of ICT opportunity levers

SMART opportunity	*Sub-opportunity*	1 Reduced energy consumption		2 Reduced or eliminated travel/shipment	3 Reduced or eliminated materials
SMART Motors	Smart Motor	• Optimization of variable speed motor systems	• ICT driven automation in key industrial processes		
SMART logistics	Air transportation	• Reduction in ground fuel consumption	• In-flight fuel efficiency	• Reduction in unnecessary flight time	
	Road transportation	• Eco-driving		• Optimization of logistics network • Intermodal shift (to other transports) • Optimization of truck itinerary planning • Optimization of truck route planning • Flexible home delivery methods • Intelligent traffic management	• Minimization of packaging
	Ship / Rail / Other	• Optimization of ship operations		• Optimization of train operations • Maximization of ship load factor	
	Warehouse	• Centralized distribution centres • Reduction in inventory			• Reduction of damaged goods • Recycling and remanufacturing
SMART buildings	Building design	• Improved building design for energy efficiency	• Reduced building space through design		
	Building technology	• Building management systems • HVAC automation • Lighting automation • Ventilation on demand	• Intelligent commissioning • Benchmarking and building recommissioning • Voltage optimization		
SMART grids	Consumption efficiency	• Reduce consumption through user information	• Demand management • Intelligent load dispatch		
	Renewable Energy	• Integration of renewables			
	T&D Loss	• Reduce transmission and distribution losses			
Dematerial-ization	Physical material				• Online media • E-commerce • E-paper
	Travel substitution			• Video-conferencing • Telecommuting	

Path forward

Path forward

Development of additional case studies

- Additional real-world case studies to demonstrate successful application of methodology

Expansion of shared data

- Increased volume of, access to primary data to more accurately capture real-world impacts (especially those driven by adoption rates and behavioral changes)

Development of assessment tools and databases

- Continued development of tools to support application of methodology
- Integration of tools and aggregation of underlying data

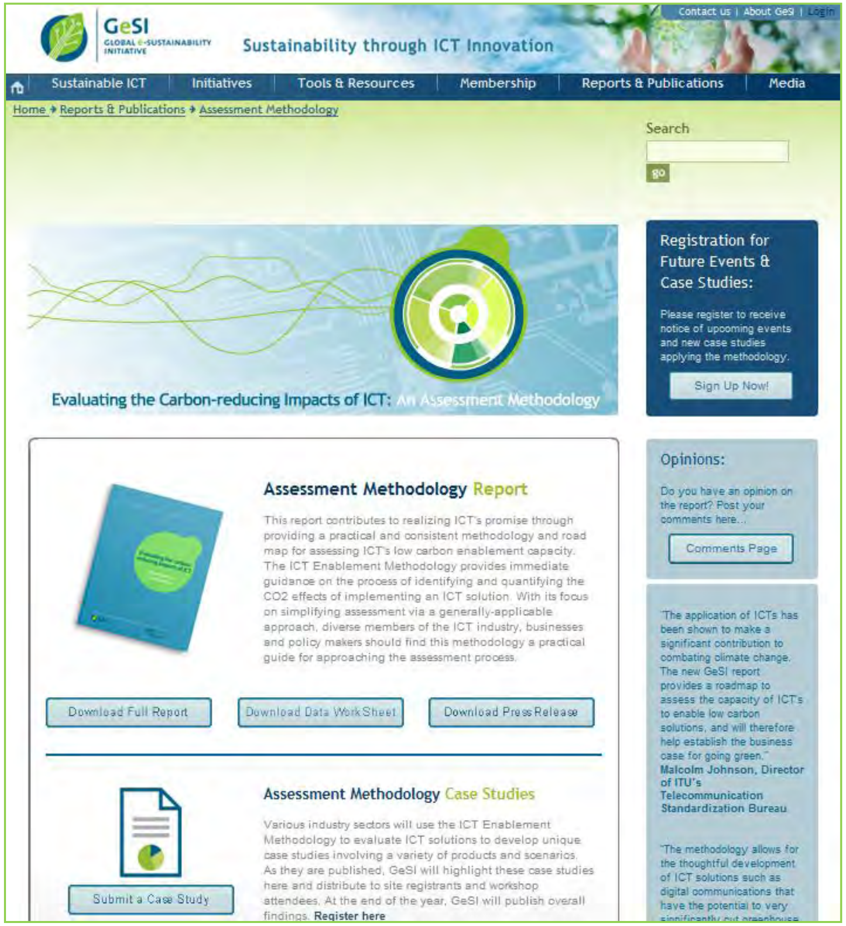
Standardization of impacts and life cycle processes included in assessment

- Establishment of agreed-upon approaches for assessing effects of specific ICT product or service categories

The launch website at GeSI.org is the starting point

There, you can:

- Download the Report
- Download methodology worksheets you can use to guide your own assessment and track your data
- Review the latest case studies
- Watch a video explaining the study
- Register your interest in future workshops and published case studies



Evaluating the carbon-reducing impacts of ICT
Case Study 6: Cisco TelePresence

Darrel Stickler
Sustainable Business Practices
Cisco Systems

September 24, 2010

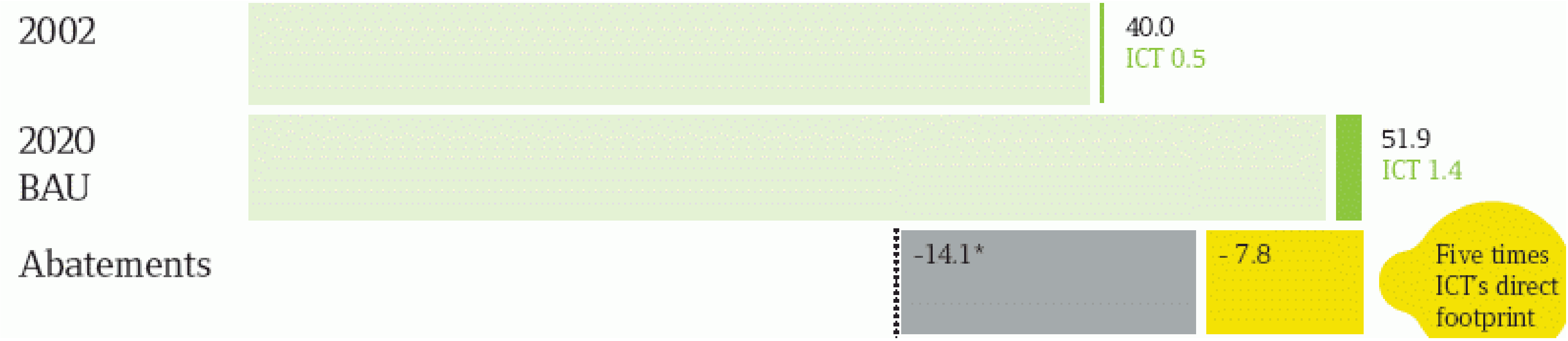
Agenda

- The promise of Information and Communication Technology (ICT)
- Cisco TelePresence case study
  - CTS models
  - Cisco GHG performance
  - The Challenge
  - Cisco TelePresence carbon footprint
  - Business value!
- Next Steps

The 98%

ICT as Part of the Solution

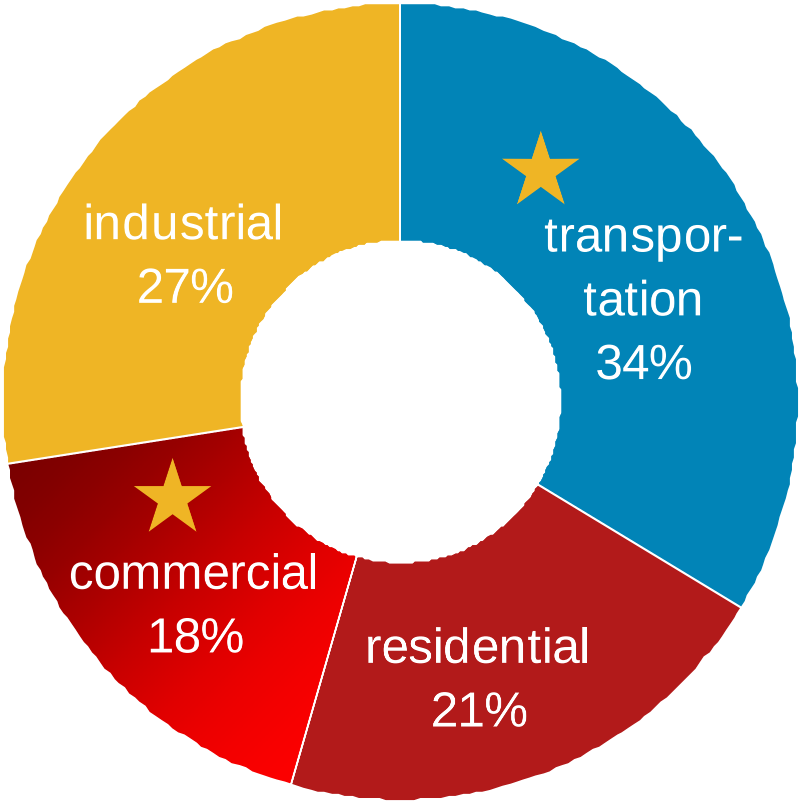
- ICT could reduce global emissions up to 15% by 2020; five times its own footprint in 2020
- Make every Internet connection a greener connection

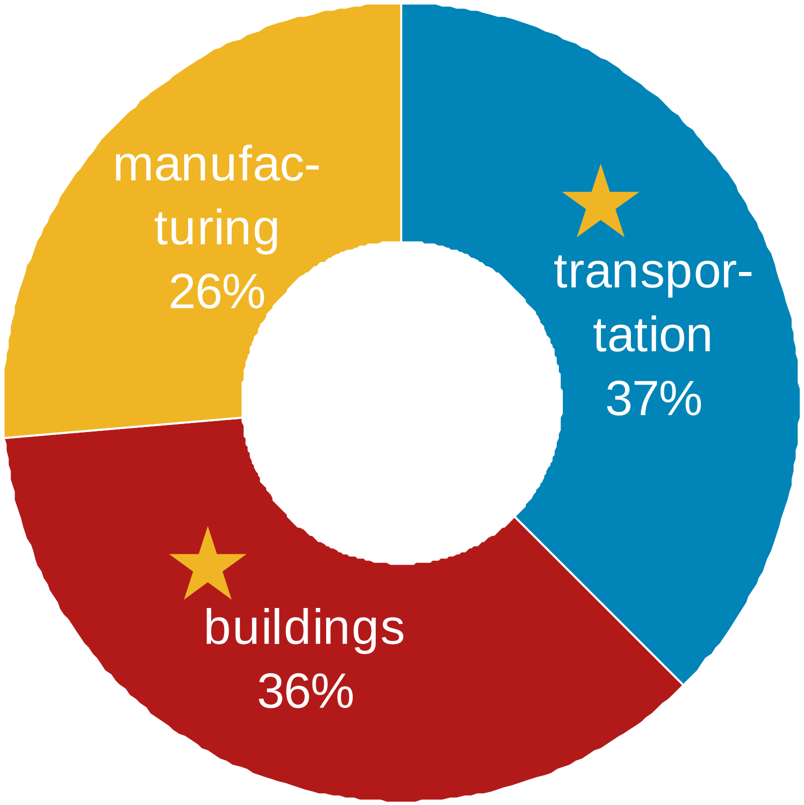


Source: SMART 2020: Enabling the Low Carbon Economy in the Information Age, Report, June 2008

How Can Remote Collaboration Help?

Greenhouse Gas Sources (energy-related)





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)

SMART 2020

7.8 $GtCO_2e$ of ICT-enabled abatements are possible out of the total BAU emissions in 2020 (51.9 $GtCO_2e$)

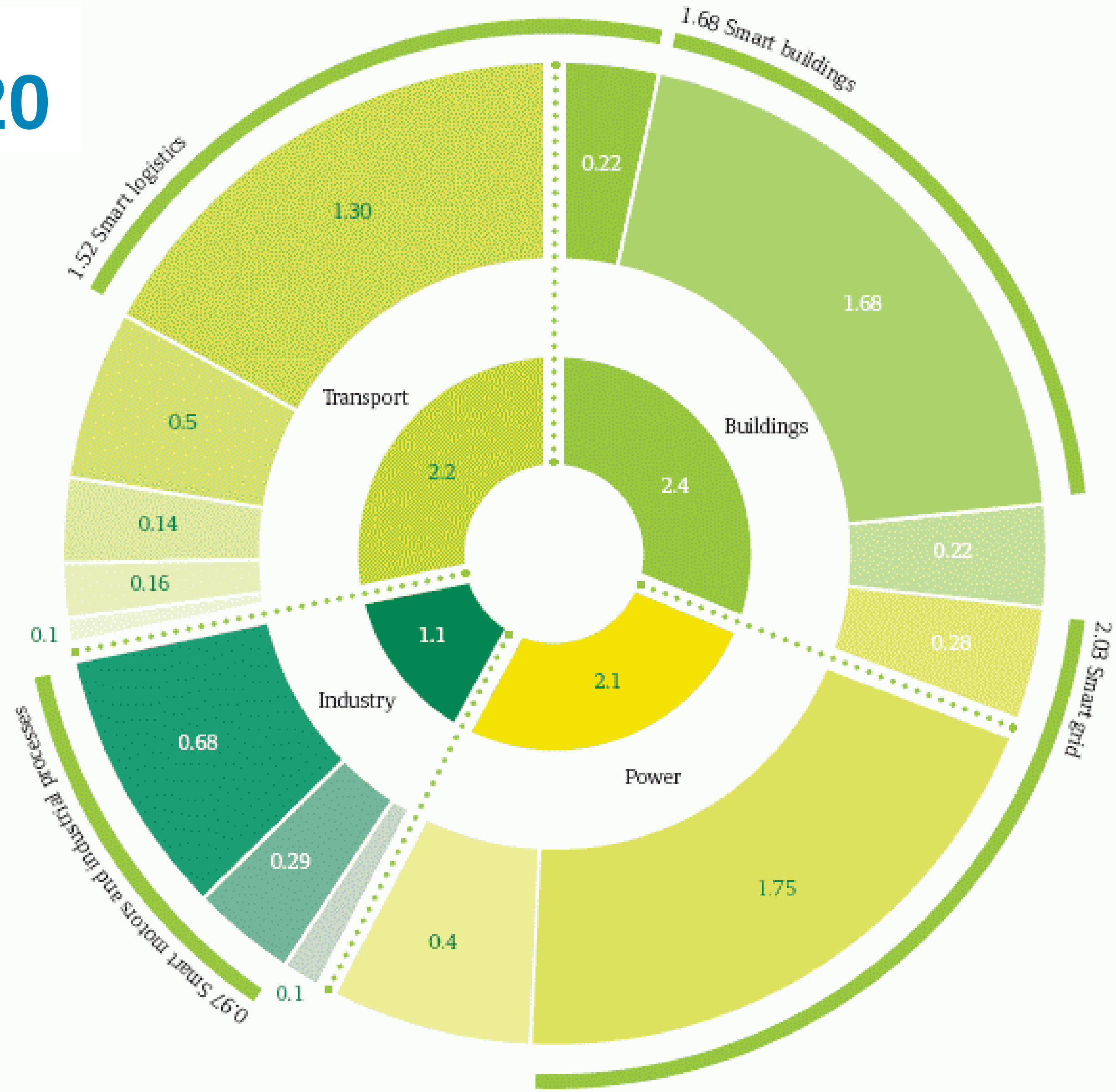
The SMART opportunities including dematerialisation were analysed in depth

Industry
- Smart motors
- Industrial process automation
- Dematerialisation* (reduce production of DVDs, paper)

Transport
- Smart logistics
- Private transport optimisation
- Dematerialisation (e-commerce, videoconferencing, teleworking)
- Efficient vehicles (plug-ins and smart cars)
- Traffic flow monitoring, planning and simulation

Buildings
- Smart logistics†
- Smart buildings
- Dematerialisation (teleworking)
- Smart grid‡

Power
- Smart grid
- Efficient generation of power, combined heat and power (CHP)

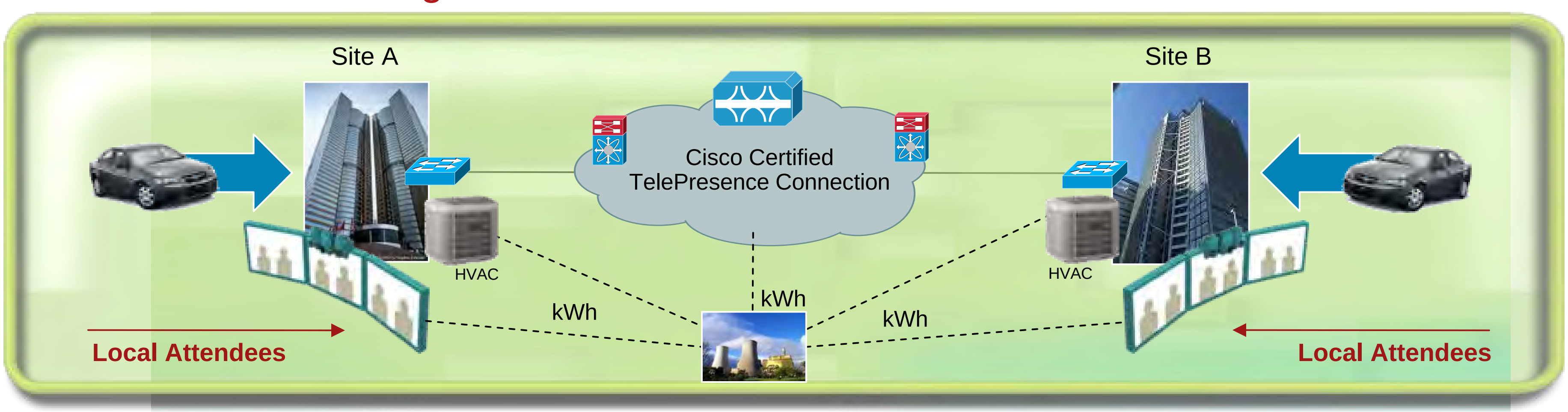


*Dematerialisation breaks down into all sectors except power. See detailed assumptions in Appendix 3.
†Reduces warehousing space needed through reduction in inventory. See Appendix 3.
‡Reduces energy used in the home through behaviour change. See Appendix 3.

Cisco TelePresence vs. Air Travel

Traditional Face-to-Face Meeting

TelePresence Meeting



CTS-1000 (one screen)

TelePresence Active Collaboration Room

CTS-3000 (CTS 3200 on screens)

CTS-3000 (CTS-3200 on screen)

Cisco Air Travel GHG Performance

Indicators	FY06	FY07	FY08	FY09
GHG EMISSIONS				
Total air travel GHG emissions: Scope 3 (metric tonne CO_2e)	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)

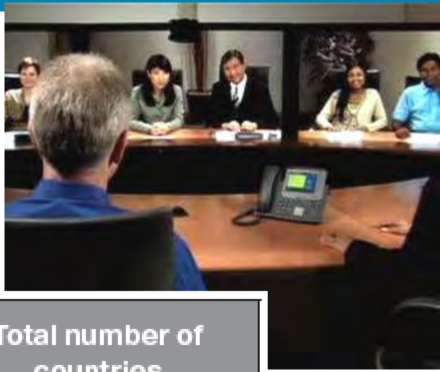
FY2006 → 2009

Employee count ↑ >25%

Revenue ↑ >27%

Source: 2009 CSR Report, p. C32

Cisco TelePresence 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.

- TelePresence deployment — **doubled** last two years

Source: [2009 CSR Report](), p. C36

“There are no standards but there’s a lot of hand waving by companies and what we’re asking for are case studies that explain the assumptions made when an ICT company says its products and services saved half a million metric tons of CO_2 or CO_2-equivalent gases.”

Casey Harrell

Greenpeace International

Source: PricewaterhouseCoopers Communications Review

Cisco TelePresence Carbon Footprint

Cisco-developed “Calculator”

Remote Collaboration - Green Business Value Calculator

= help

Introduction | Current Profile | Impact | TelePresence | Notes | Assumptions

Summary Impact | Costs and Benefits | GHG Emissions

(Optional) You may adjust the typical values provided below to your actual values to improve the estimate of the number of TelePresence systems needed.

Sizing the TelePresence Deployment

Trips Where Remote Collaboration Displaces Travel:	Air Travel	Ground Travel
Share of Travel Displaced by TelePresence, %	80%	1%
Share of Travel Displaced by WebEx and UC, %	20%	99%

Trips Where TelePresence Displaces Travel:	Air Travel	Ground Travel
Average number of meetings per trip	1.10	1.00
Average time per meeting, hours	1.25	1.00

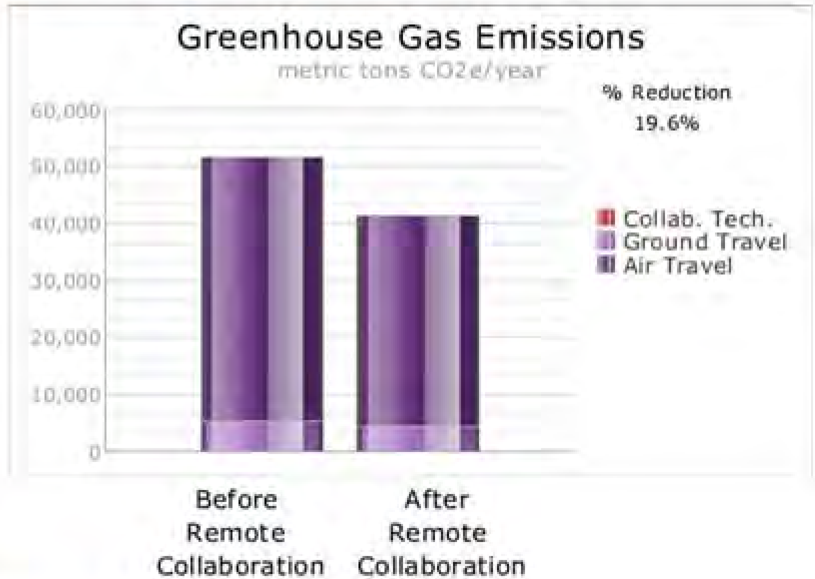
TelePresence Meetings Where Travel Was Avoided:	Air Travel	Ground Travel
Average number of locations participating per meeting	2.1	2.1
Average number of employees avoiding travel per meeting	3.5	3.5

TelePresence Operations	
% of TelePresence meetings that avoid travel	30%
TelePresence work hours available, hours/week/system	50
TelePresence utilization of time available, %	50%

Source: Cisco IBSG website

Number of TelePresence systems needed 28

Projected Green Impact



Projected Financial Impact

Investment in Remote Collaboration technologies, $	$8,271,089
Reduction in travel costs, $/year	$17,200,000
Value of employee time savings, $/year	$6,160,000
Impact of faster cycle time	Not Quantified
Net cost savings quantified, $/year	$16,796,318
Payback on investment, years	0.49

Model developed by Cisco Internet Business Solutions Group (IBSG) Innovations Practice

GeSI/BCG Study – TP Carbon Footprint

50:1 Leverage

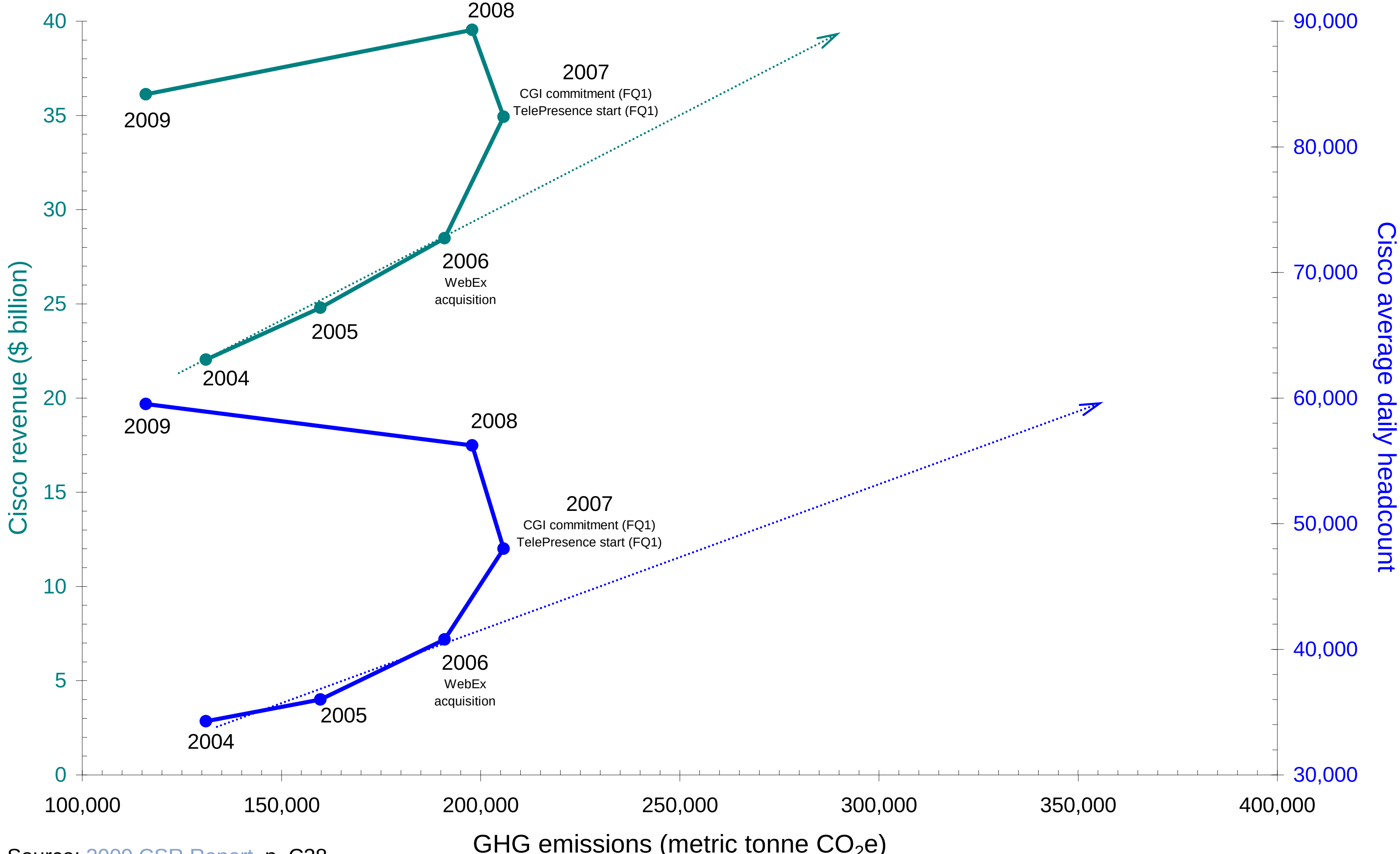
	Business-As-Usual Air Travel	ICT Solution Cisco TelePresence
• Use phase	• Jet fuel Cisco travel data 4425 km/trip • Ignore (conservative) home transportation rental car hotel **1000 kg CO_2e per 2 people**	• Two telepresence endpoints 50% usage; 10 hr/day, 5d/wk • HVAC • Network equipment Enterprise switch SP aggregation/core **4.3 kg CO_2e/hour**
• Embodied emissions	• Ignore (conservative) home transportation airport/airplane rental car hotel **0 kg CO_2e**	• Process sum LCA raw material production logistics end of life (10 yr) **3.2 kg CO_2e/hour**
• Other considerations		• Improved business meetings (without reducing travel) **11.1 kg CO_2e/hour** • Check if switch to rail **0 kg CO_2e/hour** • Ignore impact of broader adoption • Ignore "avoided" emissions • Assume most energy-intensive endpoints (vs. home telepresence, one screen)

1000 kg CO_2/trip ← **~50:1** → **18.6 kg CO_2/meeting**

Source: GeSI Enabling ICT report

“Avoided” GHG Emissions

Fiscal Year



Source: 2009 CSR Report, p. C38

Cisco TelePresence Business Case

Solution	Benefits,$ million/year	Avoided Emissions metric tons CO_2e/year
Business value		163,000*
- Cost savings	$469M	
- Productivity	$127M	
- Revenue	$115M	
Telecommuting	$299M	48,300
Connected Workplace	$ 14M	2,700
Total	$1,024M	214,000

Fiscal Year 2009 Results

Net Financial Impact = Benefits – Costs
= $1,024M – $111M = $913M/year

Source: Cisco IBSG website

*Avoided air travel emissions based on comparison to what would have resulted if emissions per employee remained constant at FY06 levels while Cisco grew our employee base.

Next Steps

Full Remote Collaboration Case Study

CTS-3200 CTS-3000 CTS-1100

Cisco TV

CTS-1300 **TelePresence**

encoder/
decoder

CTS-500

Smart + Connected Real Estate

Web conferencing,
events, training, support

WebEx

WebExConnect

PC-PC
call

desktop
sharing

Mobility

Cisco Virtual Office
(CVO)

IM

video
chat

Unified Communications

IP
Communicator

voice
mail

IP Phone

- Business air travel emissions
- Employee commuting emissions
- Building emissions

Next Steps
Full Remote Collaboration Case Study

Cumulative, as of end of fiscal year	Total number of TelePresence rooms	Total number of cities	Total number of countries
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*EBC stands for Executive Briefing Centers, regional meeting facilities that Cisco uses for presentations to customers.

Cisco TelePresence deployment — **doubled** each of last two years

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

Cisco WebEx and MeetingPlace usage — **doubled** each of last two years

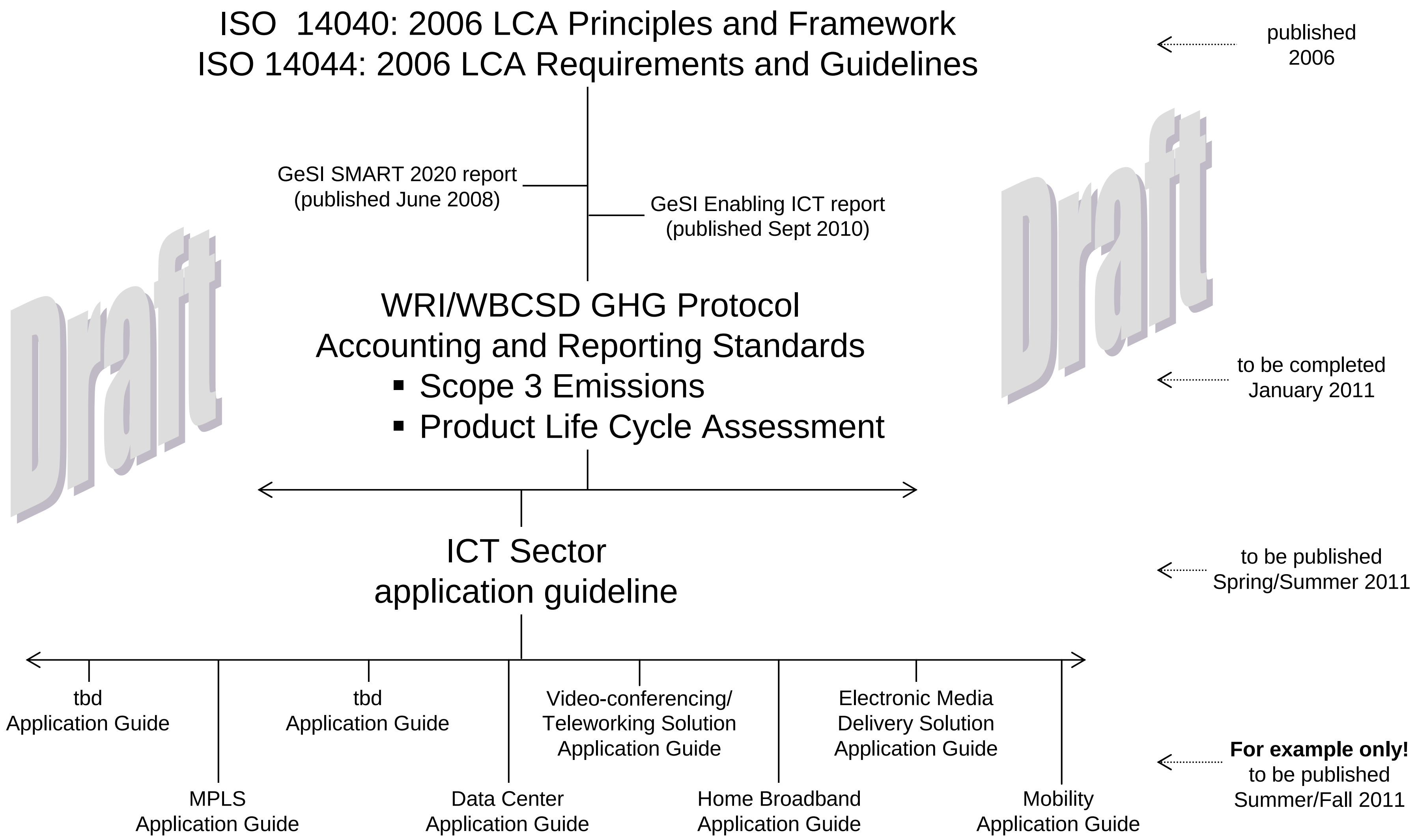
Calendar Year	Total users
2005	1,467
2006	5,006
2007	8,234
2008	13,052
2009 (through October)	16,890

Cisco Virtual Office (CVO) installations — **doubled** each of last 4 years (average)

Source: 2009 CSR Report, p. C36

Next Steps — ICT Carbon Footprinting

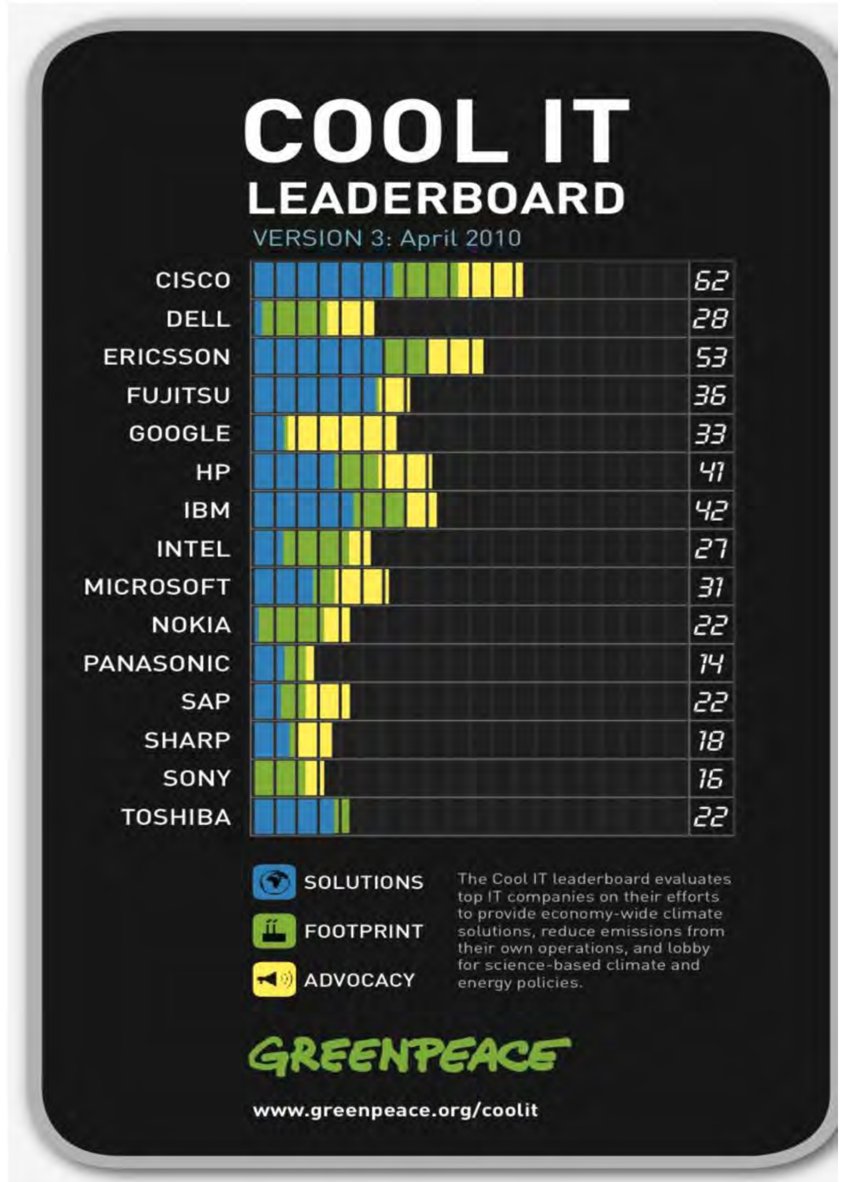
Standards Development Timeline



Gary Cook, Climate Policy Analyst for Greenpeace International's Cool IT Campaign

Measuring Climate Leadership

- **Climate Solutions** (40%)
- **IT Energy Impact** (25%)
- **Political Advocacy** (35%)



IT Solutions Leadership

- **Calculations of GHG/energy savings potential** (20)

  Good example: Cisco provided list of seven solutions with significant documentation

- **Publish Metrics & Assumptions to Calculate Net Savings** (10)

  Good example: Ericsson provided detailed LCA methodology for telecom savings

- **Investment in Clean Tech Solutions and R&D** (5)

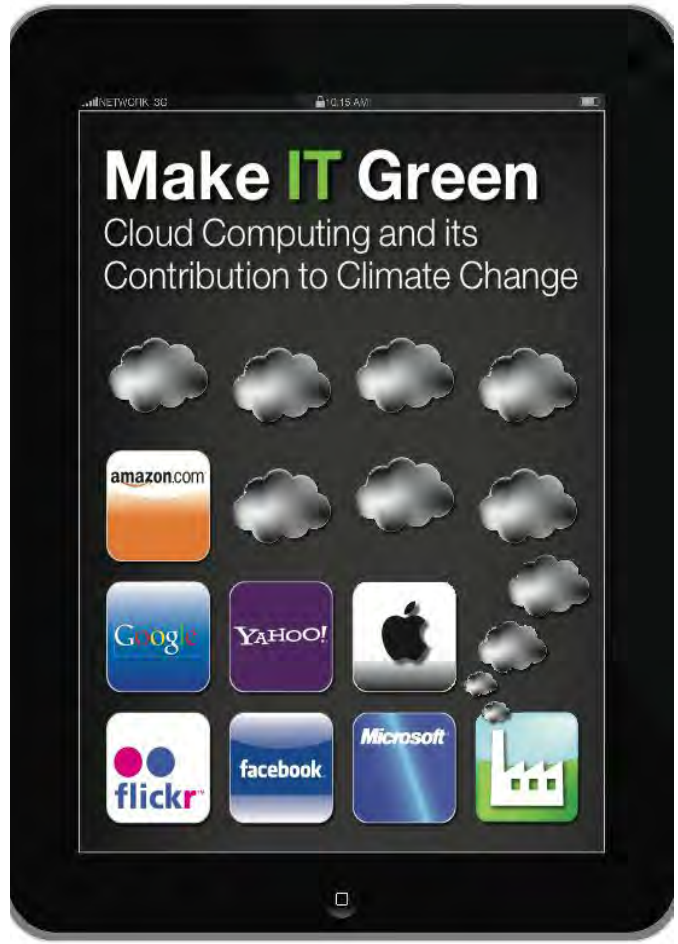
  Good example: Google's recent investment in wind farms

- **Future Savings Goal** for net GHG reductions from IT solutions (5)

  Good example: Fujitsu published public target for carbon savings

IT Energy Impact

- IT Sector Related Energy Use Rapidly Expanding
- Cloud: Looking beyond efficiency gains to source of energy
- Impact of product use & supply chain footprint



Advocacy Leadership

- Increased Advocacy Activity from IT Sector, but..
- Need Stronger Leadership: clearer demands and coherent message:

  "make yourself politically relevant"

- Priority Advocacy Opportunities:

  California: AB32 Rollback and Prop 23

  EU: Support for 30% by 2020

  Smart Grid & Renewable Electricity Standards/Investment

Thank you

If you have further questions, contact info:

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Thank you!

Questions?
Comments?