ITU-T WORKSHOP "ICTs: Building the Green City of the Future"

(Shanghai, China, 14 May 2010)

ICT & Climate Change Policies and Actions in Japan

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ICT & Climate Change Policies in MIC: ICT Green Project

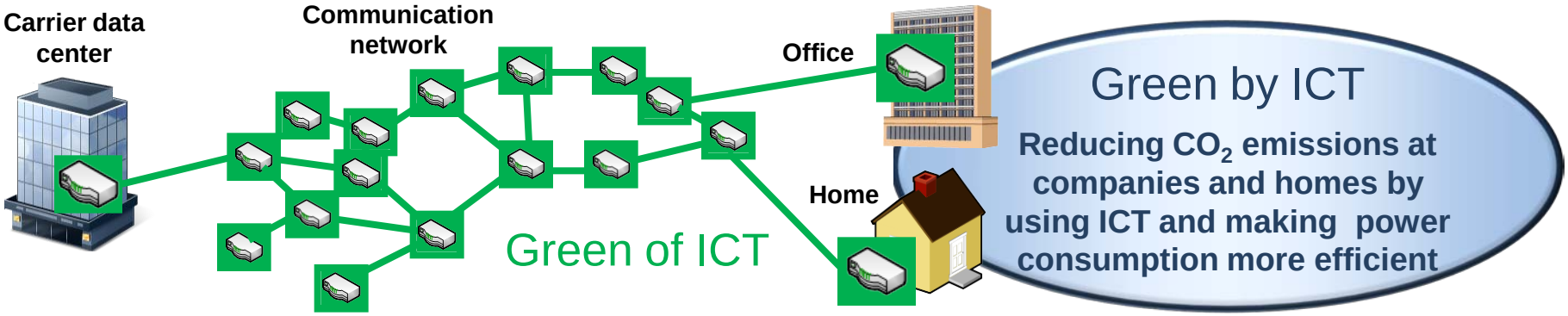
ICT for helping to reduce environmental impact

Significant reductions in CO_2 emissions can be achieved by using ICT.

Three pillars of the "ICT Green Project"

1) Greening of the ICT system itself (***Green <u>of</u> ICT***)
   - Responding to increased power consumption by expanding usage of ICT systems (e.g., R&D to conserve power in the overall system from carrier equipment to in-home equipment)
2) Greening of other fields through extensive use of ICT (***Green <u>by</u> ICT***)
   - E.g., formulation of communication standards for achieving early practical implementation of smart meters
   - Establishing best practices such as by demonstration testing to promote usage of ICT which is highly effective at reducing CO_2 emissions
3) International contribution
   - Establishment of techniques for evaluating effectiveness in reducing CO_2 and active contribution to International Organizations.

ICT Green Project



1) Greening of ICT system itself (Green of ICT)

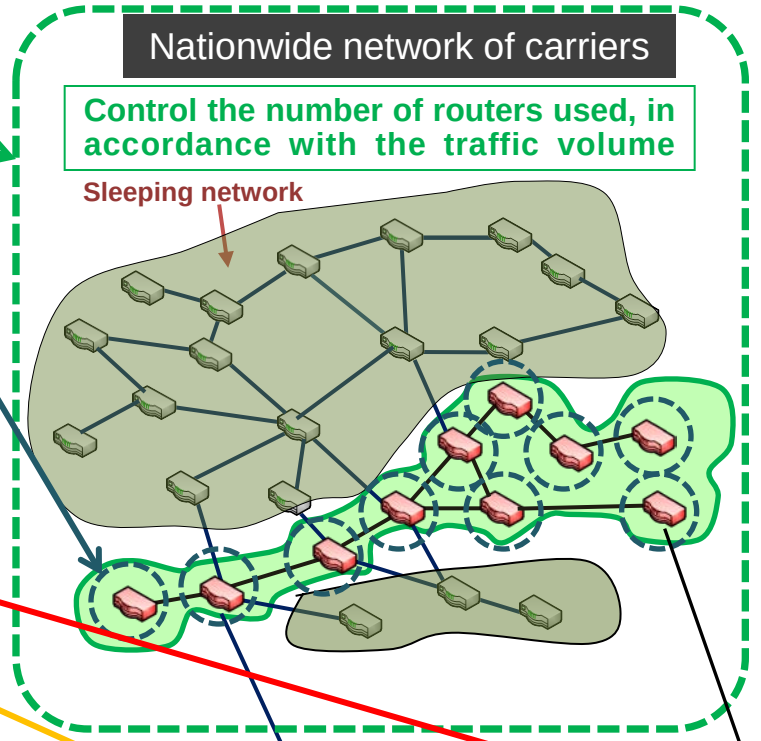
2) Greening of other fields through extensive use of ICT (Green by ICT)

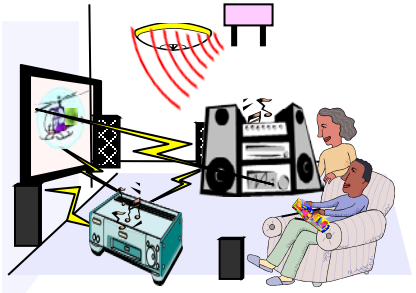
3) International contribution
(e.g., establishing techniques for evaluating effectiveness in reducing CO_2 emissions)

Reduction of CO2 emissions

1-1. R&D on “Green of ICT”

Technology	Application
High-reliability, power-saving network control technology to support cloud services	Reduce power usage through optimal control of entire network by carriers
Ultra high-speed optical edge node	Reduce power usage of large routers of carriers
High-speed, power-saving network node	Reduce power usage of general-purpose routers
Power-saving broadband set-up technology	Reduce power usage of ICT equipment in the home





Home

Office bldg.

Achieves power savings in entire ICT system from carrier equipment to in-home equipment

Discovering new ICT technologies to reduce CO2 emissions through a competitive funding system

1-2. Environmental Guidelines for the ICT Field

1 Background

The report (June 2, 2009) of the "Study Group on Environmental Response in the Information and Communications Field" recommends formulating guidelines for the procurement of energy-saving ICT equipment as a way to strengthen voluntary efforts by the private sector.

Five groups including a telecom carriers group launched a "**Conference on Environmental Guidelines for the ICT Field**" on June, 2009

< Main points considered >

1) Specific evaluation standards for applicable equipment
2) Specific evaluation standards for data centers
3) Labeling standards for an "Eco ICT Mark"
4) Guideline management organization, future review, etc.

Release of the "Environmental Guidelines for the ICT Field" (February, 2010)

2 Members of the Conference on Environmental Guidelines for the ICT Field

・Telecommunications Carriers Association
・Communications and Information Network Association of Japan
・Telecom Services Association
・ASP and SaaS Industry Consortium
・Japan Internet Providers Association

* MIC participates as an observer.

3 Evaluation standards for equipment and data centers

(1) Equipment

・Small routers ・L2 switches ・Transport equipment (WDM) ・PON equipment（GE-PON） ・Broadband base station equipment (WiMAX)
・External power supplies (AC adapters) ・Server equipment

- A value estimated based on evaluation indicators was determined on a 5 level scale, and the ranking was indicated by the number of stars (★-★★★★★). Of these, two stars (★★) was taken to be the rank including the standard value.

The next step will be adding to the applicable equipment, and reviewing evaluation indicators and standard values etc.

(2) Data centers

- For the moment, PUE※ was adopted as one indicator of energy conservation at data centers.

* PUE（Power Usage Effectiveness) = Power consumption of entire facility/Power consumption of ICT
* When publicizing PUE, describe the measurement method etc.

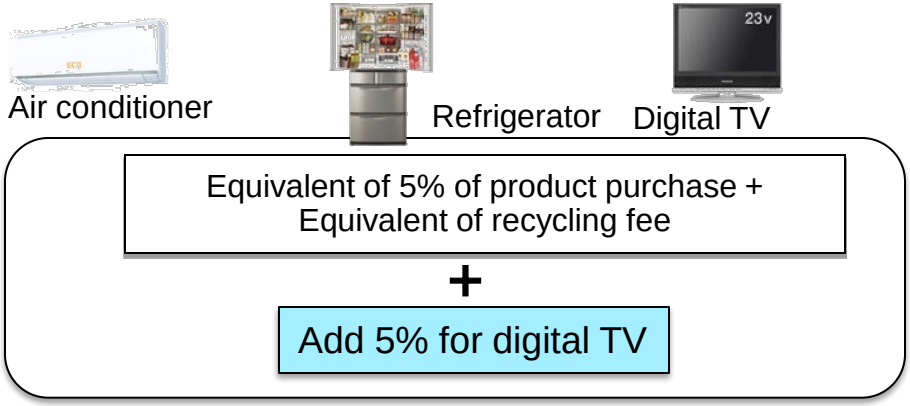
4 "Self-evaluation checklist" and "Eco ICT Mark"

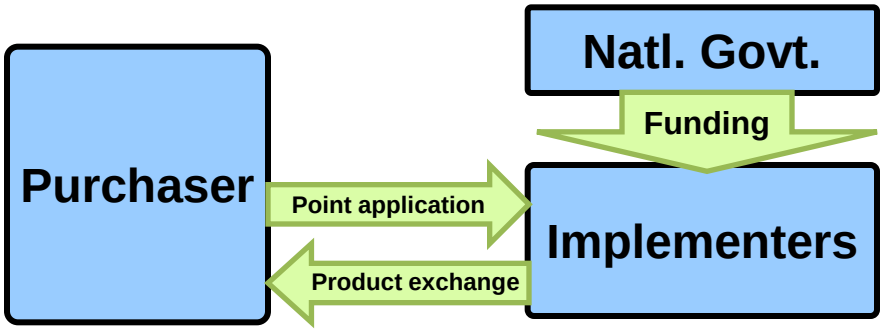
- Telecommunications carriers themselves evaluate their efforts to reduce CO2 emissions according to a checklist, and publicize the efforts they are making.
- If a company describes their specific efforts for all the mandatory items, then they can use the "Eco ICT Mark"

1-3. Promote Dissemination of Green Appliances

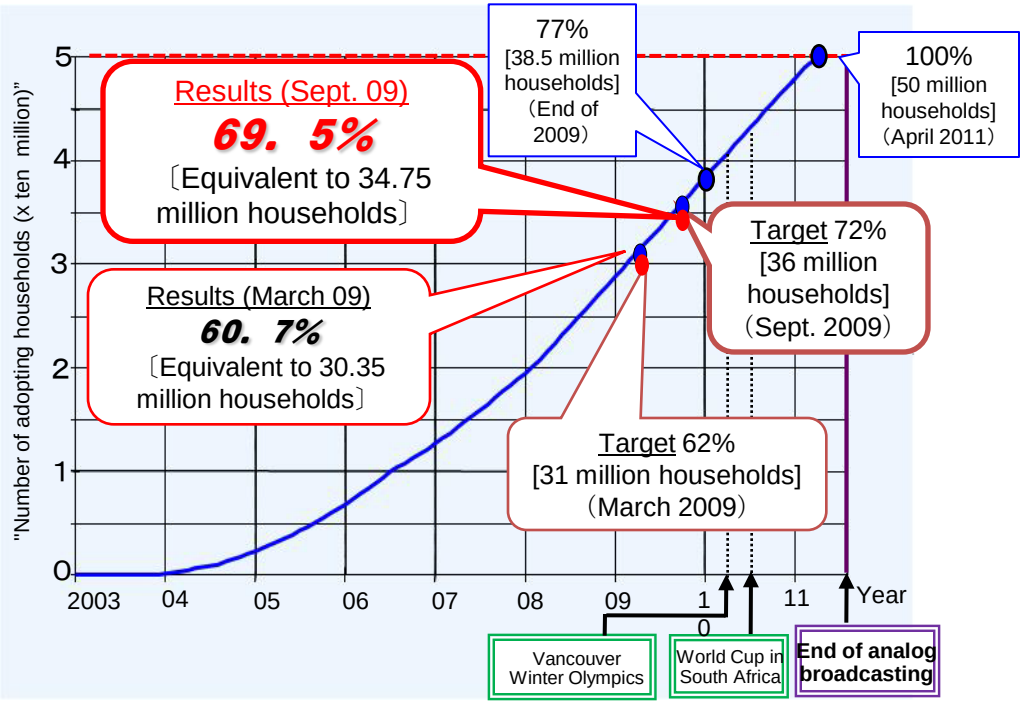
To promote the dissemination of environmentally-friendly green appliances, purchasers of green appliances are given "Eco Points" which can be exchanged for local products or gift certificates etc.
To facilitate the shift to completely digital TV in July 2011, extra points are added to help reduce the burden on viewing audience (until December 31, 2010).

Applicable products and points given

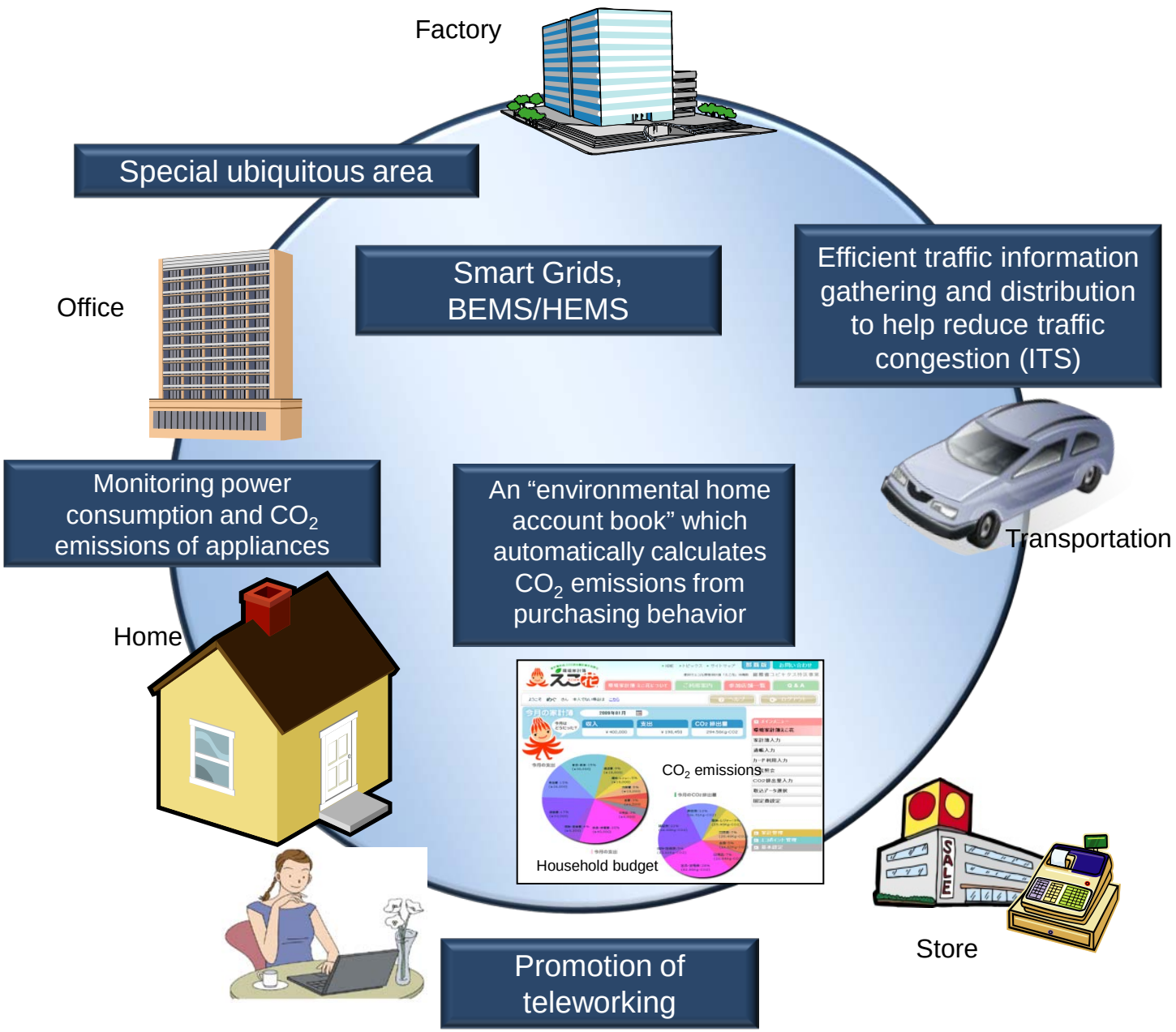




target and results of the dissemination of the digital TV



2-1. Examples of efforts using ICT to reduce CO2 emissions “Green by ICT”



Related policies

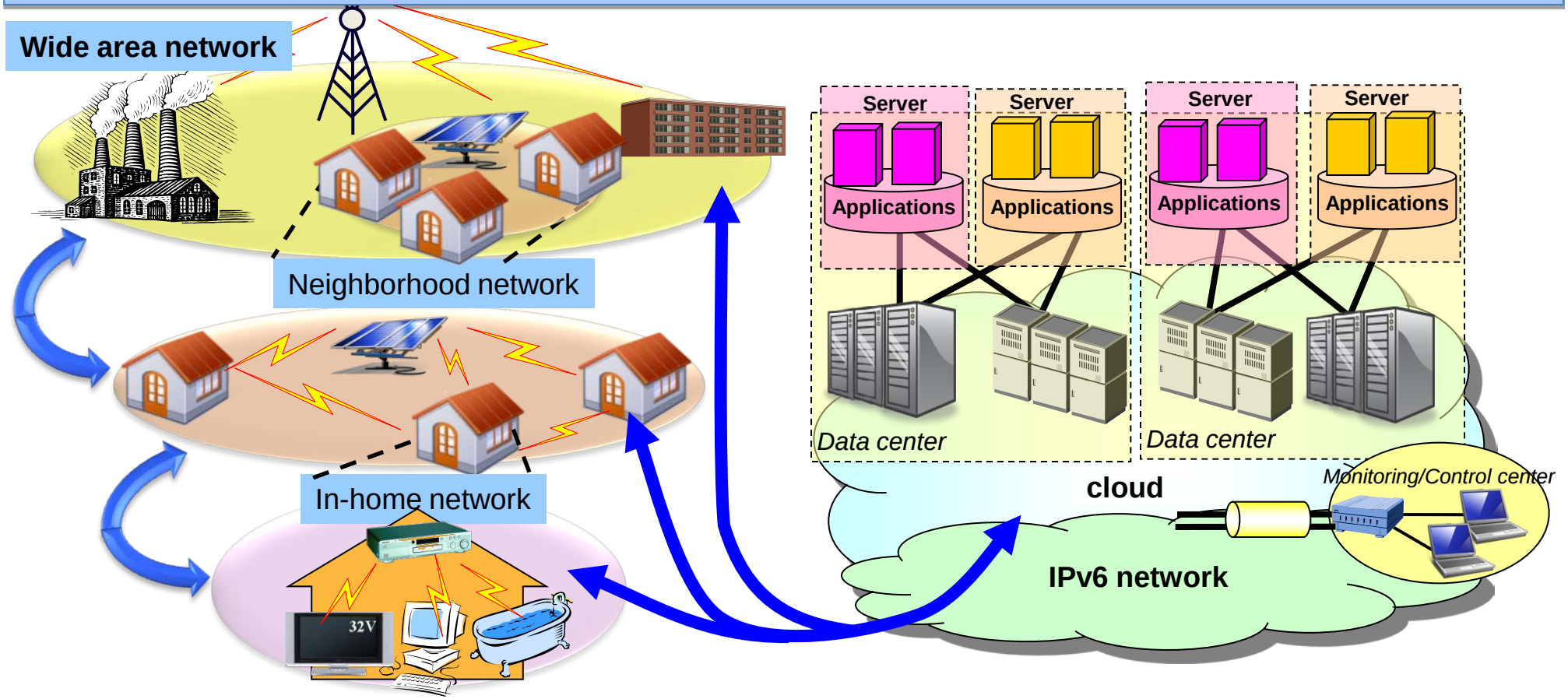
- Special Ubiquitous Area Project (Demonstration of environmental home account book using ASP/SaaS, and appliance states monitoring service using PLC etc.)
- Investigation and demonstration of ITS systems for realizing a low-carbon society
- Investigation and research on next-generation teleworking environments
- Demonstration experiments on shared systems for telecommuting

Etc.

2-2. Demonstration experiments of ICT systems for Smart Grid

2nd correction, FY2009
Budget: 2 billion yen

To support the development of environmentally friendly towns, this project will build and demonstrate ICT system infrastructure suited to local characteristics . The project will establish technical standards for communication necessary to lessen environmental impact, and promote production of local resources (green energy etc.) and optimization of consumption (local production for local consumption).



Points to be demonstrated (Examples)

- Verification of network combination suited to local characteristics
- Verification of best approach for management/protection of data in cloud system
- Radio frequency band available in local area (white space)
- Verification of security issues in cloud system

→ **Establish necessary technical standards**

2-3. Demonstration experiments on shared systems for telecommuting

The aim is to realize an environment where even small and medium sized businesses can easily adopt telecommuting, without restrictions on equipment or location; to achieve work-life balance and expand the scope of at-home work; and to further increase dissemination of telecommuting, which helps promote social participation by a diverse range of people who have skills and abilities.

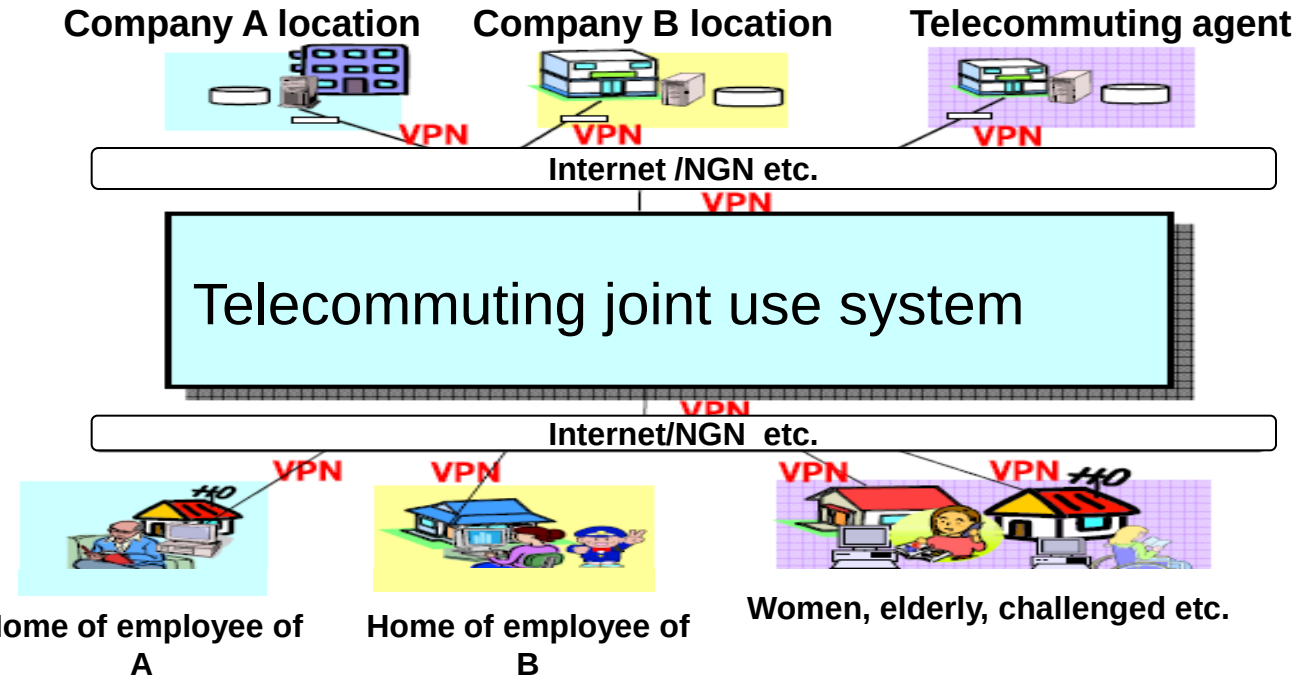
Challenges for telecommuting systems

- Troublesome to ensure security
- Requires a major investment for seamless communication (Call forwarding etc.)
- difficulty in handling of large volumes of data

NGN-based telecommuting system

- By using a next generation network (NGN), this approach achieves simple and robust security, and a work environment.
- Improve dissemination of telecommuting into diverse fields by having multiple firms build an NGN telecommuting system which can be shared.

Further disseminate telecommuting by expanding the scope of work which can be done at home, and help combat global warming by reducing energy consumption regarding the movement of people.



【Reference】
Reduction target based on telecommuting for achieving commitments of the Kyoto Protocol **(2012)**
Telecommuting population: 13 million
(20% of total working population)
Expected reduction in CO_2 emissions 504,000 tons

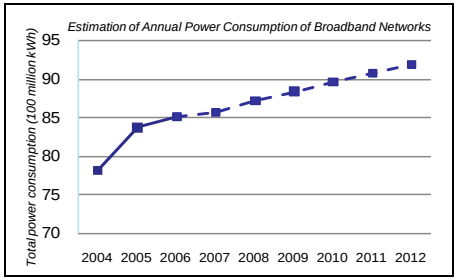
2-4. Demonstration experiments on Green Data Center

Challenges

Measures to resolve the issue

- **Increase in energy consumption and traffic volume of broadband networks**

  Increase in the number of devices such as servers due to the increase in data volume



Source: 2008 Communications Society Conference, "Estimation of Broadband Network Power Consumption", nstitute of Electronics, Information and Communication Engineers

Concept of the Green Cloud Data Center with the highest environmental performance

Ex. 1: Clean energy data center

- Utilization of areas where wind/solar power can be easily used
- Power consumption reduced to half because of devices cooled by snow, ice, etc.

Ex. 2: Energy Efficient data center

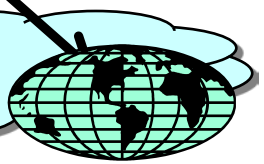
- High quality/low cost data center equipment
- Use of networks, power supply, and highly seismic-resistant above-ground areas

Maintenance of personal information

Ensuring an innovative ICT environment

Information security

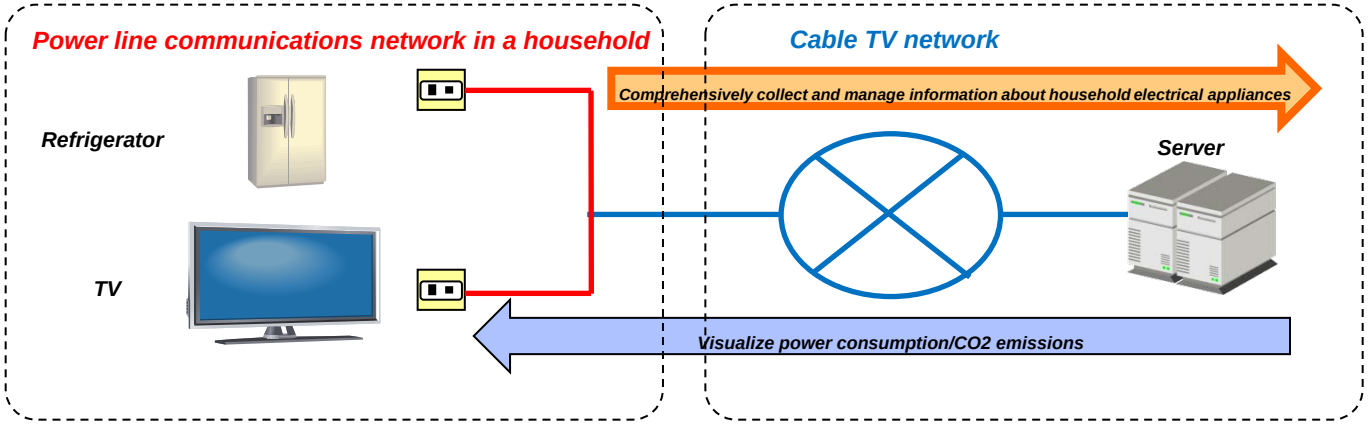
Internet



2-5. Ubiquitous Special District (demonstration experiment)

"Verification of household electrical appliance status monitoring services utilizing 'power line communications (PLC)'

- *Develop and verify technology that can comprehensively collect and manage information about household electrical appliances (model numbers, power consumption, etc.) of each household by connecting the power line communications network in the household and the cable TV network.*
- *Thus, visualize power consumption and CO2 emissions in households, and build an environment where various services, including traceability, can be used.*



- *Place: Kyoto Prefecture*

PLC (Power Line Communications) : Technology to use power lines as communications circuits. High-speed communications at several Mbps are made possible by installing an adaptor for communications (PLC modem) at a wall outlet, and connecting a communications device.

"Environmental housekeeping book using ASP/SaaS"

- *Visualize CO2 emissions in a household using an "environmental housekeeping book with ASP/SaaS" that can automatically calculate CO2 emissions from purchasing/consumption in consumers' daily lives.*
- *CO2 Emissions are automatically calculated using the data obtained via cooperation between various data and servers, such as Internet-based POS.*

* Study the possibility of collaboration with the Eco Action Point Program of the Ministry of the Environment

- *Place: Okinawa, Chiba*

3-1. Potential climate change impacts of ICT

Establishment of the ICT Policy Taskforce for the Global Age

With concerns that the rapidly progressing aging of the population and declining birthrate may impact the economic growth in the background, a task force was launched in MIC to review the competition policies in order to respond to the changes in environment, as well as to play a part in solving economic and social challenges that Japan and other countries face, by utilizing ICT. (from Oct. 2009)

Four Agenda (plan)

1. Review past competition policies

2. Respond to the changes in the telecommunications market environment

3. Enhance international competitiveness of the overall ICT industry

4. Contribute to solving global issues

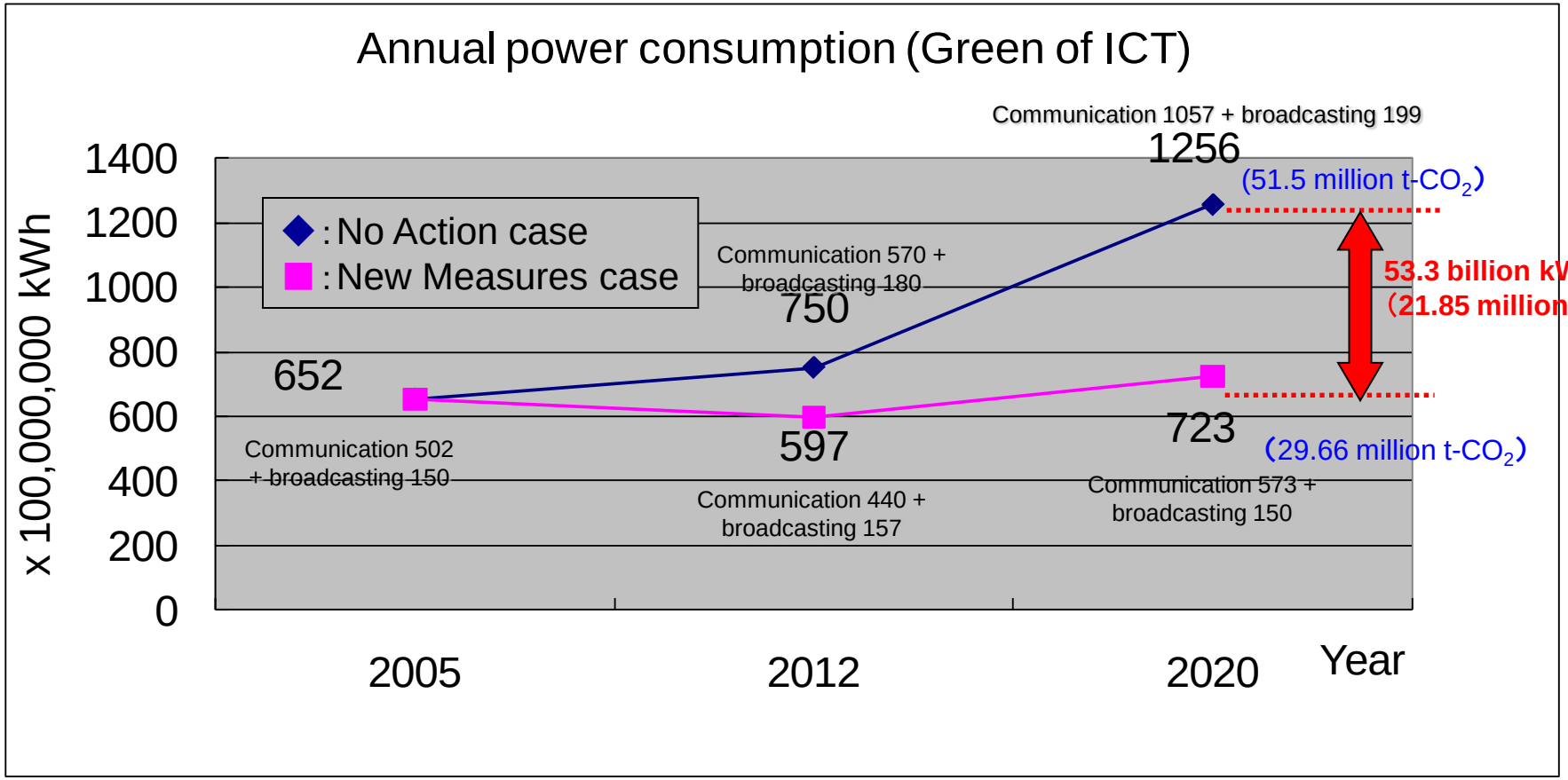
Discuss possible solutions to enable all people to benefit equally from the utilization of ICT, including abundant distribution of content, in the face of local and global issues worldwide, such as environmental issues and healthcare issues.

The Environment Issues Working Group was set up under the taskforce.

- Its mission is to examine the potential climate change impacts of ICT in the year 2020.
- The extended 2020 analysis incorporates recently developed ICT applications such as Smart Grid networks and considers additional factors such as the existence of regulatory systems and the influence of government policy.

3-2. Reducing power consumption in ICT field (Green of ICT)

- In BaU case (where no additional measures are implemented), total power consumption in ICT field will rise sharply to over 51 million tons (125.6 billion kWh) by 2020 due to increased ICT usage.
- In the New Measures case, which includes R&D and demonstration experiment (such as optical communication network technology), ecological ICT equipment and data canters, and promoting cloud computing , power consumption could be cut back to under 30 million tons (72.3 billion kWh).

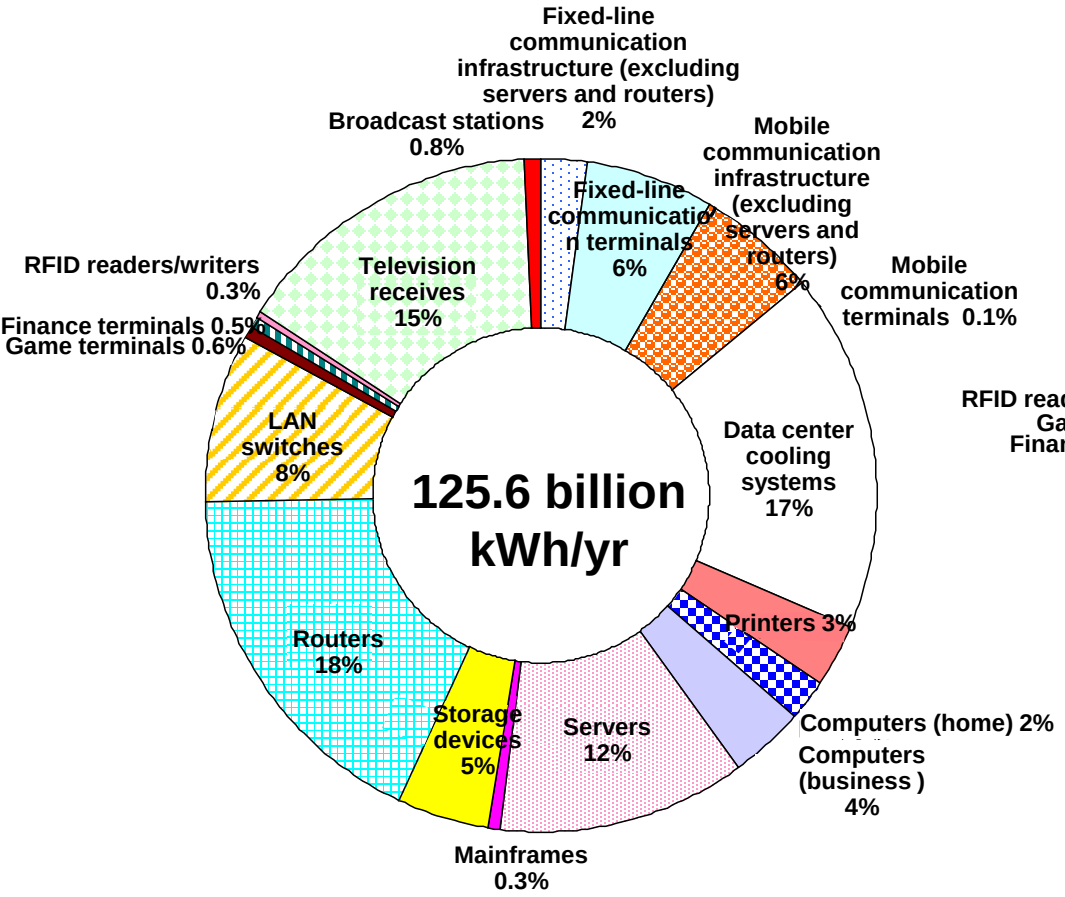


* CO_2 emission base unit: 0.41 kg-CO_2/kWh

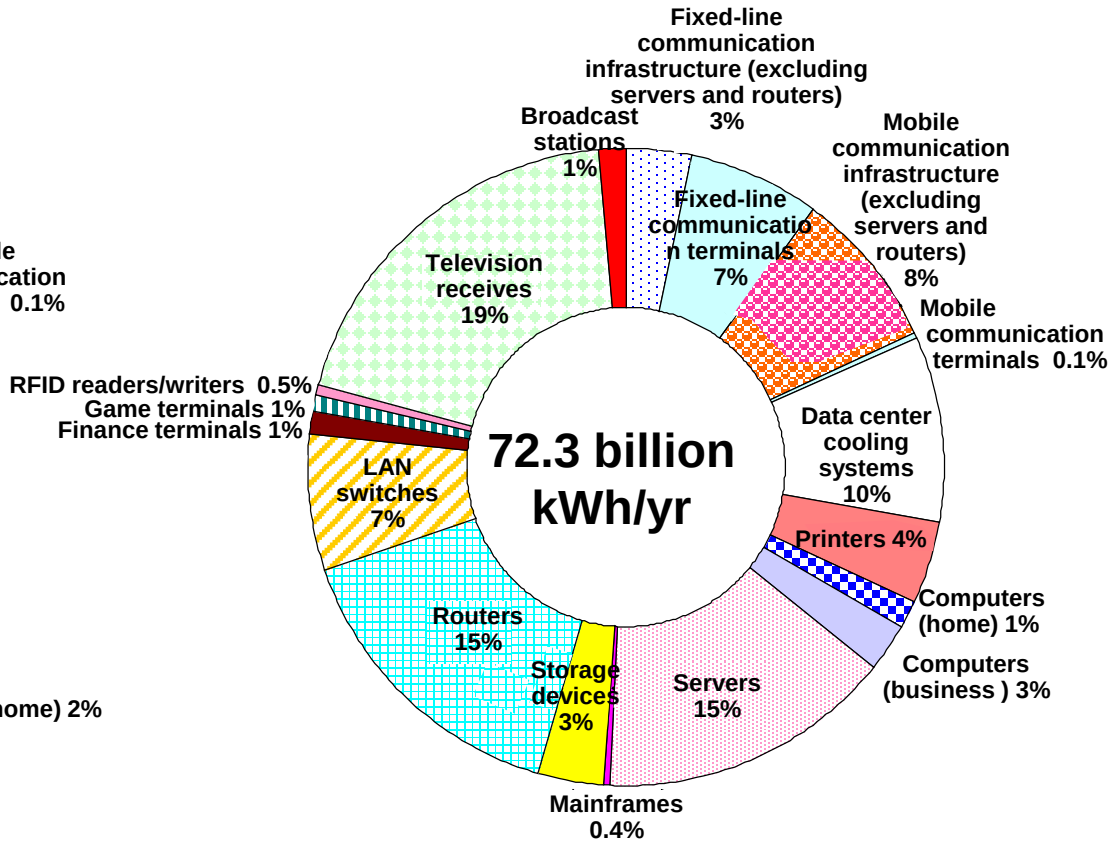
3-3. Assumptions used for calculation (Green of ICT)

The New Measures case would reduce power consumption by a total of 53.3 billion kWh per year relative to the BaU case, through a combination of cloud computing and virtualization of server storage (reduction = 7.76 billion kWh); energy savings in routers and LAN switches using optical communication technology (16.25 billion kWh); and more efficient cooling of data canters (14.6 billion kWh).

2020 BaU case



2020 New Measures case



3-4. Estimate CO2 Emission reduction through the use of ICT (Green by ICT)

At current ICT usage levels (i.e., BaU case), a CO_2 reduction of around 95 million tons would be achieved in 2020. This could be boosted to 150 million tons such as by installation of smart grids, BEMS/HEMS and the paperless office systems in a range of industries (the New Measures case).

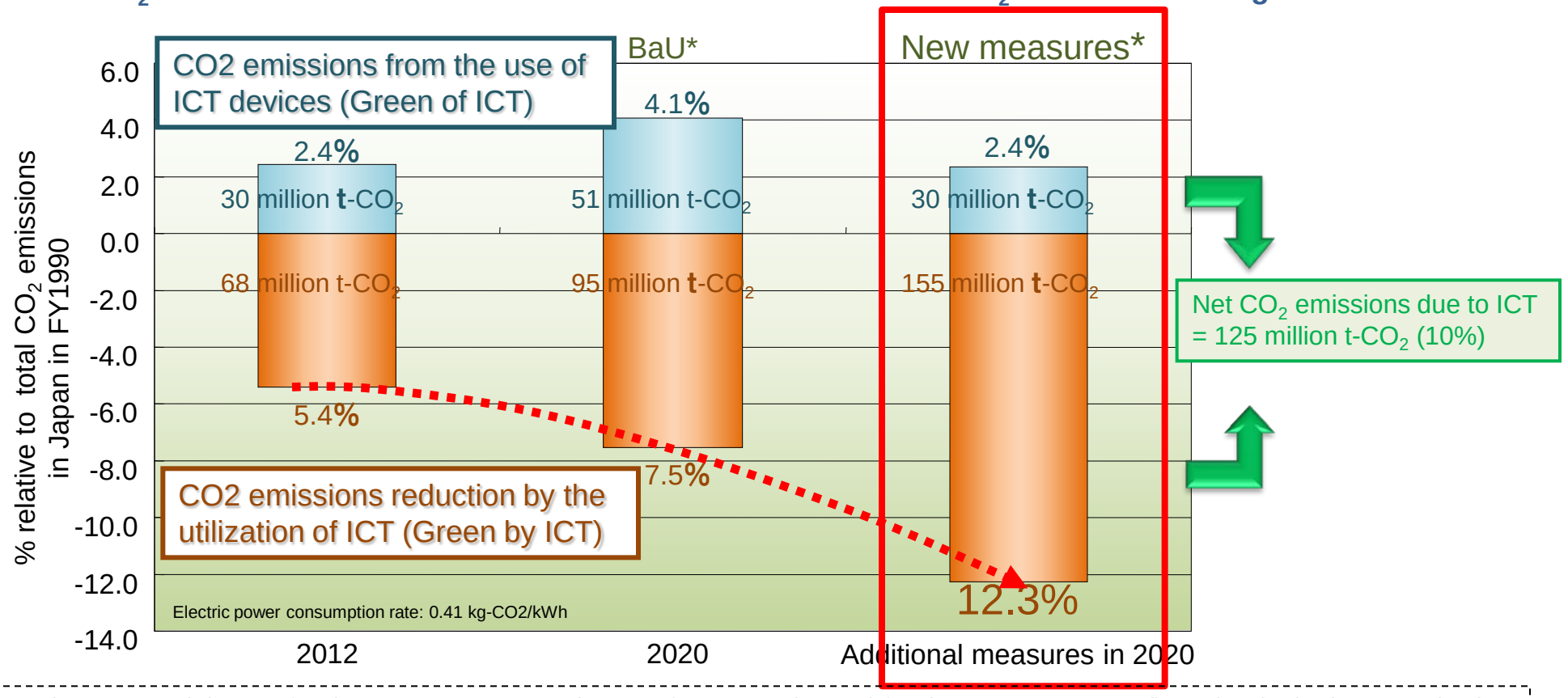
Evaluation Field	Application	2020 (BaU)		2020 (New Measure Case)	
		10000t-CO2	Percentage (%)	10000t-CO2	Percentage (%)
E-commerce—personal	Online shopping	805	0.6	805	0.6
	e-tickets for air travel	7	0.0	7	0.0
	Purchasing of event and other tickets at convenience stores	6	0.0	6	0.0
	ATM terminals	598	0.5	598	0.5
E-commerce-business	Online trading	605	0.5	1456	1.2
	Supply chain management	2289	1.8	2289	1.8
	Second-hand market	644	0.5	1863	1.5
Digitization of information/content	Music content	213	0.2	653	0.5
	Video content	119	0.1		
	Computer software	97	0.1		
	Newspapers/magazines	165	0.1		
	Digital patient records	-	-	84	0.1
	Paperless office	-	-	130	0.1
Passenger transport	Teleworking	77.2	0.1	103	0.1
	Video-conferences	1169	0.9	1181	0.9
	Remote monitoring of vending machines	2	0.0	2	0.0
Advanced road traffic systems	ITS	1220	1.0	1332	1.1
e-government (national and local)	Electronic tender processes	6	0.0	6	0.0
	e-applications—tax returns	25	0.0	25	0.0
	e-applications—online statements	2	0.0	2	0.0
Energy usage	BEMS,HEMS	1430	1.1	2393	1.9
	Smart grids (other than above)	-	-	2240	1.8
	Optimized motor control	-	-	370	0.3
	Total	9480	7.5	15545	12.3

Note) Percentage is a percentage of total greenhouse gas emission in Japan for 1990

3-5. Estimate of reductions in CO2 emissions (Integration)

- **Green by ICT**
  ICT can potentially reduce CO_2 emissions by up to 155 million tons in 2020. This is equivalent to a 12.3% reduction in total emissions relative to 1990 levels in JAPAN.
- **Green of ICT**
  In terms of the amount of CO_2 generated by ICT equipment, new strategies are expected to reduce CO_2 emission to around 30 million tons, roughly equivalent to CO_2 emission in 2012.

CO_2 emissions from entire ICT fields and reduction effect in CO_2 emissions through utilization of ICT



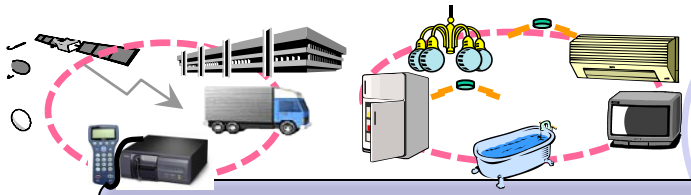
BaU: Business as Usual. (Green of ICT) No new measures to reduce CO_2 from ICT equipment (of ICT); assumes ICT usage (by ICT) maintained at current levels
New measures: New effective measures taken to reduce CO_2 generated by ICT equipment (of ICT); assumes ICT usage expands into other fields, with maximum effort made to promote usage of ICT

Global Warming Issues and ICT

- ICTs themselves produce CO_2 emissions due to consumption of electrical power to operate equipment/systems.
- On the other hand, ICT usage can contribute to a reduction in CO_2 emissions due to a marked improvement in the efficiency of production, consumption and business, also that of traffic alternatives, and a reduction in traffic volume.
- It is possible to make environmental measurements and predictions using ICT.

Improved energy efficiency

- ITS (Intensive control of ETC, VICS, and traffic lights)
- BEMS (Building energy management system)
- HEMS (Household energy management system)

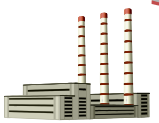


Reduced movement of people and products

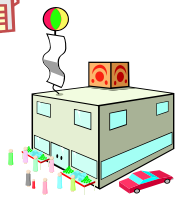
- Online shopping, online trading
- Telework, TV conferencing
- Music, video, and software distribution
- e-applications (tax declarations, online receipts)

General households

Production/ distribution/ transportation

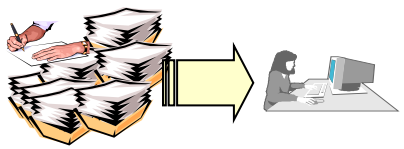


Offices/ shops



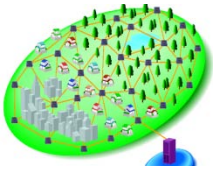
Improved efficiency of production and consumption

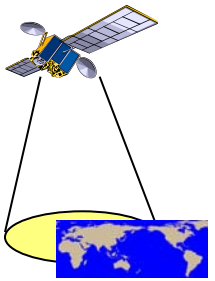
- Supply chain management
- e-publication and distribution
- Paperless office



Environmental measurements and predictions

- Radar for measuring CO_2
- Sensing network
- Global simulator





Use of ICT

Contribute to tackling global warming issues by promoting wider use of ICT

Thank you

Shanghai, China, 14 May 2010

UN Expo 2010 Shanghai

ITU International Telecommunication Union